ACADEMIC HANDBOOK

FACULTY OF AGRICULTURAL TECHNOLOGY
UNIVERSITAS BRAWIJAYA
2022/2023

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UNIVERSITAS BRAWIJAYA

ACADEMIC YEAR 2022/2023

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FOREWORD

The purpose of implementing Higher Education according to the Regulation of the Minister of Research, Technology and Higher Education of the Republic of Indonesia No. 44 Article 3 of 2015 concerning National Higher Education Standards are: 1) ensuring the achievement of higher education goals that play a strategic role in educating the nation's life, advancing science and technology by applying humanities values as well as civilizing and empowering the Indonesian nation that is sustainable; 2) ensure that learning in study programs, research, and community service organized by universities in all jurisdictions of the Unitary State of the Republic of Indonesia achieves quality in accordance with the criteria set out in the National Higher Education Standards;

In achieving these goals, a curriculum is prepared that refers to Presidential Decree no. 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI), which is a competency qualification framework that can juxtapose, equalize, and integrate the fields of education and the field of job training and work experience in order to provide recognition of work competencies in accordance with the work structure in various sectors. In this regard, the Education Manual for the Faculty of Agricultural Technology for the Academic Year of 2022/2023 is prepared so that students understand the curriculum of the Study Program at the Faculty of Agricultural Technology, Universitas Brawijaya and become a guide or reference for students in carrying out academic activities and also as a guide for lecturers in directing and guide students.

Permendikbud No. 3 of 2020 concerning National Standards for Higher Education and PP No. 4 of 2022 concerning amendments to PP No. 57 of 2021 concerning National Education Standards, which mandate the implementation of independent learning-independent campuses and community service for students. The Education Manual includes guidelines for implementing independent learning. The evaluation of the undergraduate curriculum in 2020 in all undergraduate study programs at FTP UB has accommodated the implementation of independent learning and includes community service courses.

Hopefully this Academic Handbook will be useful in supporting the successful study of all students of the Faculty of Agricultural Technology, Universitas Brawijaya and producing quality and characterful students.

Malang, August 2022
Dean,

Prof. Dr. Ir. Imam Santoso, MP
NIP. 196810051995121001

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C. Department of Agroindustrial Technology

Head of Department	Department Secretary
Dr. Siti Asmaul Mustaniroh, STP, MP Head of Department	**Sri Suhartini, STP, M.Env.Mgt., Ph.D** Department Secretary

DEVELOPMENT TEAM AND EDUCATION GUIDELINE EDITORS FACULTY OF AGRICULTURAL TECHNOLOGY UNIVERSITAS BRAWIJAYA

ACADEMIC YEAR 2022/2023

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Vice Chairman I	: Dr. Dodyk Pranowo, STP., M.Si
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	Jaya Mahar Maligan, STP, MP
	Latifa Putri Aulia, STP, M.Sc.
Administration	:Tedjo Wahono Adi Putro, SE
	Dwi Setyo Handoko, SP
	Trias Yuliani, SE
	Mohamad Rifqi Sufanda, SE
	Anang Iswanto

KEPUTUSAN
DEKAN FAKULTAS TEKNOLOGI PERTANIAN UNIVERSITAS BRAWIJAYA
NOMOR 64 TAHUN 2022

TENTANG

PEDOMAN PENDIDIKAN
FAKULTAS TEKNOLOGI PERTANIAN UNIVERSITAS BRAWIJAYA
TAHUN AKADEMIK 2022/2023

DEKAN FAKULTAS TEKNOLOGI PERTANIAN UNIVERSITAS BRAWIJAYA

Menimbang :
a. Bahwa dengan diterbitkannya Pedoman Pendidikan Universitas Brawijaya Tahun Akademik 2022/2023, maka Pedoman Pendidikan Fakultas Teknologi Pertanian perlu disempurnakan agar sesuai dengan ketentuan-ketentuan yang ada pada Pedoman tersebut;
b. Sehubungan dengan butir a diatas, perlu diterbitkannya Pedoman Pendidikan Fakultas Teknologi Pertanian Universitas Brawijaya Tahun Akademik 2022/2023;

Mengingat :
1. Undang-Undang Nomor 12 Tahun 2012 tentang Pendidikan Tinggi (Lembaran Negara Republik Indonesia Tahun 2012 Nomor 158, Tambahan Lembaran Negara Republik Indonesia Nomor 5336);
2. Undang-Undang Nomor 5 Tahun 2014 tentang Aparatur Sipil Negara (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 6, Tambahan Lembaran Negara Republik Indonesia Nomor 5494);
3. Peraturan Pemerintah Nomor 4 Tahun 2014 tentang Penyelenggaraan Pendidikan Tinggi dan Pengelolaan Perguruan Tinggi (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 16, Tambahan Lembaran Negara Republik Indonesia Nomor 5500);
4. Peraturan Pemerintah Nomor 108 Tahun 2021 tentang Perguruan Tinggi Badan Hukum Universitas Brawijaya (Lembaran Negara Republik Indonesia Tahun 2021 Nomor 240, Tambahan Lembaran Negara Republik Indonesia Nomor 6732);
5. Keputusan Rektor Universitas Brawijaya No. 308 Tahun 2019 tentang Pemberhentian dan Pengangkatan Dekan Fakultas Teknologi Pertanian Universitas Brawijaya;
6. Peraturan Rektor Universitas Brawijaya Nomor 52 Tahun 2018 Tentang Publikasi Ilmiah sebagai Bagian Tugas Akhir Pendidikan Program Magister dan Program Doktor
7. Peraturan Dekan Fakultas Teknologi Pertanian No. 5 Tahun 2020 tentang Kode Etik Mahasiswa di Fakultas Teknologi Pertanian Universitas Brawijaya;
8. Peraturan Dekan Fakultas Teknologi Pertanian No. 3 Tahun 2021 tentang Pelaksanaan Tugas Akhir Program Doktor Bertahap di Fakultas Teknologi Pertanian Universitas Brawijaya;

9. Peraturan Dekan Fakultas Teknologi Pertanian No. 4 Tahun 2021 Pelaksanaan Tugas Akhir Program Magister Bertahap di Fakultas Teknologi Pertanian Universitas Brawijaya;

MEMUTUSKAN:

Menetapkan	:	KEPUTUSAN DEKAN TENTANG PEDOMAN PENDIDIKAN FAKULTAS TEKNOLOGI PERTANIAN UNIVERSITAS BRAWIJAYA TAHUN AKADEMIK 2022/2023.
KESATU	:	Tim Penyusun Pedoman Pendidikan Fakultas Teknologi Pertanian Universitas Brawijaya Tahun Akademik 2022/2023 sebagaimana yang tercantum dalam lampiran Surat Keputusan ini.
KEDUA	:	Pedoman Pendidikan Fakultas Teknologi Pertanian Universitas Brawijaya Tahun Akademik 2022/2023 sebagai acuan seluruh unit pelaksana akademik di Fakultas Teknologi Pertanian Universitas Brawijaya.
KETIGA	:	Keputusan ini berlaku sejak tanggal ditetapkan dan apabila di kemudian hari terdapat kekeliruan dalam keputusan ini akan diadakan perbaikan sebagaimana mestinya.

Ditetapkan di Malang
Pada tanggal 4 Agustus 2022
DEKAN,

IMAM SANTOSO
NIP. 196810051995121001

I. Introduction

1.1. HISTORY OF FACULTY OF AGRICULTURAL TECHNOLOGY

Faculty of Agricultural Technology Universitas Brawijaya (FTP UB) was established on January 26, 1998 with the Decree of the Minister of Education and Culture of the Republic of Indonesia (Mendikbud RI) Number: 012a/O/1998. However, for a period of 22 years, from 1975 to 1997, Agricultural Technology Science (TP) has been held by the TP Department when it was still under the Faculty of Agriculture, Universitas Brawijaya (FP UB).

The journey to the establishment of FTP UB is quite long, starting with the opening of a new department called the Department of Agricultural Products Technology (THP) under the Faculty of Agriculture, Universitas Brawijaya in 1975. The establishment of this new department is intended to develop disciplines related to post-harvest handling of agricultural products. Based on the Decree of the Minister of Education and Culture of the Republic of Indonesia Number: 0211/U/1982, since 1982 this institution has been officially designated as one of the majors under FP-UB, overseeing the THP Study Program (PS) with an interest in the study of Agricultural Mechanization. In 1984, based on the Decree of the Director General of Higher Education of the Ministry of Education and Culture of the Republic of Indonesia (Dirjen Dikti Depdikbud RI) Number: 118/DIKTI/Lap/84, the name of the THP department was changed to the TP Department which managed two PS, namely Agricultural Product Technology Study Program (THP) and Agricultural Mechanization Study Program (MP). In an effort to spur the development of the agricultural sector, especially the agroindustrial, the Department of Agricultural Technology opened a new study interest, namely MS Agroindustrial Technology (TIP) in 1983. Since 1984, the Department of Agricultural Technology has had three Study Programs (PS), namely PS THP, PS TEP and PS TIP, although the determination as PS TIP only occurred on April 1, 1998 with the issuance of the Decree of the Director General of Higher Education, Ministry of Education and Culture Number: 103/DIKTI/Kep/1998. In 1994, the Decree of the Minister of Education and Culture of the Republic of Indonesia No. 0411/U/1994 was issued which changed the name of the Agricultural Mechanization Study Program (MP) to Agricultural Engineering Study Program (TEP). namely MS Agroindustrial Technology (TIP) in 1983. Since 1984, the Department of Agricultural Technology has three Study Programs (PS), namely PS THP, PS TEP and PS TIP, although the determination as PS TIP only occurred on April 1, 1998 with the issuance of a decree Director General of Higher Education, Ministry of Education and Culture Number: 103/DIKTI/Kep/1998. In 1994, the Decree of the Minister of Education and Culture of the Republic of Indonesia No. 0411/U/1994 was issued which changed the name of the Agricultural Mechanization Study Program (MP) to Agricultural Engineering Study Program (TEP). namely MS Agroindustrial Technology (TIP) in 1983. Since 1984, the Department of Agricultural Technology has three Study

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In 1998, FTP UB was officially established by overseeing three departments, namely the THP Department, the TEP Department, and the TIP Department. In 2011 there was a change in the name of PS THP to PS Food Science and Technology (ITP) based on the Decree of the Director General of Higher Education No. 865/EI.3/HK/2011. The change in the name of the Department to the Department begins in 2022. This name change occurs in line with the change in UB's status from a Public Service Agency (BLU) State University to a Legal Entity State University (PTNBH) based on Government Regulation Number 108 of 2021 and the Rector's Regulation of Universitas Brawijaya No. 24 2022 concerning Organization and Work Procedure of the Faculty of Agricultural Technology. Currently, the name of the THP Department has changed to the Department of Food Science and Biotechnology, the TEP Department to the Department of Biosystem Engineering, and the TIP Department to the Department of Agroindustrial Technology. Until 2022, FTP UB has 6 Undergraduate Study Programs (S1) which are under 3 Departments. The Department of Food Science and Biotechnology houses 2 Bachelor's Degree Programs, namely the Bachelor of Food Science and Technology (ITP) and Bachelor of Biotechnology. The Department of Biosystems Engineering houses 3 undergraduate programs, namely Agricultural Engineering (TEP), Environmental Engineering (TL) and Bioprocess Technology (TBP). The Department of Agroindustrial Technology has one Master's Degree Program, namely the Bachelor of Agroindustrial Technology (TIP). PS Bachelor Degree in Environmental Engineering (TL) and PS Bachelor Degree in Bioprocess Technology (TBP). The Department of Agroindustrial Technology has one Master's Degree Program, namely the Bachelor of Agroindustrial Technology (TIP). PS Bachelor Degree in Environmental Engineering (TL) and PS Bachelor Degree in Bioprocess Technology (TBP). The Department of Agroindustrial Technology has one Master's Degree Program, namely the Bachelor of Agroindustrial Technology (TIP).

FTP UB also has a Postgraduate study program. FTP UB has 3 PS Masters, namely PS Masters in Agricultural Products Technology (since 1999) under the Department of Food Science and Biotechnology, PS Masters in Agroindustrial Technology (since 2007) under the Department of Agroindustrial Technology and PS Masters in Agricultural Engineering (since 2013) under the Department of Biosystems Engineering. For the Doctoral level, the opening of the Doctoral Program for Agroindustrial Technology PS has received a permit in 2013 with the Decree of the Minister of Education and Culture No. 420/E/O/2013 under the Department of Agroindustrial Technology. PS Food Science has obtained a permit in 2016 with the Decree of the Minister of Research, Technology and Higher Education No. 448/KPT/I/2017 dated August 21, 2017 under the Department of Food Science and Biotechnology.

In terms of institutional organization and management of existing departments, study programs, and laboratories, FTP UB follows the statutes of Universitas Brawijaya according to the Decree of the Minister of Education and Culture of the Republic of Indonesia Number: 0444/O/1992. Along with the development of the study program, the field of laboratory science underwent adjustments. Based on the Rector's Regulation of Universitas Brawijaya Number 24 of 2022 concerning Organizational Structure and Work Procedures, FTP is in charge of 23 laboratories, namely the Laboratory of Processing Technology and Biomass, Laboratory of Chemistry and Biochemistry of Food and Agricultural Products, Laboratory of Food Microbiology, Laboratory of Food Nutrition, Laboratory of Food Processing and Product Engineering Agriculture, Agricultural Power and Machinery Laboratory, Natural Resources and Environmental Engineering Laboratory, Biosystem Mechatronics Laboratory, Agroindustrial Process Engineering Laboratory,

In addition to the laboratory, there are other service units at the faculty level, namely the Quality Assurance Group (GJM), the Research and Community Service Agency (BPPM), the Counseling and Academic Consideration Agency (BKPA), the Information Systems and Public Relations Manager (PSIK), English Language Service Unit (ULBI), and Journal Publishing Agency (BPJ), Quality Assurance Unit at the Department level (UJM), Counseling and Academic Consideration Agency (BKPA), Integrated Service Unit (ULT), Integrated Service Unit for Sexual Violence and Bullying (ULTKSP), International Relations Office (IRO)

Regarding the number of graduates, until July 2022, 8,418 Bachelors and Masters have been produced spread throughout Indonesia. To increase the number and quality of graduates produced and to strengthen the role of graduates in the development of the agricultural sector, especially agro-industry, FTP UB always strives to increase the quantity and quality of its lecturers. Until 2022, FTP-UB has 134 lecturers consisting of 84 PNS lecturers, 40 non-PNS permanent lecturers, 1 lecturer with a work agreement, and 9 contract lecturers. FTP UB's lecturer staff consists of 13 professors, 70 lecturers with doctoral degrees (S3), and 64 lecturers with masters degrees. For education staff, FTP has 79 people of which 28 are civil servants, 37 are non-civil servants,

All study programs in FTP UB already have accreditation certificates from the National Accreditation Board for Higher Education (BAN-PT). PS Bachelor of Food Science and Technology, PS Bachelor of Environmental Engineering, and PS Master of Agroindustrial Technology received accreditation with superior predicate. PS Bachelor of Biotechnology, PS Bachelor of Agricultural

Engineering, PS Bachelor of Agroindustrial Technology, PS Master of Agricultural Products Technology, PS Master of Agricultural Engineering, PS Doctoral of Agroindustrial Technology received accreditation A, PS Doctoral Food Science has been accredited B and PS Bachelor of Bioprocess Technology received accreditation with good predicate.

In addition to obtaining BAN-PT accreditation, several study programs at FTP UB have been internationally certified and have received international accreditation. The Bachelor of Food Science and Technology (PS ITP) has been internationally certified by the Institute of Food Technologists (IFT) in 2012-2017 and 2017-2022. In 2018 IFT issued new guidelines, reassessment of PS ITP by IFT was carried out at the end of 2019 and reapproval was given to PS ITP effective from 2020-2025. PS Bachelor of Agricultural Engineering and PS Bachelor of Agroindustrial Technology have been certified at the ASEAN regional level by the Asean University Network - Quality Assurance (AUN-QA). PS Bachelor of Environmental Engineering in 2021 has been internationally accredited by the Indonesian Accreditation Board for Engineering Education (IABEE) under the guidance of JABEE (Japan Accreditation Board for Engineering Education) which participated in the signing of the Washington Accord, a multilateral agreement that regulates the equality of various independent accreditation institutions from abroad for engineering study programs. In 2021, six study programs at FTP UB including PS Bachelor of Food Science and Technology, PS Master of THP, PS Master of TIP, PS Master of TEP, PS Doctoral Food Science and PS Doctoral TIP have sent a Self Evaluation Report (SER) document in the context of accreditation international Agentur Fur Qualitatssicherung Durch Akkreditierung von Studiengangen EV (AQAS).

1.2 DEVELOPMENT OF EDUCATION ORGANIZATION

Basically, educational institutions such as FTP-UB, are public institutions engaged in services in the field of education. The satisfaction of stakeholders is the best measure in assessing the performance of such an institution. Stakeholders of FTP-UB are students, parents of students, graduate users and the wider community, as well as the Government as shareholder. The expected elements of equality for educational services in general are to produce graduates who are competent in their fields, short study duration, able to compete well in getting jobs so that the waiting time after graduation is short and in the long term will be able to become leaders or figures in their fields or in the field. social life.

In line with that, in various steps taken by FTP-UB, it always pays attention to three factors, namely: (i) the factor of students as students, who naturally have individual differences, both in talents, interests and academic abilities; (ii) the increasing demand for experts in the community, both in quality and quantity; (iii) the factor of the rapid development of science and technology.

In order to fulfill these three aspects effectively and efficiently, the education system used must be adaptive. One of those systems is the "credit with semester time unit" system. Through this system it is hoped that:

1. Skilled and virtuous manpower is created in as many quantities as possible,
2. Provide opportunities for students who are capable and active in learning to complete their studies in the shortest possible time without compromising the quality of education.
3. Improving the efficiency and effectiveness of the implementation of education,
4. Facilitate the adjustment of the curriculum to the development of science and technology as well as existing employment opportunities,
5. Can open up opportunities for improving the evaluation system of student learning skills and progress,
6. Allows the transfer (transfer) of credit and transfer of students between departments, faculties and even between universities.

To achieve the things mentioned above, the education system in FTP-UB has gradually and continuously undergone changes, both in the form of comprehensive improvements and in the form of minor improvements in accordance with the development of the needs and demands of stakeholders.

If at the start of Agricultural Technology education in 1975, a semester system with a study length of 5 (five) years was applied. Initially, this credit system was a package, but since 1980/1981, it was further refined into an undergraduate (Strata 1) system with an individual credit system. In 2020 based on Permendikbud No. 3 in 2020, undergraduate education costs 144 to 160 credits, which requires 6-14 semesters of education, with timely graduation taken 4 years or less.

In the 1984/1985 academic year, there was a change in the Agricultural Technology education curriculum which refers to the "Core Curriculum for Undergraduate Education in Agricultural Technology" issued by DIKTI through the Decree of the Director General of Higher Education, Ministry of Education and Culture of the Republic of Indonesia Number: 28/DJ/Kep/1983. After going on for about 10 years, in 1994 the Decree of the Minister of Education and Culture of the Republic of Indonesia Number: 0411/U/1994 was issued regarding the nationally applicable curriculum on Agricultural Technology education and has been implemented in FTP-UB since the 1995/1996 academic year. In accordance with developments and needs, in 2004-2005 a curriculum reconstruction was carried out for each study program in FTP-UB which was implemented in the 2005/2006 Academic Year. In 2010 the curriculum was re-evaluated and implemented in the 2010/2011 Academic Year. Since 2013, FTP has implemented educational curriculum adjustments that refer to Presidential Decree no. 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI) and refers to the Regulation of the Minister of Research, Technology and Higher Education of the Republic of Indonesia No 44/2015 concerning National Standards for Higher Education. In an effort to continue to improve the competence of graduates and meet the needs of users, in 2015 a review and evaluation of the curriculum was carried out for the 2015/2016 Academic Year.

Minister of Education and Culture Regulation (Permendikbud) No. 3 of 2020 mandates universities to implement independent learning-independent campuses in undergraduate programs, so this Handbook also includes guidelines for implementing independent learning-independent campuses at FTP UB. In addition, the mandate of the Minister of Education and Culture No. 3 of 2020 also requires community service for students as a compulsory subject. In line with that, the undergraduate study program at FTP UB has evaluated the curriculum and reconstructed its curriculum by including compulsory community service courses. Curriculum reconstruction also includes the implementation of Outcome Based Education (OBE) as a mandatory requirement for international accreditation. In 2020, curriculum evaluation is carried out for all undergraduate study programs that refer to OBE.

II. VISION, MISSION AND GOALS

In 2002, the Decree of the Minister of National Education of the Republic of Indonesia Number: 080/O/2002 regarding the Statutes of Universitas Brawijaya (UB) was issued, hereinafter referred to as the Statutes of the University of 2002 which includes the vision, mission, and goals of the university. After a decade, along with the development of UB, there are several changes to the vision, mission and goals of the university which are included in the educational guidelines of UB.

2.1. UNIVERSITY VISION, MISSION AND OBJECTIVES

2.1.1. Vision

UB's vision is to become a superior university with international standards and able to play an active role in nation building through the process of education, research, and community service.

2.1.2. Mission

1. Organizing international standard education so that students become human beings who have academic and/or professional abilities with high quality and personality and have entrepreneurial spirit and/or abilities;
2. To develop and disseminate science, technology, and art, as well as to strive for their use to improve the standard of living of the people and enrich the national culture.

2.1.3. UB's goal based on Permenristekdikti No. 58 of 2018 concerning the Statute of Universitas Brawijaya

1. Produce quality human resources, fear God Almighty, have an entrepreneurial spirit, have broad insight, have discipline, and work ethic so that they become strong academic and professional people who are able to compete at the international level;
2. Transforming, developing, and disseminating science, technology, and art in order to encourage the development of the nation;
3. Helping community empowerment through the application of science, technology, and art;
4. Realizing an entrepreneurial university that is internationally competitive; and
5. Realizing UB's governance that is credible, transparent, accountable, responsible, and fair.

2.2 VISION, MISSION AND OBJECTIVES OF THE FACULTY

2.2.1 Vision

To become a superior faculty in the field of agricultural technology that is known and recognized at the international level and contributes to national development through the Tridharma of Higher Education.

2.2.2 Mission

1. Organizing an educational process to produce graduates who excel in the field of agricultural science and technology, have character, have an entrepreneurial spirit and are globally competitive.
2. Conduct research and development of agricultural science and technology in order to encourage the progress of agro-industry and contribute to solving global problems.
3. Disseminate agricultural science and technology and use it for the welfare of the community as well as establish strong cooperation with national and international stakeholders.

2.2.3 Destination

1. Producing quality human resources, devoted to God Almighty, able to teach themselves who have broad insight, have discipline and work ethic, so that they become strong experts in the field of Agricultural Technology, and are able to compete globally.
2. To become a center for the development of science, technology, and art in the field of Agricultural Technology in order to encourage the development of advanced and resilient agro-industry.
3. Have the ability to empower agro-industry communities through the development of problem-solving concepts using scientific methods.

2.2.4 Organizational Values

The achievement of FTP's vision will be more effective if its achievement is based on organizational values that are understood and implemented by all members of the organization. The values developed in the FTP institution include philosophical values and basic organizational attitudes as follows:

1. Faith, knowledge and charity
   Making faith as the main foundation in thinking and acting; knowledge as a field of service and the Tri Dharma of higher education as a vehicle for doing good deeds.
2. Trust and dedication
   Be trustworthy in carrying out the obligations, duties, authorities and responsibilities carried out and dedicated in every action and deed.
3. Difference, innovation and excellence
   Making every difference an entry point for innovation in realizing excellence.
4. Independence and togetherness

Able to work independently in carrying out their main duties and functions but have a togetherness attitude in achieving organizational goals.

2.2.5 Motto

FTP's motto is "Do the best towards perfection"

2.3 VISION, MISSION AND OBJECTIVES OF THE DEPARTMENT

2.3.1 Department of Food Science and Biotechnology

a. Vision

To become a center for the development of science, technology and human resources in the field of agricultural product technology and with an entrepreneurial perspective with quality and reputation at the national, regional and international levels.

b. Mission

1. Organizing educational programs that are oriented towards producing superior human resources in the field of agricultural technology and with an entrepreneurial perspective.
2. Conducting research for the development of science, knowledge, and technology as well as innovative works for the benefit of mankind in the field of technology for agricultural products based on local materials.
3. Take an active role in the dissemination and application of agricultural technology that provides added value to improve people's lives.

c. Destination

1. Produce reliable, competent, and qualified human resources in the field of agricultural technology with an entrepreneurial perspective.
2. Produce applicative research work in the field of agricultural technology based on local materials to support the development of agro-industry.
3. Generate added value that can support the development of competitive local agroindustry.

2.3.1.1 Undergraduate Study Program (S1) Food Science and Technology

a. Vision

To become a center for the development of quality and dynamic science, technology and human resources to support food industry and entrepreneurs in global competition.

b. Mission

1. Organizing international standard education programs oriented to produce scientists, industry practitioners, and entrepreneurs who are professionals in the field of food science and technology.
2. Conducting research to develop science and technology in the field of food.
3. Take an active role in the application and dissemination of food science and technology in order to encourage industrial development.

c. Destination

1. Producing internationally competitive graduates who are able to keep up with the development of science and technology in the food sector and have an entrepreneurial perspective and are able to apply them to the scope of work.
2. Produce research work based on local food ingredients that can encourage the development of food science and technology directed at producing quality, guaranteed and competitive products.
3. Take an active role in the diffusion of food science and technology to provide added value that can support the development of a competitive agro-industry.

2.3.1.2 Biotechnology Undergraduate Study Program

a. Vision

To become a center for the development of science and technology that produces superior human resources in the field of industrial biotechnology with global competitiveness.

b. Mission

1. Organizing quality educational programs in the field of industrial biotechnology that can compete nationally and internationally.
2. Conducting industrial biotechnology research to produce products that are beneficial to human welfare.
3. Diffusion of science and technology to society in the face of the bioeconomic era.

c. Destination

1. Producing quality human resources in the field of industrial biotechnology.
2. Producing good quality research in the form of scientific publications and Intellectual Property Rights (IPR) that are beneficial for the development of industrial biotechnology at national and international levels.
3. Take an active role in the diffusion of science and technology related to the development of industrial biotechnology.

2.3.1.3 Master Study Program (S2) Agricultural Product Technology

a. Vision

To become a leading Masters study program at the international level in the field of agricultural product technology that plays a role in the development of a reliable and competitive agro-industry.

b. Mission

1. Organizing master's education in the field of agricultural technology to produce superior human resources and be able to play a real role in the life of the global community.

2. Conducting research to develop science and technology in the field of agricultural product technology.
3. Disseminate science and technology in the field of agricultural product technology and strive for its use to improve people's lives.

c. Destination

1. Produce graduates who have the ability to develop and update science and technology in the field of agricultural technology.
2. Have the ability to solve problems through research and development activities in the field of agricultural technology.
3. Develop innovative works that provide added value that can support the development of agro-industry.

2.3.1.4 Doctoral Study Program (S3) Food Science

a. Vision

Become a doctoral study program in the field of food science that is able to produce superior and innovative human resources in research and development of food based on local resources at the international level.

b. Mission

1. Organizing doctoral education in the field of food science to produce independent human resources in managing, leading, and developing research and playing a real role in the life of the global community.
2. Conducting research to develop food science based on local resources that are relevant in solving current problems to support national development through synergies with other scientific disciplines.
3. Take an active role in the diffusion of innovative and applicable research work to provide added value to society.

c. Destination

1. Produce graduates who are able to develop novelty in the field of food science independently through research with an inter, multi or trans-disciplinary approach.
2. Produce research in the field of food science that can be published at the international level.
3. Produce innovative and applicable works that are beneficial for the benefit of mankind.

2.3.2 Department of Biosystems Engineering

a. Vision

To become a center for Agricultural Engineering education with international standards and play an active role in the development of science through research activities and community service.

b. Mission

1. Carry out the educational process in a professional manner to produce graduates with competence in the field of Agricultural Engineering.

2. Take an active role in solving problems in the field of Agricultural Engineering through synergies with other scientific discipline groups.
3. Take an active role in global scientific activities in the field of Agricultural Engineering.
4. Build and develop science and technology related to agricultural engineering.

c. Destination

1. Produce quality graduates of Agricultural Engineering Graduates, devoted to God Almighty, independent, entrepreneurial spirit, broad insight, disciplined, high work ethic, professional and able to compete at the international level.
2. Develop science and technology in the field of Agricultural Engineering to encourage national development.
3. Develop and apply research in the field of Agricultural Engineering to support community development and empowerment.

2.3.2.1 Agricultural Engineering Undergraduate Study Program

a. Vision

To become a center for Agricultural Engineering education with international standards and play an active role in the development of science through research activities and community service.

b. Mission

1. Carry out the educational process in a professional manner to produce graduates with competence in the field of Agricultural Engineering. Take an active role in solving problems in the field of Agricultural Engineering through synergies with other scientific discipline groups.
2. Take an active role in global scientific activities in the field of Agricultural Engineering.
3. Build and develop science and technology related to agricultural engineering.

c. Destination

1. Produce quality graduates of Agricultural Engineering Graduates, devoted to God Almighty, independent, entrepreneurial spirit, broad insight, disciplined, high work ethic, professional and able to compete at the international level.
2. Develop science and technology in the field of Agricultural Engineering to encourage national development.
3. Develop and apply research in the field of Agricultural Engineering to support community development and empowerment.

2.3.2.2 Undergraduate Study Program (S1) Environmental Engineering

a. Vision

To become an international standard Environmental Engineering education center and play an active role in the development of science through research activities and community service.

b. Mission

1. Carry out the educational process in a professional manner to produce graduates with competence in the field of Environmental Engineering.
2. Creating and developing science and technology as well as playing an active role in global scientific activities in the field of environmental engineering through research activities, writing scientific articles, seminars and dissemination of research results.
3. Take an active role in solving tropical environmental problems and the global environment in the context of sustainable national development both in the national and international scope, through the application of creations and development of science and technology, research results or synergizing with other scientific discipline groups.

c. Destination

1. Produce graduates of Bachelor of Environmental Engineering who are professional, entrepreneurial, able to compete at the international level and are devoted to God Almighty.
2. Produce science and technology in the field of environmental engineering that is recognized nationally or internationally in order to improve the quality of human life.
3. Producing appropriate technology, technology packages and training modules in the field of environmental engineering as a solution to emerging environmental problems and for empowerment, as well as providing training/educational services and consulting services to the community.

2.3.2.3 Undergraduate Program (S1) Bioprocess Technology

a. Vision

To become a leading center for undergraduate education and research in the field of Bioprocess Technology and play an active role in the development and application to support the bioprocess industry in global competition.

b. Mission

1. Organizing the educational process of Bachelor of Bioprocess Technology in a professional manner with international standards, which is able to produce competent graduates in the field of Bioprocess Technology.
2. Develop research in Bioprocess Technology for food and non-food products.
3. Implement research results to develop bioprocess-based industries, both small, medium and large scale industries.

c. Destination

1. Producing Bioprocess Technology graduates who are devoted to God Almighty, qualified with mastery of science and technology and able to compete at the international level.

2. To become a center for the development of bioprocess technology in order to accelerate the progress of the bioprocess industry in the food and non-food sectors in general.
3. Disseminate concepts, ideas and technology in the field of bioprocesses in the national and international scope to solve problems in an innovative and creative way.

2.3.2.4 Masters Study Program (S2) Agricultural Engineering

a. Vision

To become a center for master's education and research with international standards in the field of Agricultural and Biosystems Engineering and play an active role in national development through the development of science and technological innovation with an environmental perspective.

b. Mission

1. Organizing the educational process of Masters in Agricultural and Biosystems Engineering in a professional manner with international standards.
2. Develop research in the fields of agro-biosystem machinery, natural resources and environmental engineering, and agricultural mechanization management systems.
3. Implementing research results in the development of environmentally friendly agro-industry for the welfare of the community.

c. Destination

1. Produce a qualified Master in Agricultural and Biosystems Engineering, entrepreneurial and professional spirit capable of competing at the international level.
2. Develop and update the Science and Technology of Agricultural Engineering and Biosystems by mastering and understanding, approaches, methods, scientific principles and their application skills.
3. Making efforts to implement science and technology research results through community service programs.

2.3.3 Department of Agroindustrial Technology

a. Vision

To be a department that excels in the development of integrated and sustainable agro-industry at the international level.

b. Mission

Organizing superior higher education in the field of agro-industry through the implementation of the tri dharma of higher education and collaboration with national and international institutions.

2.3.3.1 Bachelor Study Program (S1) Agroindustrial Technology

a. Vision

Become a study program that excels in the application of technology, management and engineering of agro-industrial systems.

b. Mission

1. Organizing an educational process in the field of agro-industry to produce graduates who are professional, entrepreneurial, and have Indonesian personalities.
2. Organizing applied research and dissemination of science and technology to develop agro-industrial systems.
3. Carry out community service to create a strong national agro-industry.

c. Destination

1. Produce human resources who have competence in technology, management and engineering of agro-industry systems with entrepreneurial insight in national and international scope.
2. Produce scientific research works in the field of Agroindustrial Technology to support sustainable agro-industry development.
3. Take an active role in disseminating research results to increase added value for the community.

2.3.3.2 Master Study Program (S2) Agroindustrial Technology

a. Vision

To become a study program that excels in the integrated development of technology, management, and engineering of agro-industrial systems at the international level.

b. Mission

1. Organizing the educational process so that students become human beings with quality academic abilities.
2. Organizing research activities so that students are able to develop sustainable agro-industry systems and publish in national or international forums.
3. Able to disseminate research results to improve community welfare.

c. Destination

1. Produce graduates who master the science of management and agro-industrial technology in a comprehensive manner.
2. Produce graduates who are able to develop sustainable agro-industrial systems.
3. Produce graduates who are able to communicate in scientific forums and agro-industry communities.

2.3.3.3 Doctoral Study Program (S3) Agroindustrial Technology

a. Vision

Become a PS that excels in producing new knowledge in the fields of technology, agro-industry management, and agro-industrial system engineering.

b. Mission

1. Organizing education in the field of Agroindustrial Technology through a research-based scientific development process.
2. Carry out scientific research and development activities in the fields of technology, agro-industry management and agro-industrial systems engineering.
3. Disseminate new findings in the form of scientific works on a national and international scale.

c. Destination

1. Produce graduates who master the principles of research that are philosophical, applicable and independent in the field of agro-industry.
2. Produce graduates who can create new findings that have more value, are innovative, tested and original in the fields of technology, agro-industrial management and agro-industrial systems engineering.
3. Produce graduates who are able to publish reputable scientific papers on a national and international scale.

III. EDUCATION PROGRAM IN THE FACULTY OF AGRICULTURAL TECHNOLOGY

3.1. UNDERGRADUATE EDUCATION PROGRAM (S1)

The undergraduate education program (S1) is an educational program that has a cumulative study load of at least 144 credits with a cumulative study duration of 8 to 14 semesters. Currently at the Faculty of Agricultural Technology there are 3 departments, namely the Department of Food Science and Biotechnology, the Department of Biosystem Engineering and the Department of Agroindustrial Technology with 6 study programs (PS): namely the Food Science and Technology Study Program (ITP); PS Biotechnology; Agricultural Engineering PS (TEP); PS Environmental Engineering (TL); PS Bioprocess Technology (TBP) and PS Technology Industrial Agriculture (TIP).

3.1.1. DEPARTMENT OF FOOD SCIENCE AND BIOTECHNOLOGY

1) Food Science and Technology S1 Study Program

The scientific specifications provided include understanding agricultural products as biological materials, knowledge of the main types of processes in converting biological materials into commodities, knowledge of processing tools and machines, ability to discuss issues related to commodity processing aspects, ability to perform process engineering for new products, as well as the operation of the processing unit as a system and its optimization.

Competence

The components of the main competencies of PS ITP graduates are as follows:

1. Understand the chemical, biochemical, and physical properties of foodstuffs and the reactions that occur that affect the quality of food products.
2. Able to apply the knowledge of Physics, Chemistry, Biology, Mathematics and Engineering in operating systems and processing food and agricultural products to produce value-added, quality and safe products.
3. Understand the principles and techniques of food analysis and be able to apply them in testing the quality of food products.
4. Understand the characteristics of beneficial and harmful microbes and be able to use and control them in food processing.
5. Able to control quality and nutritional damage due to physical, chemical, biochemical and biological changes in food products during storage.
6. Able to apply physical, chemical, biochemical, bioassay, microbiological and sensory testing techniques to evaluate food quality and safety.
7. Able to apply the principles of quality assurance and control related to Industry including Good Manufacturing Practices (GMP), HACCP, TQM and ISO Series.
8. Able to communicate in a team and work together effectively with stakeholders in the context of agro-industry development
9. Able to think logically and analytically to solve problems faced professionally
10. Have skills in utilizing the latest information and communication technology.

11. Able to express ideas clearly in oral and written form.
12. Have a sense of nationality and high social awareness.
13. Able to work independently and in groups.
14. Able to become a human learner who always follows and aligns himself with the progress and development of science and technology.

Attitude
1. Able to communicate / express opinions orally and in writing.
2. Able to identify problems, think critically and provide solutions.
3. Have professional and ethical integrity.
4. Able to work in diverse teams and resolve conflict issues.
5. Have the attitude to continue to learn for life.
6. Able to work effectively.
7. Able to lead a team independently.
8. Able to work under pressure simultaneously.
9. Able to update the knowledge and knowledge possessed.

Knowledge
1. Able to explain the causes of changes in the characteristics of materials and food products.
2. Know the basic principles of food analysis.
3. Know the basic principles of food processing technology.
4. Knowing the types of pathogenic and spoilage microbes that grow in food products.
5. Able to explain the factors that influence the growth of microbes.
6. Able to explain the principles of microbiological analysis.
7. Knowing the characteristics of food commodities, food ingredients raw materials, and food additives.
8. Able to explain biochemical processes, basic concepts of nutrition science and the relationship between food consumption and nutritional and health status.
9. Know the regulations related to food.

Skills
1. Able to control chemical damage to materials and food products.
2. Able to determine the appropriate method of food analysis for a food ingredient and product.
3. Able to apply the fermentation process for food preservation.
4. Able to identify and control damage to food materials and products during the production and distribution process.
5. Able to apply the principles of food engineering in the production process.
6. Able to carry out safe and quality food processing processes.
7. Able to determine the type of packaging that is suitable for a food material and product.
8. Able to carry out hygienic food production processes.
9. Able to use computers and statistical principles in the food sector.
10. Able to apply knowledge about quality assurance system.

11. Able to determine and carry out appropriate sensory testing.
12. Able to evaluate the nutritional value of a food ingredient and product.
13. Calculating the nutritional adequacy of an ingredient or food product, especially for labeling purposes.

2) Biotechnology Undergraduate Study Program

The scientific focus that becomes the competency target for Biotechnology PS graduates is Industrial biotechnology. This science studies the use of organisms, especially micro-organisms (for example: bacteria, fungi, and viruses) and the products produced by organisms (for example: enzymes and metabolites) in the production process to produce goods and services on an industrial scale.

Attitude

1. Faithful to God Almighty and able to show a religious attitude.
2. Upholding human values in carrying out duties based on religion, morals, and ethics.
3. Contribute to improving the quality of life in society, nation, state, and the advancement of civilization based on Pancasila.
4. To act as citizens who are proud and love their homeland, have nationalism and responsibility to the nation and state.
5. Appreciate the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others.
6. Work together and have social sensitivity and concern for society and the environment.
7. Obey the law and discipline in social and state life.
8. Internalize academic values, norms, and ethics.
9. Demonstrate a responsible attitude towards work in their area of expertise independently.
10. Internalize the spirit of independence, struggle, and entrepreneurship.

General Skills

1. Demonstrate verbal and written communication skills.
2. Able to identify problems, their causes, and make recommendations for solutions to these problems.
3. Able to apply critical thinking skills in new situations.
4. Holding the highest commitment to professional integrity, social ethical values, and environmental conservation.
5. Work effectively with others from different backgrounds.
6. Able to identify personal shortcomings and develop themselves as lifelong learners.
7. Able to lead in a variety of circumstances.
8. Able to resolve individual and group conflicts.
9. Able to analyze information from scientific and non-scientific literature.
10. Able to use the library competently.
11. Able to manage time effectively.
12. Able to facilitate group projects.

13. Able to manage tasks and pressure simultaneously.

Knowledge Mastery

I. Mastering the basic concepts of mathematics and natural sciences and understanding their relevance to the field of industrial biotechnology. These basic competencies are divided into three main skills:
   A. Knowledge skills in the field of mathematics and statistics.
   B. Knowledge skills in the field of natural sciences (biology, chemistry, and physics).
   C. Knowledge skills in the field of basic biotechnology.

II. Mastering theoretical concepts in the field of converting biomass into bioproducts (through physical, chemical, and biological processes) to support the realization of a sustainable green bioeconomy. These main competencies are divided into three main skills:
   A. Knowledge skills about biomass as raw material for bioproducts.
      1. Distribution of biomass based on taxa (viruses, archaea, bacteria, protists, fungi, animalia, and plantae), origin (terrestrial and aquatic), and type (natural and processed products or waste).
      2. Biomass biology (genetic principles of inheritance and the underlying molecular/cellular processes), databases and biomass cross-taxa interactions.
      3. The chemical composition of biomass such as carbohydrates, proteins, lipids, and nucleic acids, as well as their primary and secondary metabolites.
      4. Physical and chemical properties of biomass and their changes due to the conversion process.
      5. Biomass derivatization: types of derivatives (molecules, polymers, cells and tissues) and their benefits.
      6. Valorization of biomass derivatives through the principle of biorefinery so that its value increases.
      7. Life cycle and principles of sustainable biomass management.
      8. Biomass engineering for the food, feed, medical, renewable energy and environmental sectors.

   B. Proficient knowledge of the biomass conversion process at the lab, pilot, and industrial scale.
      1. Physical, chemical and biological pre-treatment technologies for the deconstruction and decomposition of biomass and the extraction of its components (derivatization).
      2. Bioprocess technology (bioreactor principles, design and instrumentation) for the conversion of biomass components into higher value products (valorization).
      3. Reaction of conversion of biomass components into bioproducts: principles, enzymes and reactions.
      4. Technique of separation and purification of bioproducts from other biomass components.

5. Biotechnology industrial waste treatment technology.
6. Recent developments in industrial biotechnology processes.

C. Knowledge skills about the products and services of the biotechnology industry and its entrepreneurial aspects (bioentrepreneurship).
   1. Design and specifications of bioproducts.
   2. Quality assurance system, safety, and authenticity of bioproducts, including halal food and medicine.
   3. The needs and market segmentation of the biotechnology industry.
   4. Traditional businesses that use biotechnology and the development trends of biotechnology industry products and services.
   5. Management and legal aspects of biotechnology business such as environmental conservation, copyright protection, patents, and trading strategies.
   6. Business model and development of small, medium and large scale biotechnology businesses.

Special skill

Mastering technical knowledge and possessing specific Skills that support employment in industrial biotechnology.

1. Basic laboratory techniques in the fields of biology, chemistry, and physics
2. Molecular techniques such as genetic material isolation, gene expression analysis, protein production and preservation, and biochemical assays.
3. Cellular techniques such as screening, isolation, selection, and identification of microorganisms; cell propagation; measurement of cell viability; and cell culture preservation.
4. Bioproducts conversion techniques such as physical and chemical pre-treatment; biological breakdown; immobilization of cells and enzymes; bioprocess design, instrumentation and optimization; separation and purification of bioproducts.
5. Retrieval, annotation, and interpretation of data from biological databases; data analysis using software and its presentation.
6. Genetic engineering techniques such as plasmid design and assembly using gene sequence databases and software; transformation of plasmids into host cells; and confirm the transform.
7. *Strain improvement*through random mutagenesis and DNA recombination technology.
8. Detection methods of contamination, adulteration of products, foreign genes, and transgenic organisms.
9. *Bioentrepreneurship*.

3.1.2. DEPARTMENT OF BIOSYSTEM ENGINEERING

1) Agricultural Engineering S1 Study Program

This study program focuses on the application of production technology, utilization of agricultural materials and products as well as natural energy by emphasizing on formal engineering objects in the procurement of machinery, buildings, environmental control and agricultural production systems and processing of agricultural products.

The scientific specifications provided include basic applications of agricultural engineering, operation and maintenance of agricultural equipment and machinery, managerial ability to organize and develop and implement new technologies, long-term planning and strategic planning from agricultural engineering aspects, agricultural engineering research and development, engineering (design) agricultural engineering, training and career development, installation, construction and manufacturing, security, reliability, and safety, as well as aspects of mechanization of handling agricultural materials and products and marketing.

<u>Competence</u>

1. Have the ability to use engineering principles to design technological products related to the field of agricultural engineering.
2. Innovative and creative attitudes and thoughts in work while still holding firmly to the ethics of the engineering profession.
3. Have expertise in managing and utilizing natural resources (agriculture and the environment) and supporting resources (HR, infrastructure, etc.) in an optimal and sustainable manner.
4. Professional attitude and behavior as well as having strong leadership and effective scientific communication skills.
5. Have expertise in identifying, formulating, analyzing and solving problems in the field of agricultural engineering through a systems approach.
6. Have expertise in conducting research, exploring, developing and applying science and technology in the field of agricultural engineering.
7. Having expertise in the development of the field of entrepreneurship as well as the main actor with an agribusiness and agro-industry orientation.

2) Environmental Engineering S1 Study Program

<u>Competence</u>

Graduate competencies are described from the targets in learning outcomes or Learning Outcomes (LO) of Environmental Engineering PS where graduates:

1. Able to act as a virtuous human being, think scientifically rationally, and be able to express according to the knowledge mastered in international relations.
2. Able to practice mathematics, calculus-based physics, chemistry (including stoichiometry, equilibrium, and kinetics), earth science, biology, fluid mechanics.
3. Able to formulate mass and energy balance, and analyze the phenomenon of substance transport in air, water and soil.

4. Able to conduct laboratory experiments, analyze and interpret data obtained from one main field (Remediation, Waste Management, Environmental Management and Environmental Health) or more.
5. Able to build an environmental engineering system which includes consideration of risk, uncertainty, sustainability, life cycle principles, and environmental impacts.
6. Able to apply advanced principles and practices that are relevant to the objectives of the study program.
7. Able to understand the concepts of professional practice, project management, and the rules and responsibilities of institutions and organizations in incubating environmental policies and regulations.

3) Bioprocess Technology S1 Study Program

Main Competencies

The main competencies of Bioprocess Technology graduates are as follows:
1. Able to apply the principles of engineering, mathematics, and science in identifying, formulating and solving problems in the field of bioprocess technology by considering engineering, economic, social, security, and environmental aspects.
2. Able to design bioproduct conversion processes for the development of food and non-food products.
3. Able to identify the properties of biological materials to be developed into bio-based materials.
4. Able to design and build bioreactors and their components, systems and processes.

Supporting Competencies

Supporting competencies include capabilities that support the main competencies, including:
1. Have skills in operating modern engineering instruments/equipment related to bioprocess technology.
2. Able to communicate effectively and work together in a team.
3. Applying automatic control on industrial tools and machines in the field of Bioprocess Technology both in the form of hardware (hardware) and software (software).
4. Able to design research as well as analyze and interpret data.

Other Competencies

Other competencies consist of:
1. Have morals, ethics, and attitudes in accordance with the norms of social life as well as professional and innovative behavior in work and career.
2. Have entrepreneurial spirit and leadership.
3. Able to express ideas orally and in writing both in Indonesian and English for academic and non-academic activities.
4. Able to think logically and analytically in solving problems in the field of bioprocess technology.

3.1.3. DEPARTMENT OF AGROINDUSTRIAL TECHNOLOGY

Agroindustrial Technology Education is related to an integral system (integrated) of the agricultural product industry which consists of: humans, materials/materials, machines/equipment, methods, money (money), and information. The scientific basis of agroindustrial technology is multidisciplinary because it does not only rely on mastery of Mathematics, Physics, and Biology but also social sciences including economics and management. The Department of Agroindustrial Technology has 3 scientific pillars, namely technology, management, and systems engineering.

1) Agroindustrial Technology S1 Study Program

The competency of PS S1 TIP graduates consists of 4 elements, namely Attitude, Knowledge, General Skills and Special Skills with the following details.

Attitude

1. Fear of God Almighty and able to show a religious attitude;
2. Upholding human values in carrying out duties based on religion, morals, and ethics;
3. Contribute to improving the quality of life in society, nation, state, and the progress of civilization based on Pancasila;
4. To act as citizens who are proud and love their homeland, have nationalism and a sense of responsibility to the state and nation;
5. Appreciate the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others;
6. Cooperate and have social sensitivity and concern for society and the environment;
7. Obey the law and discipline in the life of society and the state;
8. Internalize academic values, norms, and ethics;
9. Demonstrate a responsible attitude towards work in their area of expertise independently;
10. Internalize the spirit of independence, struggle, and entrepreneurship.

General Skills

1. Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise;
2. Able to demonstrate independent, quality, and measurable performance;
3. Able to study the implications of the development or implementation of science and technology that pays attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticisms;
4. Able to compile a scientific description of the results of the above studies in the form of a thesis or final project report and upload it on the university's website;

5. Able to make appropriate decisions in the context of solving problems in the agroindustrial, based on the results of information and data analysis;
6. Able to maintain and develop a network with supervisors, colleagues, colleagues both inside and outside the institution;
7. Able to be responsible for the achievement of individual and group work results and supervise and evaluate the completion of work assigned to workers under their responsibility;
8. Able to carry out the process of self-evaluation of the work group under their responsibility, and able to manage learning independently;
9. Able to document, store, secure, and retrieve data to ensure validity and prevent plagiarism.

Knowledge
1. Able to master the principles of systems engineering, technology and management in the field of agro-industry.
2. Able to identify, analyze and choose alternative solutions to agro-industry problems
3. Have an awareness of the importance of continuous learning (lifelong learning)
4. Able to understand professional, ethical and social responsibilities, and be responsive to current issues.
5. Have extensive knowledge to describe the impact of agro-industrial engineering solutions in global, economic, environmental and social contexts.

Special skill
1. Able to apply the principles of system engineering, technology and management in the field of agro-industry.
2. Able to work in multidisciplinary teams and build networks, and communicate effectively.
3. Able to apply the science and technology of agro-industry that is environmentally sound.
4. Able to design and evaluate sustainable agro-industrial systems.
5. Able to use modern engineering methods, skills and tools required for agro-industrial engineering practice.
6. Able to apply the principles of technopreneurship in designing creative agroindustry.

3.2 MASTER EDUCATION PROGRAM (S2)

The purpose of the master's education program is to prepare students to become members of the community who have academic abilities who can apply and develop academic skills in science and technology in the field of agricultural technology. This program has a cumulative study load of at least 36 credits with a cumulative study period of 4 to 8 semesters. Currently, there are 3 study programs: Agricultural Product Technology (THP), Agroindustrial Technology (TIP) and Agricultural Engineering (TEP).

3.2.1 Agricultural Product Technology Master's Program

In the THP Masters program, students are given a deeper understanding of the basics of science related to the handling and processing of food and agricultural products, so that graduates of the Agricultural Product Technology Master program are able to become pioneers in the community in solving problems related to the development of Agricultural Product Technology in Indonesia. society, especially in the industrial world. The Master's Program in Agricultural Products Technology can be completed for a minimum of 4 semesters and a maximum of 8 semesters with 41 credits which include 17 credits of compulsory subjects, 12 credits of elective courses, and 12 credits of thesis. The competencies of THP Masters graduates include main competencies, special competencies, and supporting competencies.

Main Competencies

1. Able to evaluate the specific chemical reactions that underlie the properties and reactions of various components of food/agricultural products.
2. Able to control chemical reactions that affect spoilage and shelf life of food and agricultural products.
3. Able to apply the latest processing technology.
4. Able to determine the method of analysis of specific food components/agricultural products (KU).
5. Able to develop the concept of food processing technology and agricultural products using engineering principles.
6. Able to explore beneficial microorganisms and metabolites in the fields of food, agricultural products and the environment.
7. Able to apply in an integrated manner various processing technologies to control the growth of spoilage and pathogenic microorganisms in relation to food safety.
8. Able to evaluate changes in nutritional and non-nutritive compounds due to the process
4. processing and storage.
9. Able to apply statistical principles in solving food/agricultural problems.
10. Able to apply the principles of food science/agricultural products to control and guarantee the quality of a food product.
11. Able to identify and solve problems related to food and agricultural products through the application and incorporation of food science principles/agricultural products.

Special Competencies

1. Able to develop the concept of an integrated management system in the food industry and agricultural products.
2. Able to relate the factors that influence the use of bioactive components and their effects on health with evaluation techniques using bio-assays.
3. Able to carry out product development and innovation management.
4. Able to apply the principles of shelf life and stabilization of food products.

5. Able to perform and evaluate microbiological quality control system and food safety.
6. Able to develop technology and innovative microorganism-based products.
7. Able to develop intervention and nutrification food products.
8. Able to apply computer knowledge to solve problems in food science and technology/agricultural products.

Supporting Competencies
1. Able to communicate effectively orally and in writing.
2. Think critically and analytically.
3. Have professional and ethical integrity.
4. Able to work in diverse teams and resolve conflict issues.
5. Able to lead a team independently.
6. Able to work in various conditions and work simultaneously.
7. Able to update the knowledge and knowledge possessed and lifelong learning.

3.2.2 Agricultural Engineering Masters Study Program

This study program is directed at developing the ability to multiply cognitive abilities based on the combination of theory, research and practical (applied) experience. Graduates will have values in the form of ethical behavior and noble character, have high analytical power, master research based on natural materials that have the potential to become superior products, be able to implement their research results for the development of environmentally friendly industries in the fields of interest in Agroindustrial Equipment and Machinery Engineering, Engineering Bioprocess and Post-Harvest, Renewable Energy Engineering, or Natural Resources and Environmental Engineering. Master's Program**Agricultural Engineering can be completed for a minimum of 4 semesters and a maximum of 8 semesters with a load of 41 - 45 credits which includes 15 credits of Compulsory Courses, and 12 credits of Elective Courses, 9 credits of Interest Courses, 5-9 credits of Interest Elective Courses and 12 credits Thesis. The learning outcomes of the Agricultural Engineering Masters Program are as follows:**

Main Competencies
1. Able to understand and develop engineering sciences to be applied in the field of agrocomplex systems or biosystems.
2. Able to take inventory, identify, analyze/evaluate, and design the process of agricultural commodities and management of natural resources that are environmentally sound,
3. Able to carry out environmental assessments and audits as well as take preventive and countermeasures from the decline and environmental damage as a result of the industrialization of agriculture.
4. Able to follow the development of science and technology related to the field of Agricultural Engineering and Biosystems
5. Able to develop knowledge, technology, and/or art in the field of Agricultural Engineering or professional practice through research, to produce innovative and tested works.

6. Able to solve problems of science, technology, and/or art in the field of Agricultural Engineering through an inter or multidisciplinary approach.
7. Able to manage research and development that is beneficial to society and science, and is able to gain national and international recognition.

Supporting Competencies

Able to understand and develop the basics of entrepreneurship as well as standardization and quality management.

Other Competencies

1. Able to work in a team and communicate effectively.
2. Able to understand professional, ethical and social responsibilities, and be responsive to current issues.
3. Have an awareness of the importance of continuous learning (life-long learning).
4. Environmentally minded and have an awareness of sustainable agro-industry development.

3.2.3 Master of Agroindustrial Technology Study Program

The Master's Program in Agroindustrial Technology (TIP) prepares students with academic skills, able to apply, and develop aspects of technology, management, and agro-industrial systems. The TIP Masters Program curriculum can be completed in a minimum of 4 semesters and a maximum of 8 semesters with 40-45 credits consisting of 16 credits of compulsory subjects, 12-16 credits of elective courses, and 12 credits of thesis. The TIP Masters Program is expected to produce graduates according to the Indonesian National Qualifications Framework (KKNI) level 8 with the following competencies:

Attitude

1. Fear God Almighty by showing a religious attitude;
2. Upholding human values in carrying out duties based on religion, morals, and ethics;
3. Contribute to improving the quality of life in society, nation, state, and the progress of civilization based on Pancasila;
4. To act as citizens who are proud and love their homeland, have nationalism and a sense of responsibility to the country and nation;
5. Appreciate the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others;
6. Cooperate and have social sensitivity and concern for society and the environment;
7. Obey the law and discipline in the life of society and the state;
8. Internalize academic values, norms, and ethics;
9. Demonstrate an attitude of being responsible for work in their field of expertise independently;
10. Internalize the spirit of independence, struggle, and entrepreneurship.

General Skills

1. Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and applies humanities values in accordance with their field of expertise;
2. Able to demonstrate independent, quality, and measurable performance;
3. Able to study the implications of the development or implementation of science and technology that pays attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticisms;
4. Able to compile a scientific description of the results of the above studies in the form of a thesis or final project report and upload it on the university's website;
5. Able to make appropriate decisions in the context of solving problems in the agroindustrial, based on the results of information and data analysis;
6. Able to maintain and develop a network with supervisors, colleagues, colleagues both inside and outside the institution;
7. Able to be responsible for the achievement of individual and group work results and supervise and evaluate the completion of work assigned to workers under their responsibility;
8. Able to carry out the process of self-evaluation of the work group under their responsibility, and able to manage learning independently;
9. Able to document, store, secure, and retrieve data to ensure validity and prevent plagiarism.

Knowledge

1. Able to design and develop scientific technology, management, and systems engineering in the field of agro-industry.
2. Able to develop research activities, innovation, standardization and dissemination in the field of agro-industry so as to produce innovative works that are tested and competitive.
3. Able to solve problems and make strategic decisions and policies through an interdisciplinary or multidisciplinary approach in environmentally sound and sustainable agro-industry systems.
4. Able to develop research based on research maps, with an interdisciplinary or multidisciplinary approach, both independently and in collaboration with other institutions.
5. Able to develop networks with colleagues, users and the wider agro-industry community.

Special skill

1. Able to design, develop, and implement solutions to agro-industry problems in the fields of system and industrial engineering, technological innovation and agro-industry business development.
2. Able to design, evaluate and or develop technology to produce processes/bioprocesses that are more efficient and productive, have added

value, and have higher competitiveness, and are able to integrate environmental aspects in the agro-industrial system to realize a sustainable agro-industry.

3.3 DOCTORAL EDUCATION PROGRAM (S3)

3.3.1 PS Doctor of Food Science

The Food Science Doctoral Study Program (PSDIP) provides flexibility for students to choose courses that support their dissertation. The total credit that must be taken to complete the Doctor of Food Science program is a minimum of 42 credits. This credit load consists of: One semester of lectures with a load of 12 credits. Dissertation of 30 credits consists of a) 1 credit of Qualification Examination; b) 2 credits of proposal exam; c) 18 credits of research and research results seminars; d) 4 credits Publication of international scientific articles 1 and 2; e) 5 credits of dissertation writing and dissertation examination.

PSDIP graduate profiles are expected to have the following abilities:

1. Able to develop science and technology in the field of food processing through research to produce creative, innovative and original works.
2. Able to solve problems of science, technology in the field of food and agricultural products through an interdisciplinary approach
3. Able to develop research and apply it for the benefit of the user community and get national and international recognition.
4. Mastering the concepts and theories of food science and theories of other related fields of science so that they can act as expert researchers, academics, expert practitioners or professionals with reliable abilities in applying and developing food science.

The learning outcomes of the Food Science Doctoral Study Program (PSDIP) are as follows:

1. Able to develop food science through independent research, with an inter, multi or trans disciplinary approach.
2. Able to carry out the latest, innovative, and applicable research in the field of food science so as to provide results and impacts to increase the competitiveness of local food.
3. Able to plan, manage, lead, implement and develop a research roadmap in the field of food science through an inter, multi or trans-disciplinary approach that is beneficial for the benefit of mankind.
4. Able to produce scientific work that has innovative, tested, and original novelty in the field of food science and published in international journals.

The learning competence of the UB Food Science Doctoral Program is stated in a learning achievement, which refers to the Regulation of the Ministry of Research, Technology and Higher Education No. 44 of 2015 concerning SNPT, as follows:

General Skills

Graduates of the Food Science Doctoral Program FTP UB must have the following general skills:

1. Able to find or develop scientific theories/conceptions/ideas, and contribute to the development, and practice of science and/or technology that pays attention to and applies humanities values in their fields of expertise, by producing scientific research based on scientific methodologies, logical, critical, systematic, and creative;
2. Able to compile interdisciplinary, multidisciplinary or transdisciplinary research, including theoretical studies and/or experiments in the fields of science, technology, art, and the resulting innovations in the form of a dissertation, and publish 2 articles in indexed international scientific journals.
3. Able to choose appropriate, current and advanced research and provide benefits to mankind through an interdisciplinary, multidisciplinary, or transdisciplinary approach, in order to develop and/or produce problem solving in the fields of science, technology, art, or society, based on the results of studies on availability internal and external resources.
4. Able to develop research roadmaps with an interdisciplinary, multidisciplinary, or transdisciplinary approach, based on a study of the main research objectives and their contellation to broader targets
5. Able to formulate scientific, technological or artistic arguments and solutions based on a critical view of facts, concepts, principles, or theories that can be accounted for scientifically and academically, and communicate them through mass media or directly to the public
6. Able to demonstrate academic leadership in managing, developing and fostering resources and organizations under their responsibility.
7. Able to manage, including storing, auditing, securing, and rediscovering data and information on research results that are under their responsibility.
8. Able to develop and maintain collegial and peer relations within their own environment or through collaborative networks with research communities outside the Institute.

Special skill

1. Able to deepen in the development of food science through independent research, with an inter, multi or trans-disciplinary approach.
2. Able to carry out the latest, innovative, and applicable research in the field of food science so as to provide results and impacts to increase the competitiveness of local food.
3. Able to plan, manage, lead, implement and develop a research roadmap in the field of food science through an inter, multi or trans-disciplinary approach that is beneficial for the benefit of mankind.
4. Able to produce scientific works that are novel, innovative, tested, and original in the field of food science and published in international journals.
5. Able to deepen the synthesis of new food products containing bioactive components of natural ingredients based on studies of molecular models, in vitro, and in vivo.

6. Able to deepen the synthesis of food component derivatives and design their applications in food processing and nutrition.
7. Able to deepen in process innovation based on a deep understanding of basic concepts in food processing.
8. Able to deepen the creation of specific processes to solve problems in food processing.
9. Able to carry out engineering deepening and integrated application of various processing technologies to control the growth of spoilage and pathogenic microorganisms.
10. Able to deepen the development of microorganism-based technology and products that are creative, original and innovative.
11. Able to deepen the development of functional food products based on local food ingredients that are scientifically tested to improve public health and are safe.

Knowledge

1. Mastering the philosophy of food science, food science theory with a particular field of study, the latest developments in food science, and having innovative abilities in developing local resources, as well as the application of theories in other relevant disciplines.
2. Mastering the philosophy of the nature and role of food components in the change and formation of food characteristics.
3. Mastering the philosophy of mechanism and reaction control in accordance with the reaction mechanism in food products, during processing and controlling damage to food products.
4. Mastering the philosophy of the mechanism of extraction and separation of bioactive components of natural ingredients as well as determining extraction techniques, separation of bioactive components and their application to food products
5. Mastering the philosophy of synthesizing food component derivatives and designing their applications in food processing and nutrition
6. Mastering the philosophy of the extraction mechanism and separation of bioactive components of natural ingredients and determining extraction techniques, separation of bioactive components and their application to food products.
7. Mastering the philosophy of changes in the characteristics of food raw materials and analyzing changes in food components as the effect of applied processing.
8. Mastering the philosophy of process innovation based on a deep understanding of the basic concepts in food processing
9. Mastering the philosophy of creating specific processes to solve problems in food processing
10. Mastering the philosophy of exploring beneficial microorganisms and metabolites and having novelty in the fields of food, agricultural products and the environment.

11. Mastering engineering philosophy and its integrated application of various processing technologies to control the growth of spoilage and pathogenic microorganisms.
12. Mastering the philosophy of designing, implementing and evaluating microbiological quality control systems and food safety and agricultural products
13. Mastering the philosophy of developing creative, original and innovative microorganism-based technology and products
14. Mastering the philosophy of evaluating the biological value of nutritional components and the biological activity of non-nutritive components with appropriate methods.
15. Mastering the philosophy of developing functional food products based on local food ingredients that are scientifically tested to improve public health and are safe.
16. Mastering the philosophy of developing new food products with optimal quantity and quality of nutritional and non-nutritive substances to answer nutrition-food and health problems that exist in the community

3.3.2 PS Doctoral in Agroindustrial Technology

The Doctoral Study Program in Agroindustrial Technology is aimed at producing reliable and independent researchers who are able to develop and utilize the potential of natural resources in order to empower the Indonesian people and help achieve long-term development goals in the field of higher education to increase the number and quality of teaching staff and researchers with degrees doctorate in Agroindustrial Technology. The total credit that must be taken to complete the Doctoral Program in Agroindustrial Technology is a minimum of 42 credits. This credit load consists of: One semester of lectures with a load of 12 credits and a dissertation of 30 credits.

The TIP Doctoral Study Program produces graduates who have competencies in accordance with KKNI level 9, namely:

Attitude

1. Fear God Almighty by showing a religious attitude;
2. Upholding human values in carrying out duties based on religion, morals, and ethics;
3. Contribute to improving the quality of life in society, nation, state, and the progress of civilization based on Pancasila;
4. To act as citizens who are proud and love their homeland, have nationalism and a sense of responsibility to the country and nation;
5. Appreciate the diversity of cultures, views, religions, and beliefs, as well as the opinions or original findings of others;
6. Cooperate and have social sensitivity and concern for society and the environment;
7. Obey the law and discipline in the life of society and the state;
8. Internalize academic values, norms, and ethics;
9. Demonstrate an attitude of being responsible for work in their field of expertise independently;

10. Internalize the spirit of independence, struggle, and entrepreneurship.

Knowledge

1. Mastering the concepts and theories of Agroindustrial Technology concerning the scientific fields of process technology, agro-industrial management, and systems engineering and other related fields of science.
2. Able to integrate concepts and theories of Agroindustrial Technology independently with an inter-disciplinary, multi-disciplinary or trans-disciplinary approach in various professions.

General Skills

1. Mastering the philosophy and theory of agroindustrial technology with the field of process technology studies, including production process optimization techniques, tool and machine performance analysis, as well as the development of competitive new products.
2. Mastering the philosophy and theory of agroindustrial technology with the field of agro-industry management studies, including aspects of production planning, analysis of productivity and performance of agro-industrial production units.
3. Mastering the philosophy and theory of agroindustrial technology with the field of systems engineering studies, including supply chain analysis, and integration of agro-industrial systems.
4. Mastering the philosophy and theory of agricultural engineering with fields covering Agricultural Cultivation Mechanical Engineering, Soil and Water Engineering, Agricultural Mechanization Systems and Management, Food Processing and Agricultural Products Engineering, Agricultural Energy and Electrification, Agricultural Environment and Buildings as well as Ergonomics and Agricultural Electronics.
5. Able to plan and develop sustainable agroindustry downstream.
6. Able to innovate and its application in agro-industrial systems.
7. Able to plan and evaluate the quality system in the field of agro-industry comprehensively.
8. Able to analyze problems and develop agro-industry policy strategies from upstream to downstream aspects.
9. Able to design and develop innovative agricultural tools and machines in the field of food processing and agricultural products.
10. Able to analyze and explore the application of waste treatment technology to achieve an environmentally sound agro-industry business.
11. Able to design and develop smart farming systems based on information technology and control systems.
12. Able to explore renewable energy to support the achievement of environmentally friendly agro-industry.

Special skill

1. Able to produce scientific works that are novelty, innovative, tested and original in the field of agroindustrial technology, especially in the fields of

scientific technology, management, and engineering of agro-industrial systems and can be published on a national and international scale.

2. Able to produce scientific works that are novelty, innovative, tested and original in the field of agricultural engineering, especially in fields including Agricultural Cultivation Mechanical Engineering, Soil and Water Engineering, Agricultural Mechanization Systems and Management, Food Processing Techniques and Agricultural Products, Energy and Electrification of Agriculture, Environment and Agricultural Buildings as well as Ergonomics and Agricultural Electronics through independent research activities with inter, intra, multi, or trans-disciplinary approaches and can be published on a national and international scale.
3. Able to solve problems and make strategic decisions and policies within the scope of the agro-industry system so as to provide results and have an impact on improving performance, sustainability and competitiveness of agro-industry
4. Able to plan, manage, lead, implement and develop research roadmaps in the field of Agroindustrial technology that are beneficial to agro-industrial system stakeholders.

IV. EDUCATION SYSTEM

4.1. BASIC UNDERSTANDING

4.1.1. Credit System

a. The credit system is a reward system for student study load, lecturer workload and educational program implementation burden.
b. Credit is a unit or units that state the content of a course quantitatively.
c. The characteristics of the credit system are:
   1. In the credit system, each course is assigned a value called a credit score
   2. The number of credit scores for different courses is not always the same
   3. The number of credits for each course is determined on the basis of the amount of effort to complete the tasks stated in lecture activities, practicums, field work practices or other tasks.

4.1.2. Semester System

a. The semester system is a system of administering educational programs that uses a semi-annual time unit called a semester.
b. Semester is a unit of time for the effective learning process for at least 16 (sixteen) weeks, including the mid-semester examination and the end-semester examination.
c. The implementation of education in one semester consists of lecture activities, seminars, practicum, field work practices, in the form of face-to-face, as well as structured and independent academic activities.
d. In each semester a number of courses are presented and each subject has a weight stated in semester credit units (credits).

4.1.3. Semester Credit System (SKS)

a. SKS is a credit system that is held in semester units.
b. SKS has two very important objectives, namely:
   1. **General purpose**
      In order for higher education institutions to better meet the demands of development, it is necessary to provide varied and flexible educational programs. In this way, it will provide wider possibilities for each student to determine and arrange the courses to be taken and the teaching and learning process strategies in order to obtain the best results according to the plans and conditions of each student.

   2. **Special purpose**
      a) Provide opportunities for capable and hardworking students to complete their studies in the shortest possible time.
      b) Provide opportunities for students to take courses that match their interests, talents and abilities.

c) Provide the possibility that an education system with multiple inputs and outputs can be implemented.
d) Facilitate curriculum adjustments from time to time with the development of science and technology that is very rapid today.
e) Provide the possibility that the evaluation system for student learning progress can be carried out as well as possible.
f) Provide the possibility of transfer (transfer) of credit between Study Programs or between
g) Faculties within a university or between universities.
h) Allows the transfer of students from one university to another or from a study program to another study program in a particular university.

c. Semester credit units (sks) are the amount of time for learning activities that are charged to students per week per semester in the learning process through various forms of learning or the amount of recognition for the success of students' efforts in participating in curricular activities in a study program.
d. Each course or other academic activity is presented in each semester with a set price for the semester credit which states the weight of the activities in the course.

4.2. CREDIT VALUE AND STUDY EXPENSES

4.2.1. Semester Credit Score for Lectures

For lectures, the value of one semester credit unit is determined based on the activity load which includes all activities per week as follows:

a. One (1) credit in the learning process in the form of lectures, responses, or tutorials, consisting of:
   1. Face-to-face activities 50 (fifty) minutes per week per semester;
   2. Structured assignment activities 60 (sixty) minutes per week per semester; and
   3. Independent activities 60 (sixty) minutes per week per semester.
b. One (1) credit in the learning process in the form of seminars or other similar forms, consisting of:
   1. Face-to-face activities 100 (one hundred) minutes per week per semester; and
   2. Independent activities 70 (seventy) minutes per week per semester.
c. One (1) credit in the form of practicum learning, studio practice, workshop practice, field practice, research, community service, and/or other equivalent forms of learning, is 170 (one hundred and seventy) minutes per week per semester, so that the credit score semesters are as follows:
   1. Semester Credit Score for Practicum in the Laboratory
      The value of one semester credit unit is the workload in the Laboratory equivalent to 170 minutes per week for one semester.
   2. Semester Credit Score for Field Work Practice

The value of one semester credit unit is the workload in the field equivalent to 170 minutes per week for one semester (equivalent to 40 hours/week or, @ 8 hours/day) of work.

3. Semester Credit Value for Research and Final Project Preparation for Undergraduate program is equivalent to 6 credits (6 x 170 minutes) per week, per semester, Master Program is equivalent to a minimum of 9 credits (9 x 170 minutes) per week, per semester and for Doctoral programs equivalent with a minimum of 28 credits (28 x 170 minutes) per week, per semester

4.2.2. Study Load in Semester

In determining the study load for one semester, it is necessary to pay attention to individual abilities based on the results of a student's study in the previous semester as measured by the achievement index.

The amount of achievement index (IP) can be calculated as follows:

$$IP = \frac{\sum_{i=1}^{n} K_i NA_i}{\sum_{i=1}^{n} K_i}$$

Where:

IP : is the Achievement Index, can be in the form of semester achievement index or cumulative achievement index

K : is the number of credits for each course

NA : is the final grade for each course n : is the number of courses taken

The amount of study load in the first semester is determined the same for each student, then with the IP achieved in that semester the study load in the next semester is calculated based on the following table:

Tabel 4.1 GPA (IP) and credit load that can be taken

indexs Achievement (IP)	Babyan credit (credit)
IP 3.00	22 - 24
2.50≤ IP < 3.00	19 - 21
2,00 IP < 2.50	16 - 18
1.50≤ IP < 2.00	12 -15
IP < 1.50	< 12

4.3. CURRICULUM

Curriculum arrangement as a guide for teaching and learning process at Universitas Brawijaya refers to the Decree of the Minister of National Education Number 232/U/2000 dated December 20, 2000, Law Number 20 of 2003 concerning the National Education System and Decree of the Director General of Higher Education Number 43/DIKTI/2006 and the Regulation of the Minister of Research , Technology and Higher Education RI No 44/2015 concerning National Standards for Higher Education. The Undergraduate Program Curriculum at FTP is a competency-based curriculum with learning outcomes referring to the Presidential Regulation No. 8 of 2012 concerning the Indonesian National Qualifications Framework (KKNI).

1. The determination of the study load for the undergraduate education program curriculum is a minimum of 144 credits, including:
   Group of National Content General Courses
   a. Religion (2 credits)
   b. Pancasila (2 credits)
   c. Citizenship (2 credits)
   d. Indonesian (2 credits)

   University Content Course Group
   a. Bachelor Thesis (6 credits)
   b. Field Work Practice (3 credits)
   c. Community service (4 credits)
   d. Entrepreneurship (2 credits)
   e. English (2 credits)

   Group of Faculty/Study Program Content Courses
   Faculty content courses will be arranged in separate chapters.
2. The determination of the learning load for the master's education program curriculum is at least 36 credits, including a thesis (with a weight of 12 credits). The composition of the courses is developed by each study program. The Master Program can be taken for 1.5 years (3 semesters) while the maximum length of study is 4 years (8 semesters).
3. The determination of the study load for the doctoral education program curriculum is a minimum of 42 credits, including a dissertation (weight 28 credits). The composition of the courses is developed by each study program. The length of study is a minimum of 3 years (6 semesters) and a maximum of 7 years (14 semesters). Matriculation can be done before entering a formal learning program (outside the study period of at least 3 years). For students who have outstanding achievements as determined by the Ministry of Research, Technology and Higher Education, they can take part in the doctoral program at the same time as completing their master's program. Provisions regarding the Master Program Towards an Excellent Undergraduate Doctorate (PMDSU) and PPDU (Excellent Doctoral Education Program) are regulated in a separate Rector Regulation.

4. Competence in English, Information and Communication Technology (ICT) and Potential Intelligence for Universitas Brawijaya Students
   The institutional curriculum that applies to the Undergraduate and Postgraduate programs at Universitas Brawijaya are:
   a. Competence in English and ICT as well as Sports/Art activities do not have a study load (credit value = 0), but are graduation requirements for each type and level of education.
   b. The required English proficiency/mastery is measured using the TOEIC score, while for the purposes of further study the TOEFL score is used, with the provisions for each and the type of education as follows:
      1) TOEFL ITP Score >**400 for Undergraduate Education (S1)**
      2) TOEFL ITP Score >**500**for Masters Education (S2)
      3) TOEFL ITP Score >**500 for Doctoral Education (S3)**
      4) The one who administers the TOEFL exam and issues the certificate is an official institution appointed by Universitas Brawijaya
   c. Capability in the field of Information and Communication Technology (ICT), for each level and type of education, is determined as follows:
      1) Undergraduate Program : 1 (one) application program
      2) Postgraduate Program: 1 (one) application program

      The one who conducts ICT exams and issues certificates is an official institution appointed by Universitas Brawijaya
   d. The intelligence potential of prospective students in undergraduate education is assessed in an integrated manner in the entrance exam questions.
   e. Potential intelligence of prospective students of Masters and Doctoral programs at Universitas Brawijaya must have a certificate of intelligence potential assessment in the form of an Academic Potential Test (TPA) certificate with a score of > 500, which is issued by an authorized institution.

4.4. ACADEMIC ABILITY ASSESSMENT

4.4.1. General requirements

1. The activity of assessing the academic ability of a subject is carried out through structured assignments, quizzes, mid-semester exams, and end-of-semester exams. Academic ability assessment activities for practicum courses include pre-test, post-test, practicum activities, reports, quizzes, and practicum final exams.
2. Structured activities in the activity of assessing the academic ability of a subject in a semester are carried out at least 2 (two) times in one semester.
3. Mid-semester and end-of-semester examinations are carried out according to the schedule specified in the academic calendar.

4. Assessment through structured assignments, quizzes, midterm exams, final semester exams and final practicum exams is intended to determine the final score (NA) with a certain weight or adjusted to the lecture activities that have been written in the RPS (Semester Learning Plan).
5. Assessment for practicum courses is in accordance with the RPS for practicum courses.

4.4.2. Final score

1. Assessment of student study success for each course is based on three alternative assessments, namely:
   a. Using the benchmark reference assessment system (PAP), that is by determining the graduation limit.
   b. Assessment in a course follows the assessment rubric listed in the RPS
2. The results of the final assessment of the course are stated with Quality Letters (HM) and Quality Scores (AM) as shown in the following table:

Table 4.2 Equality of Letter Value and Quality Score

Huruf Quality	**Anno quality**	**Gability job**
A	4	Very Good
B+	3,5	Between Very Good and Good
B	3	Good
C+	2,5	Between Good and Enough
C	2	Sufficient
D+	1,5	Between Suffisient and Poor
D	1	Poor
E	0	Very Poor

3. Scoring for each activity can be done with a Quality Letter (EA) which is then converted to a Quality Score (0-4).
4. The weight of a course assessment activity is determined according to the balance of the activity material with the course material as a whole in one semester.
5. Final Score calculation is done by giving weight to each lecture activity in the semester using the formula:

$$NA = \frac{\sum_{i=1}^{n} Bt_i \cdot Nt_i + Bq_i \cdot Nq_i + Bm \cdot Nm + Ba \cdot Na}{\sum_{i=1}^{n} Bt_i + Bq_i + Bm + Ba}$$

With:
Bti : is the weighted value of the structured task to i
Bqi : is the weight of the quiz score to i
Bm : is the weight of the mid-semester exam score
Ba : is the weight of the final semester exam scores
Nti, Nqi, Nm, Na is the value of each academic activity

6. From the results of the calculation of the formula point (5), if it is converted to Quality Letters using the Basic Reference Assessment (PAP), then the following references are used:

Table 4.3 Conversion of Final Value to Quality Letter Value

kisFinal Rating	Huruf Quality
80 < NA 100	A
75 < NA 80	B+
70 < NA 75	B
60 < NA 70	C+
55 < NA 60	C
50 < NA 55	D+
45< NA 50	D
0 < NA 44	E

4.4.3. Repeating Courses in the Regular Program

1. Applicable for courses with a maximum of C+
2. The maximum value given is A.
3. The value taken is the best value.
4. Repeated courses must be immediately submitted to the academic department of the department for deletion of unused grades.

4.4.4. Value Transparency

The determination of the final grades for compulsory courses is transparent. Lecturers are required to provide value transparency by announcing the percentage for UTS, UAS, and structured assignments (quizzes, papers, presentations, case studies, etc.). Final grades along with the percentage of UTS, UAS, and structured assignments must be announced through the academic section of the faculty/department administration.

4.4.5. Rate Upload

For course lecturers, the conditions for uploading grades are as follows:

1. The coordinator of the course teaching lecturers must upload all components of the value of each course taught in the middle and end of the semester via SIADO online.
2. The deadline for uploading all end-of-semester grades in the form of quality grades by the course lecturer is 10 (ten) working days from the date of the final semester examination (UAS) of a course.
3. Lecturers who are late in uploading grades will receive a warning letter from the dean.

4.4.6. Make-up exams

Requirements for follow-up exams:

1. Report the student's absence from the exam and the desire to take the follow-up exam no later than 3 (three) days after the exam for the subject in question, except in force majeure conditions.
2. Submit an application letter to the Deputy Dean for Academic Affairs accompanied by evidence stating the reasons for not participating in the exam.
3. The proof must be sent no later than 7 (seven) days after the examination of the subject concerned, except in force majeure conditions.
4. Reasons that can be accepted for taking the follow-up exam are as follows:
    a. Sick (proven by the examining doctor's letter).
    b. Parents and siblings have died as evidenced by a Certificate from the Village/Kelurahan Head).
    c. Other reasons that are justified academically and have been approved by the Deputy Dean for Academic Affairs.
    d. If the person concerned is unable to attend or is unable to attend, then it is allowed to report through another person.

5. The follow-up examination is carried out no later than 1 week after the UTS/UAS ends (according to the UTS or UAS being followed) and fulfills administrative requirements, except for force majeure conditions. If a student does not meet this rule, then he is not allowed to take a follow-up exam.

4.5. ACADEMIC SANCTIONS

Academic sanctions are imposed on students who violate academic provisions:

1. Students who attend lectures are less than 80%, then the final score is 50% of the total final score.

2. Students cannot cancel a course outside the specified time and will be given an E if they do not attend lectures according to the applicable rules.
3. Students who commit administrative fraud (falsifying documents, data and signatures) or academic fraud (cheating, collaborating, taking other students' exams and/or students whose exams are done by someone else, taking other students' jobs) in the exam, will be subject to sanctions in the form of canceling the entire study plan. the semester in question.
4. Students who make changes to the KRS illegally will be subject to sanctions for canceling the KRS for all courses in the semester concerned.
5. Students who make changes in grades illegally will be subject to suspension for a maximum of 2 (two) semesters and are not counted as terminals.
6. Students who commit these violations if accompanied by threats of violence or giving something, or promises or tricks will be subject to sanctions from being expelled from the Faculty.
7. Students who are found to have cheated (plagiarism and data falsification) in making reports on Field Work Practice, KKN, and final assignments, the entire study plan for the semester in question will be canceled.
8. Students who are found to have forged signatures on academic documents (lecture attendance, PKL/KKN/Bachelor Thesis proposals, PKL/KKN/Thesis reports, and seminar cards) will have their entire semester study plan cancelled.
9. Students who commit acts of violence and fights are subject to sanctions in the form of cancellation of all courses taken in that semester, and other sanctions in accordance with applicable laws and regulations.
10. Students who commit criminal acts and are sentenced to court decisions that have permanent legal force, a minimum of 2 (two) years in prison are removed from the status of Universitas Brawijaya students based on the Rector's Decree.

4.6. FINAL PROJECT OF BASE, MASTER, AND DOCTORATE PROGRAM

4.6.1. Degree program

a. Final Project Limits and Status

The Final Project is a written scientific work compiled by students, from the results of research, internships, entrepreneurship, technological design works or other activities in accordance with scientific principles and ethics under the guidance of competent lecturers and is a reflection of students' abilities in applying science, technology, art. and or humanities in a certain scientific scope. The final project must be prepared/implemented by every undergraduate student.

b. Final Project Goal

The preparation of the Final Project is intended to provide basic provisions for students in compiling a written scientific work to pour critical power, analysis and synthesis of students on a phenomenon or problem by paying attention to the development of science, technology, arts and humanities, from the perspective of the scope of the scientific field in the program. study in which the student is enrolled.

c. Forms of Activities for Compiling the Final Project (Thesis)

1. The final project for the undergraduate program consists of Seminar Courses (1 credit), Thesis Preparation Courses (1 credit), and Thesis Courses (6 credits).
2. The data/information used as the basis for the preparation of the Final Project can be obtained from the following types of activities: research, internships, and entrepreneurship, technological design works, and competitive scientific works. The limits for each form of activity are as follows:

Table 4.4 Types of Final Project (Thesis)

Types of Bachelor Thesis	Definition
Research (6 credits)	shapek research activities in the form of laboratory or field experimental research, simulations/modeling, surveys, or case studies in companies
Internship (6 credits)	worka practice with the aim of analyzing performance or existing problems in the industry. Internship activities are required to be in accordance with the science in the study program and must meet scientific principles which include problem identification, data collection, data analysis and conclusions. The length of the internship is equivalent to 60 days of effective work.
Design Technology (6 credits)	designn or designing futuristic concept-based equipment or software to solve existing problems or anticipate problems that may occur in the future.
Entrepreneurship n (6 credits)	shapek entrepreneurial activities related to agricultural technology disciplines starting from planning, implementing, managing, controlling, and evaluating business development activities. The minimum effort has been running for 6 months before the thesis exam is carried out which is shown by proof of the cashflow book, as well as proof during the visitation.

Types of Bachelor Thesis	Definition
Scientific Competition (6 credits)	Students who are ranked 1-3 in national and international competitions, are Pimnas finalists, or become finalists in international competitions in accordance with the disciplines of agricultural technology, all team members are awarded free thesis exams. Requirements for competitive scientific work: ▪ Thesis supervisor from the appropriate study program ▪ Topics in accordance with the field of agricultural technology ▪ There is a final task completion process such as adding data if needed and a mentoring process to get the weight of a scientific work equivalent to a thesis ▪ The requirements for organizing national competitions are those organized by government agencies or other credible institutions such as LIPI, Kemenristekdikti, Kemenpora, etc. with the Ministry of Youth and Sports, Pertamina, etc. on the condition that the competition is through a research process and the outputs produced are in the form of scientific papers. ▪ PKM which are recognized as equivalent to thesis are PKMP, PKMT, and PKMKC, while those that are not equivalent to thesis are PKM-AI, PKM GT, and PKMM ▪ The topic that is used as a thesis so that it gets an exam-free award must come from the scientific work being competed, not from other topics

3. The forms of activities and procedures for obtaining data/information are further regulated in the Bachelor Thesis Guidebook.

d. Substance and Depth of Study and Study

1. The substance of the Final Project is a study of theory and/or application of science, technology, and entrepreneurship with the substance according to the field of agricultural technology.
2. Further provisions regarding the substance and depth of the study/review of the Final Project are regulated in the Bachelor Thesis Guidebook.

e. Student Requirements, Obligations, and Rights

1. Students can carry out a series of activities related to the Final Project after fulfilling the academic and administrative requirements according to the provisions set by the Faculty.
2. Students are required to compile a Final Project based on ethics and scientific manners, honest and free from plagiarism elements and refer to the FTP UB Final Project Guidebook (Thesis).

3. All forms of output in the form of intellectual property rights, articles in scientific journals, etc., which are related to the material/substance of the Final Project are shared rights between students and their supervisors as well as the university.
4. In the event that the implementation of the research is a collaboration of other parties, the right to use data and all forms of output in the form of intellectual property rights and other forms are regulated in a cooperation agreement approved by the Dean.
5. The provisions of ownership and intellectual property rights resulting from the implementation/compilation of the Final Project are regulated separately by the Chancellor.
6. Further provisions related to requirements, student rights and obligations are regulated in the Bachelor Thesis Guidebook.

f. Final Project Requirements and Bachelor Thesis Examination

A student who has met the requirements is allowed to program the Final Project. **Requirements to program the Bachelor Thesis Course (6 credits)**is as follows:

1. Registered as a student in the academic year concerned.
2. Collect a minimum number of 110 credits.
3. Cumulative IP at least 2.00.
4. Has had a Final Project Advisory Lecturer assigned by the Department. Determination of the Final Project Advisory Lecturer at the latest in semester 5.

Requirements for the bachelor thesis exam:

1. There is no final value of E.
2. The value of D/D+ must not exceed 10% of the total credit load.

g. Procedures and Methods for Making the Final Project

The procedures and methods for making the final project are regulated in the FTP UB Final Assignment Guidebook (Thesis).

h. Final Project Credit Score

The final credit score for the undergraduate program is as follows:

Seminar Course : 1 credits
Bachelor Thesis Manuscript Writing : 1 credits
Bachelor Thesis Courses:
Research : 6 credits
Internship : 6 credits
Technology Design : 6 credits
Entrepreneurship : 6 credits
Scientific Competition : 6 credits

i. Final Project Completion Time

1. Students must take the Final Project Course (MK) for the Undergraduate Program which consists of the Seminar Court,

Bachelor Thesis Manuscript Writing Court, and Thesis Thesis Court in the semester in which the Constitutional Court is programmed in the KRS.
2. If a student does not carry out the MK Seminar, MK Bachelor Thesis Manuscript Writing, and MK Thesis in the semester in which the MK is programmed in the KRS, then the third grade of the student's MK in that semester will be E.
3. Students can reprogram the three Constitutional Courts in the following semester with a reduction in grades to grade.
4. If in the next semester it turns out that the MK Seminar is not held, then students can reprogram the following semester again with a maximum score of D.
5. If in the following semester it turns out that the Thesis MK and Thesis Compiling MK are not implemented, the student will reprogram the following semester again with a maximum score of C.
6. MK Final Project credit must be completed within 6 (six) months from being programmed in the KRS.
7. Students must carry out the thesis exam in the semester where the Thesis MK is programmed in the KRS.
8. Extension of time from the specified time limit must be informed by the Supervisor and approved by the Head of the Department.

j. Final Project Supervisor

To make a Final Project, a student is guided by a minimum of one supervisor.

1. Supervisor Requirements:
    a. The preparation of the Final Project is guided by at least one supervisor who has at least the position of Lector with the academic qualifications of Masters or Expert Assistants with the academic qualifications of Doctorate in the appropriate field of science, or in one scientific clump according to the study program in which the student is registered. If there is a Co-Supervisor, the Co-Supervisor has at least the position of Expert Assistant with a Master's academic qualification in the appropriate field of science, or in one scientific clump according to the study program in which the student is enrolled.
    b. Advisory Lecturer for "Competitive Scientific Work" equivalent to a thesis is a supervisor for competitive scientific work from the Faculty of Agricultural Technology, Universitas Brawijaya with the addition of one Advisory Lecturer in accordance with the above provisions. Special Advisory Lecturers are accompanying supervisors who come from agencies or companies and have the required competencies. Supervisor from outside the university, if from Research Institute the minimum education is Masters. If it comes from a

company, the supervisor is from a large company with a minimum position of senior supervisor.
   c. Advisors from universities outside Universitas Brawijaya, the requirements as supervisors are at least Lector, Master or Expert Assistant, Doctor.
2. Determination of Supervisors:
   The Head of the Study Program proposes the Main Advisor and Companion Advisor through the Head of the Department and is determined by the Dean
3. Supervisor Duties and Responsibilities:
   a. The main Advisor's duties and responsibilities are:
      1) Assist students in finding problems that are used as the basis for making Final Projects.
      2) Guiding and monitoring students in the implementation of the Final Project.
      3) Guiding students in writing the Final Project.
   b. The duties and obligations of the Companion Supervisor are to assist the Main Advisor in carrying out the supervision of the student's final project.

k. Final Project Assessment

1. Final Project Assessment is carried out starting from the Seminar Court, Bachelor Thesis Project, Bachelor Manuscript Writing according to their respective RPS
2. The thesis exam is tested by the Examining Lecturer Council, which consists of a minimum of 3 (three) and a maximum of 4 (four) people, including the Advisory Lecturer
3. The qualification of the Examining Lecturer is at least the same as the minimum qualification of Lector, Master or Expert Assistant, Doctor, unless there are special provisions regulated in the FTP UB Final Assignment Guidebook (Thesis).
4. Examiners from outside universities, if from Research Institute the minimum education is Masters, and if from outside Universitas Brawijaya follow the conditions of examiners.
5. Further provisions regarding the qualifications of Examiner Lecturers, assessment procedures and implementation of the Final Project are regulated in the FTP UB Final Project Guidebook (Thesis).

l. The Nature and Purpose of the Undergraduate Thesis Examination

1. The undergraduate thesis exam is the final exam that students must take as a condition for obtaining a bachelor's degree.
2. The undergraduate thesis examination is comprehensive.

3. Bachelor thesis exam is conducted orally and aims to evaluate students in mastery of science and application of technology in accordance with their field of expertise.
4. The undergraduate thesis examination aims to equip students with competencies that are considered weak.
5. Bachelor thesis exam can be done in the form of an open exam attended by students or a closed exam which is only attended by supervisors and examiners.
6. Bachelor thesis exam is carried out for a maximum of 90 minutes with the time division arranged by each department.

m. Requirements for Taking the Undergraduate Thesis Examination

A student is allowed to take the undergraduate final project examination if he fulfills the following requirements:

1. Registered as a student in the academic year concerned.
2. Have a minimum of 138 credits
3. Cumulative GPA at least 2.00.
4. D and D+ grades are not more than 10% of the total credits.
5. There is no final value of E.
6. Completed the thesis
7. Show proof of plagiarism free

n. Procedure for Application for Undergraduate Thesis Examination

The procedure for applying for examinations for all forms of the Final Project is determined by the Department by taking into account administrative and academic requirements.

o. Undergraduate Thesis Examination Examination Board

1. The Board of Examiners is determined by the Dean at the suggestion of the Head of the Department/Study Program.
2. The structure of the Examiner Council consists of a Chair who is concurrently the Main Advisory Lecturer and 2-3 examiners.
3. The Board of Examiners is a lecturer who meets the following requirements: Lector for holders of a minimum S-2 (Master) diploma or Expert Assistant for holders of a S-3 (Doctoral) diploma. Determination of the board of examiners beyond the above requirements is determined by the Dean on the recommendation of the Head of the Department.
4. Examiners who are not supervisors can be appointed from other agencies with fields of knowledge that are in accordance with the student's Final Project determined by the Dean at the suggestion of the ChairpersonDepartment. Examiners from outside universities, if from Research Institute the minimum education is Masters, and if from outside Universitas Brawijaya follow the conditions of examiners.

5. Duties of the Board of Examiners for the Undergraduate Final Project Examination:
    a. The chairman of the board of examiners is in charge of managing the smooth implementation of the exam and has the right to provide an assessment.
    b. The board of examiners is in charge of testing and providing an assessment.

p. Bachelor Thesis Examination Implementation Time

The time allotted for the final exam is a maximum of 2 (two) hours.

q. Bachelor Thesis Examination Assessment

1. Those assessed in the undergraduate thesis examination include:
    a. The quality of scientific work which includes academic weight and writing procedures.
    b. Appearance during the exam.
    c. Mastery of the material shown in answering questions from the Examiner Board.
2. Final value determination
   The chairman of the board of examiners leads the deliberation to determine the final score of the exam which is stated in the letters A, B+, B, C+, C, D+, D, or E. To be declared as passing the undergraduate thesis examination, a student must at least achieve a C grade. More detailed information can be found in the Thesis Guidebook.
3. Students who are declared not to have passed the thesis examination must carry out the decision of the examiner board.

r. Bachelor's Degree

1. A student can take a Bachelor's Degree if he fulfills the following requirements:
    a. Have completed all compulsory courses, namely national content courses, university content and faculty/study programs.
    b. Has revised the Thesis and was approved by the Examiner Council and obtained a minimum grade of C.
    c. Have collected Thesis which is printed with light blue cover and in the form of CD (which contains the final project) and has been approved by the Advisory Lecturer and has been approved by the Examiner Council and the Head of the Department. Mandatory to distribute Final Project manuscript/CD to:
        1) Main Advisory Lecturer
        2) Advisory Lecturer
        3) Faculty Library
        4) Universitas Brawijaya Library
    d. Does not exceed the maximum study period of 7 (seven) years.
    e. Has uploaded the title and thesis approval at SIAM.

f. Have paid tuition for the semester in question

2. Predicate Graduation consists of 3 levels, namely satisfactory, very satisfactory and with honors stated on the academic transcript. The Grade Point Average (GPA) is the basis for determining the graduation predicate:
   a. GPA : 2.00 GPA < 2.75 : Enough
   b. GPA : 2.75 GPA < 3.00 : Satisfactory
   c. GPA : 3.00 GPA < 3.50 : Very Satisfactory
   d. GPA : 3.50 GPA < 4.00 : Compliments (Cum Laude)

   The predicate of graduation 'Compliments' is determined by taking into account the maximum study period, for undergraduate programs a maximum of 4 years. Never been subject to disciplinary sanctions, never been subject to academic sanctions, no C/C+ score (minimum B). Specifically for transfer students, the graduation predicate 'Praise' is determined based on the calculation method as follows: cumulative value of 70-80 credits recognized (based on the relevant Dean's Decree) plus 65 credits that have been taken at the Faculty of Agricultural Technology (based on the Dean's Decree issued by the Dean). concerned), with a maximum study period of 2 years or 4 semesters. The timing of the Yudisium is regulated by the Faculty based on the Decree of the Dean of the Faculty of Agricultural Technology, Universitas Brawijaya.

4.6.2. Master's Program

a. Thesis Limits and Status

1. Thesis is an academic paper resulting from an in-depth research study that is carried out independently and contains a new contribution to the development of science and/or technology carried out by a master candidate under the supervision of his supervisor.
2. Thesis is a final task that must be carried out by master program students at Universitas Brawijaya.

b. Purpose of Thesis

1. Thesis preparation is intended so that students are able to make a description, analysis and synthesis of the facts/symptoms studied or the results of the study of mathematical theories and/or new designs that they have designed themselves, or modify/develop mathematical theoretical models, and/or designs that already exist. first proven in accordance with scientific rules.
2. Research is a rule-abiding activity in an effort to find the truth and/or solve problems in science, technology and/or art.

c. Forms of Activities to Get Data/Facts

1. The data or facts used as the basis for the preparation of the Thesis must come from research activities, either in the form of surveys and/or experiments with a statistical/mathematical approach, or the results of an in-depth study of mathematical theories/models in accordance with their scientific field.
2. Data must be obtained honestly and free from plagiarism elements.
3. Further provisions regarding the form of research/study activities in paragraphs 1 and 2, procedures for obtaining data, compilation and systematics of writing and other technical matters related to the Thesis are stipulated in the Guidebook for the Final Project of Master Program (Thesis) of FTP UB.

d. Amount of Thesis Study Load

1. Thesis has a minimum study load of 12 credits for Masters.
2. The Dean of the Faculty at the suggestion of the Head of the Postgraduate Study Program describes the magnitude of the thesis study load based on the form of activity, into the study/study and the outpouring of time for its implementation.

e. Substance and Depth of Study/Review

1. The substance of the thesis is the development of science, technology or art according to the scientific field and must be in accordance with the scope of the scientific field in the study program where the student is enrolled.
2. Further provisions regarding the substance and depth of the study/review of Thesis are regulated in the Final Project Guidebook for Master Program (Thesis) FTP UB.

f. Student Requirements, Obligations, and Rights

1. Students can carry out a series of activities related to the Thesis after fulfilling the academic and administrative requirements that have been determined by the faculty.
2. Students are required to compile a Thesis based on ethics and scientific manners, honest and free from plagiarism elements and refer to the Final Project Guidebook for Master Program (Thesis) FTP UB.
3. The Advisory Lecturer can use the data in the Thesis as material for publication in scientific journals/magazines or mass media by paying attention to ethics and scientific manners.
4. All forms of output in the form of intellectual property rights, articles in scientific journals and others related to the material/substance of the Thesis are shared rights between students, their supervisors and the university.
5. In the event that the research implementation is in collaboration with other parties, the right to use data and all forms of output in

the form of intellectual property rights and other forms is regulated in a cooperation agreement approved by the Dean.

6. The provisions on ownership and intellectual property rights resulting from the Thesis, as referred to in the provisions in paragraph 4 are regulated separately by the Chancellor.
7. Further provisions related to the requirements, rights and obligations of students as well as other provisions as referred to in paragraphs 1 to 5 in carrying out the Thesis shall be regulated by the Dean.

g. Qualifications, Determination, Rights and Obligations of Supervisors

1. Thesis preparation is directed by 2 (two) Supervisors or more who hold a doctorate in the appropriate field of science, or at least in the same scientific sub-cluster as the study program in which the student is registered, and at least has the functional position of Lecturer.
2. If deemed necessary, the Faculty administering the master's program and/or the University's Postgraduate Program at the suggestion of the Head of the Postgraduate Study Program may determine higher qualifications than the provisions in paragraph 1.
3. Thesis Advisory Lecturers are appointed by the Dean of the Faculty and/or at the suggestion of the Head of the Postgraduate Study Program.
4. Further provisions regarding qualifications, procedures for determining, rights and obligations of Supervisors are regulated by the Postgraduate Program of FTP UB.

h. Thesis Assessment Components

1. The assessment of the thesis research proposal is carried out by the examiner team in the thesis proposal seminar exam forum, the examiner team consists of supervisors and examiners.
2. Assessment of research implementation and thesis writing is carried out by the supervisor.
3. The evaluation of the thesis research results seminar is carried out by a team of supervisors in the thesis research seminar examination forum.
4. Oral presentations at national or international seminars can replace research results seminars.
5. The assessment of the thesis exam is carried out by the examiner team in the thesis exam forum. The examiner team consists of supervisors.
6. The minimum requirement for examining lecturers is a doctoral education lecturer with the functional position of lector.
7. The assessment criteria follow the academic guidelines in each study program.

8. The percentage of assessment components following the standard is set in 4 components, namely (a) Research proposals, (b) Research, (c) Seminar results and (d) Thesis exams.

i. Thesis Component Assessment Weight

The weight of the thesis component assessment is as follows:

Table 4.5. Thesis Assessment Components

Thesis Proposal Preparation				
No.	**Activity**	**Weight (B) %**	**Value (N)**	**B x N**
1.	Formulation of topics and literature	15	…………	…………
2.	Identify alternative solutions	15	…………	…………
3.	Research concept framework	20	…………	…………
4.	Proposal writing	15	…………	…………
5.	Methodological design	20	…………	…………
6.	*State of the art*study	15	…………	…………
Total (∑B x N)		100	…………	…………
Average (∑BN/100)				…………
Thesis Research				
No.	**Activity**	**Weight (B) %**	**Value (N)**	**B x N**
1.	Commitment and perseverance	15	…………	…………
2.	Initiative and creativity	15	…………	…………
3.	Independence	15	…………	…………
4.	Efficiency at work	15	…………	…………
5.	Research skills	15	…………	…………
6.	Data analysis accuracy	15	…………	…………
7.	Data processing capabilities	10	…………	…………
Total (∑B x N)		100	…………	…………
Average (∑BN/100)				…………
Thesis Report Preparation				
No.	**Activity**	**Weight (B) %**	**Value (N)**	**B x N**
1.	Originality and novelty	20	…………	…………
2.	Research relevance	5	…………	…………
3.	Foundation theory and literature	5	…………	…………
4.	Methodology and data processing	10	…………	…………
5.	Discussion	20	…………	…………
6.	Conclusions and recommendations	5	…………	…………
7.	Writing	5	…………	…………

8.	Ability to defend thesis	15	…………	…………
9.	Mastery of the field of science	10	…………	…………
10.	Verbal presentation	5	…………	…………
Total (∑B x N)		100	…………	…………
Average (∑BN/100)				…………
Thesis Seminar				
No.	**Activity**	**Weight (B) %**	**Value (N)**	**B x N**
1.	Script writing	35	…………	…………
2.	Oral presentation	35	…………	…………
3.	Scientific communication	30	…………	…………
Total (∑B x N)		100	…………	…………
Average (∑BN/100)				…………
Thesis Seminar through National/International Seminar				
No.	**Activity**	**Weight (B) %**	**Value (N)**	**B x N**
1.	Script writing	35	…………	…………
2.	Oral presentation	35	…………	…………
3.	Scientific communication	30	…………	…………
Total (∑B x N)		100	…………	…………
Average (∑BN/100)				…………
Thesis Publication				
No.	**Activity**	**Weight (B) %**	**Value (N)**	**B x N**
1.	Quality of publication of journals or proceedings	15	…………	…………
2.	Introduction	10	…………	…………
3.	Methodology (Methods)	15	…………	…………
4.	Results and discussion (Methods and discussion)	30	…………	…………
5.	Conclusion	5	…………	…………
6.	References	10	…………	…………
7.	Abstract (Abstract)	5	…………	…………
8.	Language quality	10	…………	…………
Total (∑B x N)		100	…………	…………
Average (∑BN/100)				…………

Values are assigned according to the applicable system. The final value is the average (weighted) of the previously mentioned values.

1. The minimum pass score for the thesis exam is B. If it is less than that value, students must repeat the thesis exam and are given the opportunity to take one test. If the student does not pass again, then the person concerned is given a special task (with the approval of the supervisory commission) to improve his thesis text or is declared a failure in the study of the Postgraduate program.

2. The Advisory Lecturer can propose to the Dean/Director of Postgraduate that students are declared to have obtained A Thesis scores without a final exam if they meet the following requirements:
   a. have scientific publications:
      1. at least 2 (two) scientific articles that have been published or accepted for publication in Scientific Journals at least accredited by Sinta 2;
      2. at least one article that has been published or accepted for publication in the proceedings; or
      3. at least one article that has been published or accepted for publication in an international journal indexed by Scopus or the Web of Science Core Collection (Thomson Reuter).
   b. the average value of all stages of Thesis A exams/seminars; and
   c. Thesis manuscript has been evaluated and approved by the Advisory Lecturer and disseminated in the results seminar forum.
3. The revision of the thesis manuscript (based on suggestions from the thesis examiner team) must be completed no later than one month after the thesis examination. If the specified time limit for repairs runs out and the revision of the thesis manuscript has not been completed and the student cannot account for the reasons to the Advisory Commission, the Chairperson of the Advisory Commission may propose that the student concerned take the thesis exam again.
4. Students who have passed the thesis examination, and have made improvements with the approval of the supervisory commission, can duplicate the thesis text a certain number (for the Advisory Commission, Postgraduate Program Organizers, Universitas Brawijaya and other parties who require it). The thesis manuscript is then ratified and signed by the Supervisory Commission and the Head of the Postgraduate Program Organizer.

j. Graduation and Graduation Requirements

Students are declared to have graduated from the Universitas Brawijaya Masters Program if they have completed at least 36 credits (including thesis) with a GPA 3.0 and there is no score less than C. The graduation requirements are as follows:

1. Have a TOEFL English proficiency certificate or TOEFL equivalent with a minimum score of 500, which is obtained from an English Language Institute recognized by Universitas Brawijaya.
2. In accordance with the circular letter of the Director General of Research, Technology and Higher Education Number: B/323/B.B1/SE/2019 concerning Publication of Scientific Works for Undergraduate Programs, Masters Programs and Doctoral

Programs as well as Rector's Regulation of the University of Brawijaya No, 52 of 2018, concerning Publication of Scientific Works for Masters Programs and Programs doctor. For the master's program, the publication obligation is to publish scientific journals indexed by Scopus or Web of Science Core Collection (Thomson Reuter), the lowest national journals accredited by Sinta 2, or UB journals determined by the Chancellor, or proceedings indexed by Scopus.

k. Judisium and Graduation Predicate

Yudisium is implemented after students can complete all academic and administrative requirements, namely:

1. Completed lectures, theses and other academic assignments with a GPA 3.0 during his study period.
2. The minimum grade for all courses is a minimum grade of C.
3. Complete other requirements set by the study program.

Students who are declared passed will receive the following graduation predicate:

1. Graduated with honors with honors (Cumlaude), the requirements are:
    a. GPA Subjects and elective courses (supporting Thesis) > 3.75
    b. Thesis Grade A
    c. Publish the results of his thesis research in more than one article title in scientific publications in the form of proceedings and or international scientific journals, international journals indexed by Scopus or Web of Science Core Collection, national journals that are accredited or have a minimum status of Sinta 2, and UB journals as determined by the Chancellor .
        1) The maximum length of study is five semesters.
        2) The conditional value cannot be less than B
2. Graduated with the predicate Very satisfactory, the requirements are:
    a. Does not meet other requirements in the praise predicate
    b. GPA > 3.5 (total for lectures and thesis)
3. Graduated with the predicate Satisfactory, the requirements are:
    a. Achieved GPA, 3.0 < GPA < 3.5
    b. This graduation predicate is determined by the Thesis Final Examination Committee and approved by the Dean and announced at the graduation.
4. Failed Study if:
    a. GPA < 3.0 in each semester (according to the student's KRS and KHS), or
    b. Did not pass the thesis proposal exam or

c. Did not pass the thesis exam, or the study period has expired, has not been able to complete the study load according to applicable regulations

l. Thesis Quality Assurance Team

The team guarantees that the thesis is feasible so that students can pass from the thesis research proposal to the final thesis report. Thesis Quality Assurance Team is determined by the dean at the suggestion of the Head of the Study Program. This team functions to ensure that the quality of the thesis is decent and the student is declared passed if the quality of the thesis has been checked by the Thesis Quality Assurance Team. The Study Program further regulates the Thesis Quality Assurance Team. The Thesis Quality Assurance Team is determined based on the Dean's Decree.

4.6.3. Doctoral Program

a. Dissertation Limits and Status

1. Disertasi is an academic paper that is the result of in-depth and thorough research carried out independently and contains new contributions to the development of science and/or technology carried out by doctoral candidates under the supervision of their supervisors.
2. dissertationThis is the final project that must be completed by every doctoral student at Universitas Brawijaya.

b. Dissertation Objectives

1. The preparation of the dissertation is intended so that students are able to make a description, analysis, and synthesis of the facts/symptoms studied or the results of mathematical theory studies and/or designs with deep thought, and pour them into mathematical models and/or new designs that they build themselves, or modify/develop mathematical theoretical models, and/or pre-existing designs that can be proven in accordance with scientific rules.
2. Research is a rule-abiding activity in an effort to find the truth and/or solve problems in science, technology and/or art.

c. Forms of Activities to Get Data

1. The data used as the basis for the preparation of the Dissertation must come from research activities, either in the form of surveys and/or experiments with a statistical/mathematical approach, or the results of an in-depth study of mathematical theories/models in accordance with their scientific field.
2. Data must be obtained honestly, legally and free from elements of plagiarism.

3. Further provisions regarding the form of activity and the depth of research/study as referred to in paragraphs 1 and 2, as well as procedures for obtaining data, preparation, writing systematics and other matters related to the Dissertation are regulated in the Handbook of the Faculty administering the doctoral program with reference to the relevant quality standards. determined by the Graduate Program.

d. Amount of Dissertation Study Load

1. The dissertation has a study load of 30 credits
2. The amount of study load is determined before the dissertation exam by the Dean of the Faculty administering the doctoral program/Director of the University Postgraduate Program at the suggestion of the Head of the Doctoral Study Program.
3. Further provisions regarding the details of the Dissertation study load, requirements, stages of implementation and all technical aspects related to the implementation of the Dissertation are regulated in the Handbook of the Faculty administering the doctoral program by referring to the quality standards set by the Postgraduate Program of Universitas Brawijaya.

e. Substance and Depth of Study/Review

1. The substance of the dissertation is the development of science, technology, arts or humanities with substance/material that must be in accordance with the scope of the scientific field in the study program where the student is registered.
2. The dissertation study must be in accordance with KKNI level 9.
3. The dissertation study must be in accordance with the scholarship of the student study program, have originality and novelty with a depth that is in accordance with KKNI level 9.
4. Further provisions regarding the substance and depth of the Dissertation study/study are regulated in the Handbook of the Faculty administering the doctoral program/University Postgraduate Program.
5. In the case of a dissertation for the award of an honorary doctorate or honoris causa (HC) it is regulated in a separate provision by the chancellor.

f. Student Requirements, Obligations and Rights

1. Students can carry out a series of activities related to the Dissertation after fulfilling the academic and administrative requirements that have been determined by the Faculty administering the Doctoral program and/or the University Postgraduate Program.
2. Students are required to compile a Dissertation based on ethics and scientific manners, be honest and free from plagiarism elements

and refer to the Dissertation Writing Guidelines set by the faculty administering the Doctoral program/University Postgraduate Program.
3. The promoter can use the data in the dissertation as material for publication in scientific journals/magazines or mass media by paying attention to ethics and scientific manners.
4. All forms of output in the form of intellectual property rights, articles in scientific journals, etc. Those related to the material/substance of the Dissertation are shared rights between students, their supervisors and the University.
5. In the event that the research implementation is in collaboration with other parties, the right to use data and all forms of output in the form of intellectual property rights and other forms is regulated in a cooperation agreement approved by the Dean of the Faculty administering the Doctoral program and/or the Director of the University Postgraduate Program.
6. The provisions on ownership and intellectual property rights resulting from the Dissertation, as referred to in the provisions in paragraph 4 are regulated separately by the Chancellor.
7. Further provisions related to the requirements, rights and obligations of students as well as other provisions as referred to in paragraphs 1 to 5 in carrying out the Dissertation are regulated by the Dean of the Faculty administering the Doctoral program.

g. Qualifications, Determination, Rights and Obligations of Supervisors

1. The dissertation is prepared independently by the students under the direction of the Advisory Lecturer Team which is chaired by a Promoter assisted by 2 (two) or more Co-promoters.
2. The promoter at least holds the position of Head Lector with a Doctoral academic qualification in the field of science or in one scientific sub-cluster in accordance with the study program in which the student is registered and has at least 2 (two) scientific works as the main author and/or as the corresponding author. published in reputable international journals.
3. The co-promoter has at least the position of Lecturer with a Doctoral academic qualification in the field of science or in one scientific sub-group in accordance with the study program where the student is registered and has at least 2 (two) scientific works as the main author and/or as the corresponding author published in reputable international journals
4. Based on "special considerations" and agreement with the Head of the Study Program, students can propose a co-promoter outside the Study Program who can help streamline their dissertation activities, provided that point (3) is met and has KKNI level-9 competence.

5. Promoters and Co-promoters are determined by the Dean of the Faculty administering the doctoral program/Director of Postgraduate University at the suggestion of the Head of the Doctoral Study Program.
6. Further provisions regarding qualifications, procedures for determining, rights and obligations of Dissertation Supervisors are regulated in the Handbook of the Faculty administering the Doctoral program.

h. Qualifying Exam

1. Qualification exams are carried out to assess the academic ability of doctoral participants. A doctoral program participant is entitled to take a qualifying exam if he has successfully taken a minimum of 12 credits with a GPA of at least 3.0, no score less than B.
2. Qualification exams are carried out before the start of the preparation of the dissertation and passing this qualification exam is a requirement for the preparation of the dissertation proposal to begin.
3. The form of assignments as material for the qualification exam is that students independently make scientific papers which can be considered as "pre-dissertation proposals". The preparation of this scientific paper was consulted with the supervisory committee.
4. Prior to conducting the Qualification examination, the supervisory committee and students must conduct a commission session with the aim of reaching an agreement with the student research proposal pre-proposal with the supervisory committee. The commission session was attended by the advisory committee and students. If the pre-proposal has been approved by the supervisory committee, the student can apply for a qualifying exam.
5. Qualification exams are carried out orally and the assessment is carried out by the Supervisory Commission and Examining Lecturers.
6. Lecturers who examine the qualification exam have an academic position of at least Lector and the title of Doctor. The team of lecturers who examine the qualifications for each student is 2 people.
7. The minimum passing standard of the Qualification Exam is 70 or the equivalent of a B grade.

a. Students who do not pass the qualification exam are given the opportunity to repeat 1 (one) time.

8. Components of the assessment of the qualification exam and its weighting include (a) Mastery of research methodology, (b) Mastery of the material in the field of science, (c) Reasoning ability, including the ability to abstract, systematize, and formulate ideas; both in writing and orally, and (d) The ability to communicate scientific thoughts in writing and orally in discussions.

Table 4.6 Qualification Exam Assessment Components

No	Assessment Component	Description	Weight (%)
1	Ability to review literature	Review articles are well presented which are characterized by: 1. The background in Chapter 1 is presented in a sequence so that there is a common thread with the research problems to be carried out; 2. Chapter 2 (review of literature) is well presented; 3. 80% of the libraries referred are primary/research results; 4. 75% of the referenced libraries are up-to-date (last 10 years).	20
2	Mastery of related scientific concepts	The conceptual framework is presented characterized by: 1. The conceptual framework is well presented; 2. There are concept diagrams that are clearly presented.	20
3	Ability to formulate research problems	The problem formulation is very clear and well written which is characterized by: 1. The formulation of the problem to be studied is stated in clear sentences; 2. The problems studied are up to date, there is no plagiarism or repetition; 3. The benefits are well formulated and the benefits to society and science and technology are well illustrated.	10
4	Ability to present manuscripts orally and defend them in front of examiners	The ability of students to submit scientific arguments in answering questions	15
		Mastery of scientific substance and ability to present novelty	15
		Scientific logic and presentation	10
		Scientific writing	10
Total Score			
Quality Letter			

i. Proposal Examination

After the proposal is approved by the supervisory committee, students can take a dissertation proposal exam. Students take care of the administrative process to the postgraduate administration of the Faculty of Agricultural Technology. The head of the study program appoints 3 lecturers as examiners on the recommendation of the supervisory commission. The requirements for examining a student's dissertation research proposal are at least a Doctoral degree with the position of Lector and having competencies similar to the student's research topic. The dissertation proposal review team is determined by the dean's decree.

Prior to carrying out the Proposal Examination, students and the supervisory commission have conducted a research proposal commission meeting at least once. This commission session aims to obtain an agreement between the supervisory committee and students regarding the research topic and the scope of the student's dissertation research.

Implementation of the dissertation proposal examination:

1. The dissertation proposal examination is conducted openly and must be attended by the supervisory commission and 3 examiners.
2. The dissertation examination assessment includes: dissertation research proposal manuscript, mastery of research methods, mastery of theories relevant to the research topic and reasoning abilities, abstraction, systematic thinking and formulation of ideas
3. The value of the dissertation proposal examination is the average value of the supervisor and examiner commissions present.
4. Students are declared to have passed the dissertation proposal exam if they get an average score of at least B. The proposal exam can be repeated 1 time for students who do not pass.

Table 4.7 Components of Dissertation Proposal Examination Assessment

No	Assessment Component	Description	Weight (%)
1	Bachelor Thesis Manuscript Writing ability	The manuscript is very clear and very well written which is characterized by: 1. Relevant cited libraries; 2. As many as 80% of the cited literature is primary/research results, not review literature; 3. 75% of the literature cited is up to date (last 10 years); 4. Arranged systematically, in depth and coherently; 5. Does not indicate plagiarism (check plagiarism 10%); 6. Sentences are well structured, following the rules of PUEBI (General Guidelines for Indonesian Spelling).	15
2	Clarity of problem objectives and benefits	The problem formulation is very clear and well written which is characterized by: 1. The formulation of the problem to be studied is stated in clear sentences; 2. Goals are clear and in line (gayut) with the method; 3. The benefits are well formulated and the benefits to society and science and technology are well illustrated.	15
3	Clarity of framework and clarity of research methods	Very clear and very well written framework and methods characterized by: 1. It is clear that the background, problems and methods used in writing the framework of the framework are clearly described; 2. In the method, it is clear the stages and designs used, as well as the resulting outputs; 3. It is clear how the data analysis method will be used so that it is able to answer the dissertation problem.	20

No	Assessment Component	Description	Weight (%)
4	Ability to present proposals orally and defend them	1. The presentation display is in the form of points, not sentences, is attractive, and aesthetically pleasing. 2. Presentation with appropriate voice intonation, not too fast or slow, not memorized, mastering the audience, mastering the material. 3. The timing is correct and appropriate.	5
		The ability of students to put forward scientific arguments in answering questions.	15
		Mastery of scientific substance and ability to present novelty	15
		Student reasoning ability in presentation	15
Total Score			
Quality Letters			

j. Research and Research Advancement Seminar

Student research activities produce research data that are worthy of publication in national/international scientific seminars or published in reputable international journals and/or accredited national journals, and can be used in the preparation of their dissertation. Assessment of the implementation of dissertation research is carried out by all members of the supervisory commission (promoter and co-promoter) in accordance with applicable regulations.

In accordance with Rector's Regulation 52 of 2018, the results seminar is one component of the completion of the dissertation. Students can conduct research progress seminars after having data on research results that are deemed appropriate by their supervisory commission. During their doctoral program, students are required to conduct research progress seminars 3 times. Student participation in national seminars or international seminars as an oral presenter can replace**one**(1 time) research progress seminar. Students must obtain approval for participation in national or international seminars to the supervisory committee and provide certificates and proceedings to the supervisory committee and to the Head of the Study Program.

Requirements and Procedures:

1. The dissertation research progress seminar is conducted by students after obtaining approval from the Advisory Commission.
2. Research progress seminars are held openly
3. Seminar papers on research results are written following the article format for the intended scientific publication. The seminar paper must have been approved and signed by the Advisory Committee.
4. Students reproduce the seminar abstract as much as 20-25 copies.
5. Students are required to improve the draft publication based on suggestions from the supervisory committee.

Table 4.8 Assessment Components of Results Seminar/Research Progress or National/International Seminar

Components of Assessment Seminar Results/Research Progress			
No	Assessment Component	Rating Description	Weight (%)
1	Research competence	1. Commitment and persistence; 2. Initiative and creativity; 3. Independence; 4. Efficiency in work; 5. Research skill development.	50
2	Dissertation progress report	1. Research relevance, clarity of purpose; 2. Theoretical foundations and use of literature; 3. Use of methods and data; 4. Discussion; 5. Clarity of conclusions and recommendations; 6. Writing.	30
3	Presentation	1. Verbal presentation; 2. Mastery of the field of science.	20
Numerical Value (Amount)			
Quality Letters			
National/International Seminar Assessment Components			
No	Assessment Component	Rating Description	Weight (%)
1	Research competence	1. Commitment and persistence; 2. Initiative and creativity; 3. Independence; 4. Efficiency in work; 5. Research skill development.	50
2	Article quality	1. Research relevance, clarity of purpose; 2. Theoretical foundations and use of literature; 3. Use of methods and data; 4. Discussion; 5. Clarity of conclusions and recommendations; 6. Writing.	30
3	Presentation	1. Seminar/conference quality assessment 2. Quality of presentation material	20
Total Score			
Quality Letters			

k. Monitoring of Research Implementation

Monitoring of research implementation is carried out using (1) Research Control Card, (2) Dissertation Research Logbook, (3) Dissertation Progress Report, and (4) Research Implementation Supervision.

1. **Research Control Card (KKP)**
   a. The research control card (KKP) contains brief information about the progress of the research implementation on a regular basis (weekly).
   b. This KKP is held and filled out by students and regularly (monthly) is consulted and informed to the Advisory Lecturer.
   c. The supervising lecturer signs the KKP periodically when students consult.

d. By the time students will carry out the seminar on the results of the Dissertation research, it is hoped that the KKP has been filled out completely and has been signed by the Promoter.
e. The completed KKP (point 1.4) is one of the complete requirements for registering a research seminar.

2. Dissertation Research Logbook

a. This logbook contains brief notes/information about things that students do in carrying out their research as well as notes that need to be provided by the supervisor on research problems faced by students, on a regular basis.
b. The logbook can also be filled with notes/information on the results of library analysis conducted by students.
c. This logbook is held and filled out by students and is regularly consulted and informed to the Advisory Lecturer.
d. The supervising lecturer signs the Logbook periodically when students consult.
e. The completed logbook (point d) is one of the complete requirements for registering a research seminar.
f. Students can take the Logbook in the academic section by showing proof of having passed the dissertation proposal exam.

3. Dissertation Progress Report (LKD)

a. Students who are carrying out the dissertation learning process are obliged to make a report on the progress of the research implementation every mid-semester and at the end of each semester.
b. The Dissertation Progress Report can be in the form of: (1) Research Implementation Progress Reports, (2) Study Progress Reports and Data Analysis, (3) Progress Reports on Preparation/Writing of Seminar Papers and Dissertation Scripts.
c. This progress report contains information about:
   1) Student Identity
   2) Dissertation Title
   3) Advisory Committee and Examining Lecturer Team
   4) Overall Dissertation Schedule
   5) The substance of the Progress Report includes:
      a) Activities that have been completed, and their results. If possible, these results can be written in the form of scientific articles.
      b) Activities being carried out and time limits (schedule).
      c) The planned activities will be carried out along with the time schedule.
d. This progress report must be approved and signed by the Promoter.

e. This progress report is addressed to the Head of the Doctoral Program.
f. Progress reports are made in five copies, each for students, promoters, co-promoters 1, co-promoters 2, and the head of the doctoral program.
g. Progress reports are submitted to the academic section and students are given proof of receipt of progress reports.
h. Submission of this Progress Report can be done at any time.
i. This progress report will be used by the Promoter as one of the considerations in assessing the implementation of the dissertation research.
j. This progress report will be used by the Head of the Doctoral Program to monitor the smoothness of the Dissertation learning process carried out by students.

4. Supervision of Research Implementation

a. Research Supervision The dissertation is carried out for research using experimental methods carried out in the laboratory, greenhouse, and/or in the field.
b. Research Dissertation using the survey method is not subject to research supervision, unless there are special considerations.
c. Research supervision is carried out with the aim of (1) proving whether the implementation of research is in accordance with what is planned in the research proposal, and (2) finding solutions to problems faced by students in carrying out their research in the laboratory and/or in the field.
d. Research supervision is carried out once by the Promoter or Co-promoter appointed by the Promoter to represent it.
e. The supervising lecturer who carries out research supervision is obliged to make a supervision report and at the same time an assessment of the implementation of the research.
f. The Research Supervision Report contains information on:
    1) Identity of Students and Supervisors who carry out supervision.
    2) Dissertation Title.
    3) Title/research activity being carried out.
    4) Problems faced by students in conducting research.
    5) Evidence of research implementation documentation.
    6) Other information deemed necessary.
    7) The funding for research supervision is borne by the student. Provisions regarding this matter are stipulated by a Decree of the Dean/Director of PPS.

5. Dissertation Quality Assurance Team

The dissertation quality assurance team is determined by the dean at the suggestion of the Head of the Study Program. This team functions to ensure that the quality of the dissertation starting from the proposal examination to the final dissertation report is appropriate and students are declared passed if the quality of the dissertation has been checked by the Dissertation Quality Assurance Team. The study program further regulates the Dissertation Quality Assurance Team.

a. Team Dissertation Quality Assurance is an ad hoc team formed to assess the feasibility of a dissertation
b. The team is a lecturer representative from the scientific field (laboratory) in the study program and is proposed by the Head of the Doctoral Study Program to the Dean and determined based on the Dean's Decree
c. The working period of the Dissertation Quality Assurance Team is 2 years and after that a new Dissertation Quality Assurance Team is formed.
d. The requirements for members of the Dissertation Quality Assurance Team are:
    1. Functional position of Professor or Head Lector
    2. Having experience in one publication in a reputable international journal (minimum Q3)

l. Scientific publications

According to UB Chancellor's Regulation No. 52 th 2018, every Doctoral Program student is required to take and complete a final project in the form of a dissertation and scientific publication. The final assignment in the form of Scientific Publication as referred to is prepared based on the results of the Dissertation research. The scientific publications are in the form of:

1. 2 (two) scientific articles in international Scientific Journals indexed by Scopus or Web of Science Core Collection (Thomson Reuter), having the lowest impact factor of 0.1, or Microsoft Academic Search; or
2. 1 (one) scientific article in a scientific journal as referred to in (a) and 1 (one) article in the Proceedings. One of the Scientific Publications must be written by the student as the first author.

Students must consult the supervisory committee regarding the name of the scientific journal to be addressed and the research results to be written in the journal. During the doctoral study program, students are required to publish the results of research in scientific journals as many as 2 articles in accordance with UB Chancellor's regulation no. 52 of 2018. The assessment of article quality is determined by the Dissertation Quality Assurance Team from each doctoral study program at the UB Faculty of Agricultural Technology. Students who can publish 2 (two) international scientific journals at least Q3 from the results of their dissertation research have the right not to be assessed for their dissertation eligibility by the Dissertation Quality Assurance Team from each doctoral study program at FTP UB.

m. Evaluation of the Feasibility of the Dissertation by the Dissertation Quality Assurance Team

1. The requirements for the dissertation eligibility assessment are as follows:
    a. Have passed the research result seminar
    b. Have made improvements to the dissertation manuscript
    c. The dissertation manuscript has been approved by the supervisory committee and has met the administrative requirements that have been determined
    d. Include proof of plagiarism free from FTP UB with the allowed plagiarism rate of 20%.
    e. Have a published manuscript that has been accepted to be published in international journals or proceedings according to UB Chancellor's Regulation no. 52 Year 2018.
2. Procedure for conducting the dissertation feasibility assessment:
    a. Students register for a feasibility assessment at the Doctoral Program Chair.
    b. Students submit files for dissertation feasibility assessment, including:
        - Dissertation manuscript
        - Publication manuscript
        - Evidence of acceptance of manuscripts from international scientific journals
        - Proof of proceedings (if any)
3. The dissertation feasibility assessment is carried out by desk evaluation by 2 (two) members of the Dissertation Quality Assurance Team with expertise relevant to the dissertation research topic. The appraiser gives an assessment in the form provided within 2 weeks from the time the assessment files are submitted.

n. Dissertation Final Exam

1. Requirements
    a. The dissertation manuscript has been approved and signed by all supervisors (Promoter and all Co-promoters).
    b. Has fulfilled all academic administrative requirements in accordance with applicable regulations.
    c. The dissertation manuscript has been approved and signed by all supervisors (Promoter and all Co-promoters).
    d. Has fulfilled all academic administrative requirements in accordance with applicable regulations.
    e. The dissertation manuscript has been assessed for eligibility by the Doctoral Committee.

f. Has fulfilled all financial administration requirements in accordance with applicable regulations.
g. Registering the final examination of the dissertation in the academic section. Registration is done 10-15 days before the exam.

2. The Dissertation Final Examination Committee consists of:
   a. Chairperson of the session (Dean/Director/appointed person to represent).
   b. Promoter (one person) and Co-Promoter (2 people).
   c. Dissertation Evaluation Committee (examiner lecturer) (3 people).
   d. One person is "Guest Examiner", an expert from outside Universitas Brawijaya who has expertise in a field that is in accordance with the contents of the dissertation.
   e. The Guest Examiner is proposed by the Promoter to the Head of the Doctoral Program, and is determined by the Dean's decree.
   f. The dissertation examination can be carried out if attended by at least two people from the supervisory commission (Promoter and/or Co-promoter), two dissertation assessors (examiners) and or an outside examiner. Deviations from this provision require special approval from the Head of the Doctoral Program.
3. Completion of Dissertation revision
   a. After being declared to have passed the final dissertation exam, the student concerned is given 1 (one) month to revise (if any).
   b. The revised dissertation manuscript, signed by the supervising commission and KPS-S3 and then submitted to the postgraduate program of the Faculty of Agricultural Technology.
   c. If up to 1 (one) month the student has not submitted his dissertation manuscript to the postgraduate academic section of the Faculty of Agricultural Technology, the value of the student's dissertation is reduced by one level.
   d. If within 1 (one) month the dissertation manuscript has not been submitted, the student's dissertation score is lowered according to the following table:

No.	Lateness	Decreasing Value
1.	1 month	½ grade
2.	2 months	1 grade
3.	3 months	Repeat Exam

o. Assessment of Learning Outcomes for Dissertation

1. In the event that the material/substance of the dissertation consists of several sub-researches, it must be a unified whole research work that is interrelated or in series.
2. Student learning outcomes on the implementation of the Dissertation are assessed starting from the process of preparing

proposals, implementation, reporting, scientific articles/papers and exams.

3. The research form for each stage of the dissertation is regulated in the Handbook of the Faculty administering the Doctoral Program/University Postgraduate Program.
4. Referring to the Rector's Regulation of 2018 Article 4 concerning Dissertations and Scientific Publications, students are required to use the material/substance of the Dissertation to compile 2 (two) scientific articles in reputable International Scientific Journals (indexed by Scopus or Web of Science Core Collection (Thomas Reuters) or 1 (one) scientific article in a reputable International Scientific Journal and 1 (one) article in Scopus indexed proceedings, and students are still required to compile a Dissertation to be assessed by the Examining Lecturer Council in an Exam
5. In the event that a student is declared to have obtained an A dissertation score without a final exam, the student is required to produce two scientific articles that have been published or accepted for publication in an International Scientific Journal indexed by Scopus or the Web of Science Core Collection (Thomas Reuters) which has the lowest impact factor of 0.200; the average value of all stages of the Dissertation examination/seminar A; and the dissertation manuscript has been evaluated and approved by the Promoter Team and disseminated in scientific forums at the Faculty / Postgraduate.
6. The student's proposal to get an A dissertation score without a final exam is carried out by the Promoter to the Dean/Director of Post Graduate.
7. The components of the dissertation assessment include (a) research proposals, (b) special tasks to support dissertation, (c) research implementation, (d) dissertation writing, (e) scientific publications, (f) seminar results, and (g) dissertation examinations.

p. Doctoral Program Judisium

Yudisium is implemented after students can complete all academic and administrative requirements, namely:

1. Have fulfilled all academic requirements (lectures and academic assignments) and administrative and passed the final exam
2. GPA > 3.00 during the study period
3. Complete other requirements set by the study program
4. If within 1 (one) month the student has not submitted the complete judicial documents, the student's dissertation score will be lowered according to the following table:

No.	Lateness	Decreasing Value
1.	1 month	½ grade
2.	2 months	1 grade
3.	3 months	Repeat Exam

5. Judicial implementation
   a. The Yudisium was held openly attended by promoters, co-promoters, test teams, invitees, and students
   b. The head of the doctoral study program acts as the head of the judiciary
   c. In the graduation, students present the results of their research followed by the submission of reviews of student research results by the promoter, co-promoter, and the examiner team.
   d. Students are declared to have passed the graduation in accordance with the predicate of graduation from the doctoral program.

q. Doctoral Program Graduation Predicate

Students who are declared passed will receive the following graduation predicate:

1. Graduated with "Compliments" (Cumlaude), the requirements are:
   a. GPA of courses and supporting courses for the dissertation>3.75, without a B grade.
   b. Dissertation Value A.
   c. Publish the results of his dissertation research in more than one international scientific journal article title with impact factors indexed by Scopus, Web of Science (at least there is a letter of acceptance of the article).
   d. The maximum length of study is eight semesters.
2. Graduated with "very satisfactory" predicate, the requirements are:
   a. Does not meet the requirements in point (1) and,
   b. Achieved 3.50 < GPA 3.75 (total for lectures and dissertation)
3. Graduated with "Satisfactory" predicate, the requirements are:
   Achieved 3.00 GPA 3.50 (total for lectures and dissertation) This graduation predicate is determined by the Dissertation Final Examination Committee and ratified by the Dean and announced at the graduation.

4.6.4. English Class Program

The English class program is a class that uses English as the language of instruction in PBM activities including in fulfilling structured assignments and course exams. English classes are held starting in semester 2 for each batch, which is attended by students who pass the selection to take English classes. Selection is held every first semester.

English Class Student Rights

1. Students receive a certificate upon graduation that the student is from a class with English language of instruction
2. Requirements to take part in student exchanges in the form of joint research students, internships, short courses, double degree programs, and others abroad, must come from classes with English language of instruction
3. Have the opportunity to take part in a short course / summer course held by FTP UB

Implementation of English class

1. Selection is carried out in semester 1 for study programs that hold English classes
2. The selection is in the form of a written exam that must be followed by all 1st semester students in study programs that hold English classes
3. Students who pass the written exam are required to take part in a selection interview conducted by the head of the study program and/or departmental leadership
4. Students who pass the selection test will be offered to take English classes and make a statement of willingness to take English classes to completion.

English class rules

1. Students who have enrolled in English classes are not allowed to change classes
2. Under conditions of necessity, students are allowed to withdraw from English classes and move to regular classes with conditions
   a. Show evidence of a decline in the GPA in two consecutive semesters (two semesters showing a declining GPA)
   b. Loss of rights as an English class program student
   c. Make a written letter of inability to take English classes with the knowledge and signature of the student concerned, parents, academic supervisor, and head of the study program
   d. Submitting resignation to the Vice Dean for Academic Affairs FTP UB
3. If a student moves to a regular class without submitting a letter of resignation, he or she will be transferred back to an English class by the faculty
4. PKL Thesis and reports are allowed to be written in English

4.6.5. Double Degree Program

The Double Degree education program is an educational program that provides 2 (two) diplomas, from UB and universities abroad that are partners of UB, for students who have met the requirements.

a. Learners

1. Students for the Double Degree Education Program are community members who are registered as active students in Bachelor, Master, or Doctoral programs at UB.
2. Prospective students must follow and pass the selection as students in
3. Double Degree Education Program.
4. The selection system, which contains the requirements, procedures and graduation, and the partner universities abroad are determined by the Chancellor.

b. Requirements

1. During compulsory academic activities at UB, students must be registered as active students in the study program at the chosen level which organizes the Double Degree Education Program.
2. During compulsory academic activities in other universities abroad that are partners of UB, students must be registered as active students in the established study program.
3. All consequences of academic administration as a result of participation in the Double Degree Education Program in accordance with applicable regulations.

c. Financing

Students are required to pay off all forms of payment obligations related to the Double Degree Education Program in accordance with applicable regulations.

d. Curriculum

1. Double Degree Education Program students must take the curriculum that has been determined by the study program at the chosen level at the University.
2. The faculty/program leader proposes to the Chancellor the requirements and educational curriculum that must be completed in UB before students are allowed to study in the Double Degree Education program set by UB and partner universities abroad.
3. Students must pass the academic and/or administrative requirements set by partner universities abroad.
4. Double Degree is included in the regular class, not a special class.
5. To get 2 (two) diplomas, students must pass all academic obligations and complete administrative requirements at the education level chosen in the Double Degree Education Program set by UB and partner universities abroad.

e. Diplomas and Degrees

1. Diplomas from 2 (two) study programs at UB and other universities abroad that are partners are given to students who have completed

all the Double Degree Education Program curricula at the level chosen legally and according to the provisions.

2. Title designations from other foreign universities that are partners follow the designation rules imposed by these universities.

4.6.6. Credit Transfer Program (Credit Transfer)

The credit transfer program is a lecture program that is partially implemented in other universities. Lectures carried out at other universities are recognized as credits that can be converted into credits with the appropriate courses.

4.6.7. Cooperation Guidance Program (Joint Supervision)

The implementation of research outside Universitas Brawijaya either in research centers or other universities can be guided by external supervisors. The lecturer becomes a mentoring lecturer with the main supervisor being a lecturer of FTP UB. The supervising lecturer must follow all the processes of carrying out the final project such as mentoring, proposal seminars, and final exams. If FTP UB students carry out research outside of UB in order to help research projects for lecturers/researchers outside UB, the study program and department must evaluate the satisfaction of research partners as an evaluation material and improve research collaboration in the future.

4.7. STUDY SUCCESS EVALUATION

4.7.1. Degree program

a. Evaluation of Final Semester Study Success

Evaluation of the success of the end-of-semester study is carried out at the end of each semester, including the courses taken by students in that semester. The results of this evaluation are mainly used to determine the study load that may be taken in the next semester based on the following provisions:

tabell 4.9 Study Load According to Semester IP

GPA	Credits Load
3.00	22 – 24 credits
2.50 – 2.99	19 – 21 credits
2.00 – 2.49	16 – 18 credits
1.50 – 1.99	12 – 15 credits
< 1.50	< 12 credits

b. Evaluation of First Year Study Success

Is an evaluation of the success of the study conducted after students have studied for two cumulative semesters (excluding academic leave). Students are allowed to continue their studies if they meet the following requirements:

1. Collect at least 20 credits.
2. Achieve a GPA (GPA) of at least 2.00 which is calculated from 20 credits of the best course scores.
3. Meet other requirements determined by the faculty.

c. Evaluation of the Success of the Second Year Study

Is an evaluation of the success of the study carried out after students have studied for four cumulative semesters (excluding academic leave). Students are still allowed to continue their studies after the second year, if they meet the following requirements:

1. Collect at least 48 credits.
2. Achieve a minimum GPA of 2.00 which is calculated from 48 credits of the best course scores.

d. Evaluation of the Success of the Third Year Study

Is an evaluation of the success of the study carried out after students have studied for six cumulative semesters (excluding academic leave). Students are still allowed to continue their studies after the third year, if they meet the following requirements:

1. Collect at least 72 credits.
2. Achieve a minimum GPA of 2.00 which is calculated from 72 credits of the best course scores.

e. Evaluation of the Success of the Fourth Year Study

Is an evaluation of the success of studies conducted after students have studied for eight cumulative semesters (excluding academic leave). Students are still allowed to continue their studies after the fourth year, if they meet the following requirements:

1. Collect at least 96 credits.
2. Achieve a minimum GPA of 2.00 which is calculated from 96 credits of the best course scores.
3. The final project will be evaluated every semester through a mechanism regulated by each faculty.

f. Evaluation of Study Success at the End of the Undergraduate Study Program

The number of credits that must be collected by a student to complete undergraduate study is 144-160 credits including thesis/other assignments. The minimum number of credits is determined by each department within the distribution limit. Students who have collected at least the minimum number of credits above are declared to have completed the undergraduate study program if they meet the following requirements:

1. Grade Point Average (GPA) of at least 2.00.
2. The D/D+ score does not exceed 10% of the total credit load, except for Citizenship Education, and Religion courses which are not allowed to get D/D+ scores.
3. No E value.
4. Pass the undergraduate exam with a score as low as C.

If the achievement index is less than 2.00, then the student concerned must improve the value of the course as long as the study period limit has not been exceeded. Improvements must be made in the following semester when the courses to be repaired are offered. For each subject that is corrected, the best score is used for evaluation.
For transfer students from Diploma III, the maximum study period in UB is 4 years, from Diploma II is 5 years and from Diploma I is 6 years. For transfer students, the length of study at the original university is not counted as the study period. The evaluation of the success of the study is carried out by the Deputy Dean for Academic Affairs
at the end of each school year. In summary, the evaluation of the success of the study is summarized in the following table:

Table 4.10 Evaluation of Study Success

Year	Credit	GPA min	Penalty
1	20	2.00 of the best 20 credits	Warning letter
2	48	2.00 of the best 48 credits	Cannot continue studies (DO)
3	72	2.00 of the best 72 credits	Cannot continue studies (DO)
4	96	2.00 of the best 96 credits	Cannot continue studies (DO)
End of Study	144-160	2.00	If the GPA < 2.0 must improve the MK value if there is still time

4.7.2. Master's Program

Master's program education for participants with undergraduate education in a field is designed in a period of four semesters (2 years). Education can be taken in less than four semesters and a maximum of 8 semesters (4 years). For students who have not been able to complete their studies in four years without justifiable reasons, the student is declared to have failed to take part in the master's program.

The length of study does not include academic leave (terminal), and each student is entitled to a maximum of 2 (two) semesters of academic leave during his studies. Academic leave can be taken by students on the condition that (1) long-term health problems/illness, so that it is not possible to carry out the learning process, (2) maternity leave, (3) domiciled in a place where it is not possible to carry out the learning process, (4) other reasons that can be accepted by the Head of the Postgraduate Program Organizer.

a. Failed Study

Students are declared failed studies if at least one of the following:

1. GPA < 3.0 for the best 16 credits as stipulated in the evaluation of study success, or
2. Did not pass the thesis proposal exam on the second chance, or
3. Did not pass the thesis exam on the second chance, or
4. The study period has expired and has not been able to complete the study load according to applicable regulations.

b. Success Evaluation

The evaluation of the study success of the Masters Education Program is:

1. Students who at the end of the first semester have not been able to achieve a GPA = 3.0 for the best eight credits will receive a warning from the faculty
2. Students who at the end of the fourth and third active semesters have not been able to achieve a 3.0 GPA for the best 16 credits, then the student concerned is declared a failure and is not allowed to continue his studies.

Thesis Proposal Preparation

1. For students who have taken a minimum of 14 credits with a minimum GPA of 3.0 and have passed the Research Methods course, the person concerned can formally submit a thesis research proposal.
2. The thesis research proposal must be approved by the Advisory Commission and be defended and passed in front of the Research Proposal Assessment Team (i.e. the supervisory commission plus two examiners who have been appointed)**Head of the**

Postgraduate Program Organizer based on the proposal of the Head of the Study Program).

3. Students who have passed the research proposal exam and all improvements.

4.7.3. Doctoral Program

a. Failed Study

Students are declared failed studies if:

1. Not passing the qualifying exam on the second chance, or
2. Did not pass the dissertation proposal exam on the second chance, or
3. Did not pass the dissertation exam on the second chance, or
4. The study period has expired (more than 14 semesters) and has not been able to complete the study load according to applicable regulations.
5. No re-registration for 3 consecutive semesters

b. Evaluation of Study Success

The evaluation of the success of the doctoral education program studies are:

1. Students who at the end of the first semester have not been able to achieve a minimum GPA of 3.0 for the best 12 credits will be given a warning to try their best to improve their academic performance in the following semesters.
2. Students who at the end of the first semester can achieve a GPA of 3.00 for the best 12 credits, then the student concerned can apply for a qualifying exam in the second semester.
3. Courses that score below A can be repeated and implemented in the following semester.

4.8. STUDY TIME LIMIT

4.8.1. Degree program

The undergraduate program must be completed in no more than seven years, starting from the time the student is enrolled as a student. If it turns out that up to the specified study period, the student has not been able to complete his undergraduate studies, then the person concerned is declared unable to continue his studies (***Drop Out***).

The study period of 7 (seven) years includes academic/terminal leave, but for students who do not re-register without the permission of the Chancellor, it will still be counted as a study period. Each student is entitled to a maximum of 4 (four) semesters of academic leave during his studies. Academic leave can be taken by students on the condition that (1) long-term health problems/illness, so that it is not possible to carry out the learning process, (2) maternity leave, (3) domiciled in a place where it is not possible to carry out the learning process, (4) other reasons that can be accepted by the Program Manager.

4.8.2. Master's Program

The study load of the Master program is a minimum of 36 credits including a thesis. The Master Program (for participants with a bachelor's degree) is designed in a period of 4 (four) semesters, can be taken in less than 4 (four) semesters and a maximum of 8 (eight) semesters (4 years). For students who have not been able to complete their studies in 4 (four) years without justifiable reasons, the student is declared to have failed to take part in the master's program. Academic or terminal leave does not count as the length of study, and each student is entitled to a maximum of 2 (two) semesters of academic leave during his studies.

Academic leave can be taken by students on the condition that (1) long-term health problems/illness, so that it is not possible to carry out the learning process, (2) maternity leave, (3) domiciled in a place where it is not possible to carry out the learning process, (4) other reasons that can be accepted by the Head of the Postgraduate Program Organizer.

4.8.3. Doctoral Program

The study load for the doctoral program is for participants with a master's degree in one field, at least 42 credits scheduled for 6 (six) semesters and can be taken in less than 6 (six) semesters with a maximum study length of 14 (fourteen) semesters. The study load for the doctoral program for participants with S2 education is not in the same area, at least 52 credits are scheduled for 5 (five) semesters and can be taken in less than 6 (six) semesters with a maximum study duration of 14 (fourteen) semesters. Students who apply for the dissertation exam for less than 5 semesters must receive consideration from the Doctoral Committee to assess the merits of achievement. Eligibility for achievement is measured by the number of international scientific publications in Q3 that have been published, the quality of published articles and journals and other achievements that support student academic programs.

4.9. INTERMEDIATE SEMESTER PROGRAM IN THE GRADUATE PROGRAM

4.9.1. Definition

The intermediate semester program is a lecture program that is carried out during even semester holidays.

4.9.2. Destination

The intermediate semester program aims to provide opportunities for students to improve the value of courses that have been taken or take new courses in order to increase the cumulative achievement index and shorten the study period and avoid dropping out of study.

4.9.3. Assessment

The implementation of the intermediate semester program includes face-to-face activities, structured assignments, quizzes, independent assignments and final exams.

4.9.4. Academic Curriculum and Regulations

The curriculum and academic regulations in the intermediate semesters still refer to the curriculum and academic regulations in force at that time. The courses taken in the intermediate semester are theoretical subjects, not practical courses. If the repeated courses are courses that include practicum, then the theory is repeated, while the practical value is taken from the previous value. Students who have just taken a course are not allowed to take courses that have a practicum.

4.9.5. Study Load

The maximum study load for the intermediate semester is 9 credits.

4.9.6. Student Requirements

Students who are allowed to take intermediate semesters are students who repeat grades courses**C+,C, D+, D and E or students who have just taken new courses on condition that they have a GPA > 3.5.**

4.9.7. Score

The value of the courses taken in the semester between**maximum A.**

4.9.8. Number of Face-to-face

The intermediate semester is held for at least 8 weeks and/or held face-to-face at least 16 times including the mid-semester and end-semester exams.

4.10. RECOGNITION OF LEARNING RESULTS FROM OTHER PTS TO UNIVERSITAS BRAWIJAYA

4.10.1. Limitations of Studying at Other Colleges

1. Universitas Brawijaya students are allowed to study at other universities to complete some activities/academic burdens in the study program they take at Universitas Brawijaya.
2. Studying at other universities is the participation of students in learning activities within a certain period of time at other universities, both at home and abroad, which have cooperation with Universitas Brawijaya.

4.10.2. Academic Burden and Form of Activities

1. Activities/academic burdens that can be taken through learning activities at other universities are limited to no more than 50% of the

academic burden of the applicable curriculum in the study program taken by students at Universitas Brawijaya.

2. Studying in other universities, as referred to in article 1, includes the participation of Universitas Brawijaya students in the form of activities:
    a. Double degree program (Double degree program),
    b. Twin Program (Twinning program),
    c. sandwich program,
    d. Student Exchange Program (Student Exchange),
    e. Other equivalent Academic Programs.
3. As long as they are legally studying at other universities, students are exempted from tuition fees at Universitas Brawijaya.
4. The conditions for temporary study, the form of the program, the study load that can be taken at other universities and other conditions are regulated by the Chancellor.

4.10.3. Recognition of Study Results in Other Universities

1. Learning outcomes from academic activities/loads taken legally, institutionally and fulfilling academic requirements from other universities can be equalized after going through verification.
2. The Dean of the Faculty/Head of Program/Director of the Postgraduate Program forms a committee at the suggestion of the Head of the Study Program/Department for the verification task as referred to in paragraph 1.
3. Procedures for verification and recognition of learning outcomes are regulated in the Faculty/Program/Postgraduate Program Handbook.
4. All costs incurred related to learning activities and recognition of learning outcomes at other universities are the responsibility of the student concerned.

4.10.4. Degree Award

1. Students who complete part of the study load at other universities legally and pass verification can be given a graduation degree according to the study program and level of study they take.
2. Further provisions regarding the awarding of titles are regulated in the Dean's Decree.

4.11. STUDENTS TRANSFER FROM OTHER UNIVERSITY TO UB

1. Students from other universities must meet the following main requirements:
    a. Not a forced college dropout (dropped out) and have never received and/or are undergoing academic sanctions from the original university.

b. The original field/study program is in accordance with the one at Universitas Brawijaya.
c. The original study program is accredited by BAN with at least an A rating.
d. Have studied continuously at the original university for:
    1) Vocational Program (Diploma III): a minimum of 2 (two) semesters and a maximum of 3 (three) semesters, provided that:
        a) 2 (two) semesters: have achieved a minimum of 36 credits with a GPA 3.50, or
        b) 3 (three) semesters: 54 credits have been reached with GPA 3.00.
    2) Undergraduate Program: a minimum of 2 (two) semesters and a maximum of 4 (four) semesters, provided that:
        a) 2 (two) semesters: have achieved a minimum of 40 credits with a GPA 3.50, or
        b) 4 (four) semesters: 80 credits have been reached with GPA 3.50.
    3) Master Program : minimum 1 (one) semester and maximum 2 (two) semesters, provided that:
        a) 1 (one) semester: has achieved a minimum of 15 credits with a GPA 3.50, or
        b) 2 (two) semesters: 30 credits have been reached with GPA 3.50.
    4) Doctoral Program: a minimum of 1 (one) semester and a maximum of 2 (two) semesters, provided that you have taken 12 credits with a GPA 3.50
    5) Get permission/approval to move from the head of the university of origin, and submit evidence of other legal academic activities.
e. Have a valid certificate for Academic Potential test results issued by an authorized institution with a score of > 450 for the Vocational program, a score of > 500 for the Bachelor, and a score of > 550 for the Postgraduate program.
f. Students submit a letter to the Chancellor of Universitas Brawijaya with a copy of the letter to the Dean of the Faculty/Head of Program/Director of the Postgraduate Program in charge of the intended study program.

2. In order to guarantee the quality of graduates, Faculties/Programs/Postgraduate Programs may set additional requirements, other than those stipulated in paragraph 1.

4.11.1. Capacity

1. Acceptance of transfer students from other universities must consider the capacity of the intended study program.
2. The Dean of the Faculty determines the capacity for transfer students from other universities.

4.11.2. Equivalence Test and Recognition of Study Loads That Have Been Taken

1. Students from other universities who have met the administrative and academic requirements can undergo the Equivalence Test.
2. The Equality Test is carried out by a committee formed by the Dean of the Faculty/Chairman
3. Program/Director of Postgraduate Program at the suggestion of the Head of Study Program/Department.
4. Students who have passed the Equivalence Test are entitled to receive recognition for the learning outcomes they have taken at the original university.
5. Recognition of learning outcomes from other universities and the determination of the curriculum that must be taken by students to complete education in the intended study program is determined by the Dean of the Faculty/Head of Program/Director of the Postgraduate Program at the suggestion of the Head of the Study Program/Department.
6. The cost of conducting the Equivalence Test and recognition of student learning outcomes from other universities is the responsibility of the transferring student.
7. The requirements, procedures for the Equivalence Test and recognition of learning outcomes that have been taken by students at their home universities and other related matters are regulated in the University/Faculty/Postgraduate Program Handbook.

4.12. LEARNING INDEPENDENT PROGRAM

The Independent Learning Policy - Independent Campus is in accordance with Permendikbud Number 3 of 2020 concerning National Standards for Higher Education, in Article 18 it is stated that the fulfillment of the learning period and burden for students of undergraduate or applied undergraduate programs can be carried out: 1) following the entire learning process in the study program at tertiary institutions according to the period and study load; and 2) following the learning process in the study program to fulfill part of the time and learning load and the rest following the learning process outside the study program.

Through Merdeka Learning – Merdeka Campus, students have the opportunity for 1 (one) semester or equivalent to 20 (twenty) credits of studying outside the study program at the same university; and a maximum of 2 (two) semesters or equivalent to 40 (forty) credits of studying in the same study program at different universities, learning in different study programs at different universities; and/or learning outside of Higher Education.

Implementation of Independent Learning - Merdeka Campus is implemented in the Merdeka Curriculum. Not all students are required to take an independent curriculum. This curriculum applies to interested students. The consequences of costs arising from the implementation of this independent curriculum are borne by the students. The Independent Curriculum in FTP is guided by the Independent Learning Guide – Independent Campus from the Ministry of Education and Culture and LP3M UB which consists of two parts:

1. Learning outside the study program at Universitas Brawijaya which consists of 20 credits
2. 40 credits of learning carried out by taking 1 or 2 choices from 8 choices provided in Merdeka Learning – Merdeka Campus, namely:
   a. Apprenticeship
   b. Teaching Assistant in Education Unit
   c. Research/Research
   d. Humanitarian Project
   e. Entrepreneurial Activities
   f. Independent Project
   g. Building Villages/Thematic Real Work Lectures (KKNT)
   h. Student exchange

Students can take number 1 or 2 or both.

Figure 4.1. Choices in Independent Learning-Independence Campus

4.12.1. Learning Outside the Study Program at Universitas Brawijaya

Learning outside the study program can be carried out starting in semester 2. Students can take courses outside the study program at FTP UB with courses coded TPF or MKU. The MKU code shows the general course code consisting of Religion, Citizenship, Pancasila, and Indonesian. The TPF code indicates that the course is a joint course managed by the faculty and is a subject of a minimum of two study programs in FTP. Courses coded for MKU and TPF can be taken as MK across study programs in FTP. The courses that can be taken outside the study program outside FTP UB are courses coded MKU. For this MKU coded course, students can take it outside the study program either in FTP or outside FTP. In addition to the MK code TPF and MKU,

MBKM other than student exchange outside the PT is held in one semester, in that semester students are not allowed to take courses at FTP UB. The process of taking the Constitutional Court outside the study program is carried out by including it on the Study Plan Card (KRS) in consultation with the academic supervisor. Students process KRS according to applicable procedures.

4.12.2. Lectures Outside College

Students who take the independent curriculum / independent learning are required to take 1-2 choices from the 8 options offered. Each option weighs 20 credits. Both options are taken in semesters 7 and 8. For student exchange, students are accommodated to take courses outside UB starting before semester 7 and not always having a total of 20 credits. Options that can be integrated with the thesis thesis are those that contain at least one of the elements of design, development, and research including:

1. Research outside Universitas Brawijaya
2. Internship in the industry
3. Entrepreneurship
4. Independent project
5. Real work lectures if it requires a research project in its implementation.

4.12.2.1. Internship/Work Practice

So far, students lack work experience in the industry/real professional world so they are not ready to work. Meanwhile, short-term internships (less than 6 months) are not sufficient to provide students with industry experience and competence. Companies that accept internships also state that short-term internships are not useful, and even interfere with activities in the Industry.

The objectives of the internship program include:

1. **1 semester internship program**, with 20 credits credit will provide sufficient experience to students, direct learning in the workplace (experiential learning). During the internship students will gain hard skills (complex problem solving skills, analytical skills, etc.), as well as soft skills (professional/work ethics, communication, collaboration, etc.).
2. The industry gets talent that, if suitable, can be recruited immediately, thereby reducing the cost of recruitment and initial/induction training. Students who are familiar with the workplace will be more stable in entering the world of work and careers.
3. Industries that can be used as internships are medium to large industries whose eligibility is determined by the supervisor and head of the study program.

4. Industrial problems will flow to universities so that updating teaching materials and lecturers' learning and research topics in universities will be more relevant.
5. Students will learn to solve real problems in the world of work.
6. Internship activities can be integrated with the final project if in the implementation of the internship there are aspects of research, design, and development.

4.12.2.2. Teaching Assistant in Education Unit

Learning activities in the form of MBKM Teaching are carried out by students in educational units such as elementary, middle, and high schools. Schools where teaching practice can be located in urban or remote areas.

The objectives of the teaching assistance program in educational units include:

1. Provide opportunities for students who have an interest in the field of education to participate in teaching and deepening their knowledge by becoming a teacher in the education unit.
2. Helping to improve equity in the quality of education, as well as the relevance of primary and secondary education to higher education and the times.

4.12.2.3. Research/Research Outside Higher Education

Students who have a passion to become researchers can make it happen through an independent learning curriculum in the form of research activities at research institutes/study centers or outside Universitas Brawijaya. Through research, students can develop critical thinking, something that is very much needed for various scientific groups at the higher education level. With the ability to think critically, students will be able to explore, understand, and be able to do research methods better. For students who have an interest and desire to work in the research field, the opportunity to do an internship in a research center laboratory is their dream. In addition, laboratories/research institutes or several universities abroad sometimes lack research assistants when working on short-term research projects (1 semester – 1 year).

Research for independent students in learning can also be carried out outside the University of Brawijaya as a collaboration between universities and their students as joint research students. The purpose of research at other universities is to provide broader insights, interact with various situations, and experience research at other universities, especially abroad.

The objectives of the research/research program include:

1. The quality of student research is expected to be improved. In addition, student experience in large research projects will strengthen the research talent pool topically.
2. Students gain research competence through direct supervision by researchers at research institutions/study centers or researchers/lecturers from other universities.

3. Improving the ecosystem and the quality of research in Indonesian laboratories and research institutions by providing research resources and regeneration of researchers from an early age.

4.12.2.4. Humanitarian Project

Universities have so far helped a lot in dealing with disasters through humanitarian programs. So far, student involvement is voluntary and only short term. In addition, many international institutions (UNESCO, UNICEF, WHO, etc.) have conducted in-depth studies and made development pilot projects in Indonesia and other developing countries. Students with young souls, scientific competencies, and interests can become "foot soldiers" in humanitarian and other development projects both in Indonesia and abroad.

The objectives of the humanitarian project program include:

1. Prepare excellent students who uphold human values in carrying out their duties based on religion, morals, and ethics.
2. Train students to have social sensitivity to explore and explore existing problems and contribute to providing solutions according to their respective interests and expertise.

4.12.2.5. Entrepreneurial Activities

The Independent Campus policy encourages the development of student entrepreneurial interests with appropriate learning activities programs. Learning activities in the form of entrepreneurship, both those that have not been or have been determined in the curriculum of the study program. Requirements are regulated in the academic guidelines issued by the College.

The objectives of the entrepreneurial activity program include:

1. Provide students who have an interest in entrepreneurship to develop their business early and be guided.
2. Dealing with unemployment problems that result in intellectual unemployment from among scholars.

4.12.2.6. Independent Study/Project

Many students have a passion for realizing great works that are contested at the international level or works of innovative ideas. Ideally, independent studies/projects are carried out to complement the curriculum already taken by students. Colleges or faculties can also make independent studies to complete topics that are not included in the class schedule, but are still available in the syllabus of the study program or faculty.

Independent project activities can be carried out in the form of cross-disciplinary group work. Independent studies/projects can be a complement or substitute for the courses that must be taken. The equivalence of independent study activities into courses is calculated based on the contribution and role of students as evidenced in activities under the coordination of the supervisor.

4.12.2.7. Building a Thematic Village/Real Work Course (KKN)

Thematic Real Work Lecture (KKNT) is a form of education by providing learning experiences for students to live in the community outside the campus, which directly together with the community identify potentials and deal with problems so that they are expected to be able to develop village/regional potential and formulate solutions. for problems in the village. KKNT activities are expected to hone partnership soft skills. Cross-disciplinary/scientific team collaboration (cross-competence), and student leadership in managing development programs in rural areas. KKNT in this independent learning activity can be carried out to help home industries or small industries in the village according to the scientific competence of the student study program.

So far, universities have implemented the KKNT program, it's just that the semester credit units (credits) cannot or can be recognized in accordance with the independent campus program whose credit recognition is equivalent to 6 months or 20 credits, with the implementation based on several models. It is also hoped that after the implementation of the KKNT, students can write down the things they do and the results in the form of a final project.

The objectives of the program to build a real work village/college include:

1. The presence of students for 6 – 12 months can provide opportunities for students to utilize their knowledge, technology, and skills in collaboration with many stakeholders in the field.
2. Assist in accelerating development in rural areas together with the Ministry of Villages of PDTT.

4.12.2.8. Student exchange

Student exchanges are held to shape several student attitudes as set out in the Minister of Education and Culture Regulation (Permendikbud) Number 3 of 2020, namely respecting cultural diversity, views, religions, and beliefs, as well as other people's original opinions or findings; and work together and have social sensitivity and concern for society and the environment.

The objectives of student exchange include:

1. Studying across campuses (domestic and overseas), living together with family at the destination campus, students' insight into Bhinneka Tunggal Ika (Unity in Diversity) will develop, and cross-cultural and ethnic brotherhood will be stronger.
2. Building student friendships between regions, ethnicities, cultures, and religions, thereby increasing the spirit of national unity and integrity.
3. Organizing the transfer of knowledge to cover educational disparities between domestic universities, as well as the condition of domestic higher education and abroad.

V. EDUCATION ADMINISTRATION

The implementation of educational administration at the Faculty of Agricultural Technology is regulated and implemented centrally, by utilizing the online SIAKAD (Academic Information System) to meet the demands of the semester credit system.

5.1 GENERAL EXPLANATION

5.1.1 Educational Guidelines

This Education Guide is provided before the course of a particular academic year begins, and contains, among other things:

a. Academic Calendar, which regulates:
   1. Start and end time of lectures, exams, re-registration and other academic activities in odd and even semesters.
   2. Dies Natalis, Graduation and other ceremonial activities.
   3. Student activities.

b. Explanation of the Semester Credit System.

c. Explanation of Educational Objectives, for Undergraduate, Masters, Specialist and Doctoral Programs.

d. Explanation of Academic Regulations related to lectures, examinations, evaluation of study success, student transfers, and others.

e. Explanation of the management of education administration.

f. Explanation of guidance counseling and academic advisory.

g. An explanation of the manners of life on campus.

5.1.2 Counseling and Academic Advisory Guidance (PA)

(Explanation in Chapter VI)

5.1.3 Student Identification Number (NIM)

NIM consists of 15 digit numbers which have meaning based on codes. The explanation regarding the digit code in the Student Identification Number (NIM) is listed in Table 5.1.

Table 5.1 Information on the Digit Code of the Student Identification

Keterangan	Digit ke														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Tahun terdaftar di UB	■	■													
Jenjang Pendidikan / Strata			■												
Fakultas / Program				■	■										
Program Studi						■	■								
Jalur Penerimaan / Seleksi								■	■						
Semester Penerimaan										■					
Kelas (Indonesia / Inggris)											■				
Kampus UB												■			
Nomor Urut mahasiswa													■	■	■

Number

5.2 IMPLEMENTATION OF CREDIT SYSTEM ADMINISTRATION

Several stages of activities in each semester are required to carry out the administration of the credit system, namely:

5.2.1 Registration Preparation

The equipment required at this stage of preparation for registration includes:

a. List of names of Academic Advisors (PA) and the students they supervise.
b. Instructions for charging and the cards, namely:
   1. Study Plan Card (KRS).
   2. Study Plan Change Card (KPRS).
   3. Study Result Card (KHS).

5.2.2 Study Plan Card Filling (Online)

Filling in the KRS online is carried out in the following stages:

a. Taking registration complete

Students come to the Academic Sub-Section of the Faculty of Agricultural Technology to take complete registration by showing a valid Student Identity Card for the semester.

b. Determination of Semester Study Plan

The determination of the semester study plan is carried out with the guidance of the appointed Academic Advisory Lecturer (PA Lecturer). For new students, the first semester study plan is required to take a predetermined study load. The determination of the next semester's study plan is determined based on the achievements achieved by students in the previous semester. The amount of study load that may be taken in the next semester is determined by the achievement index that has been achieved. Students plan the courses to be taken by inputting data on SIAKAD. Students are required to print the KRS and must seek approval from the Academic Advisor lecturer, then submit it to the Academic Sub Division of the Faculty of Agricultural Technology, Universitas Brawijaya.

c. Change of Study Plan

Changes in the study plan are replacing one course with another course in the same semester. Changes in the study plan are carried out no later than the end of the second week since the lecture begins and must obtain approval from the PA lecturer and immediately reported to the Academic Sub-Division of the Faculty of Agricultural Technology.

d. Course Cancellation

Cancellation of courses is the cancellation of the plan to take courses which are therefore not tested in the semester concerned.
Students who wish to cancel a course are given the opportunity no later than the second week of the first week of the semester in question. This cancellation must be approved by the PA lecturer, and immediately reported to the Academic Sub-Division of the Faculty of Agricultural Technology.

e. Study Results

Study results are the scores obtained by students for all courses programmed in the KRS and included in the Study Results Card (KHS).

5.2.3 Lectures, Seminars, Practicum and the like

Students are required to attend lectures, seminars, practicums and similar academic activities in accordance with their study plans in an orderly and orderly manner according to applicable regulations. The schedule for lectures and practicum is regulated by the Faculty.

5.2.4 Implementation of Course Exams

The stages that need to be considered in administering the exam are as follows:

a. Planning Exam Schedule

In accordance with the academic calendar, the schedule for the mid-semester and end-semester examinations must be carefully planned in advance and announced to students and lecturers.
The exam schedule is announced no later than a week before the exam takes place, so that students and lecturers can arrange the necessary preparations as early as possible. The exam schedule is prepared together with the preparation of the lecture schedule and practicum

schedule. Mid-semester examinations and end-of-semester examinations are held by a committee determined by the Dean.

b. Exam Implementation

Students who are allowed to take the exam are students who have attended at least 80% of the lectures for the semester in question and meet other requirements. For students who attend courses less than 80%, are not entitled to take UAS, however, they still consider the assessment components other than the UAS that have been obtained for that course. The test results in the form of final grades and their components (mid-semester test scores, practicum grades, quiz scores and others) are announced to students. Students who cheat in exams (cheat, take other students' exams and or students whose exams are taken by someone else) will be subject to sanctions for canceling exams for all courses in the relevant semester.

5.2.5 Value Administration

a. Study Result Card (KHS)

Exam results must be entered online in the SIADO (Lecturer Information System) online by the supervisor to be used as the basis for making KHS and KRS for the next semester by the Academic Sub-Section. The KHS semester is made in 4 (four) copies, one each for students, parents/guardians, the Department and the Academic Sub-Section.

b. Storage of Student Assessment Results

Storage of student assessment results is carried out by the Academic Sub-Division of the Faculty of Agricultural Technology. Data on student assessment results that need to be stored are:

1. List of student assessment results for each course.
2. KHS which includes the cumulative value of the student's assessment results in each semester and their achievement index.
3. Cumulative value for all courses from the first semester up to the semester concerned.
4. Documentation of student learning assessment results must be complete with all assessment tools archived also in the administration of the Department

5.3 STUDENT REGISTRATION

5.3.1 Destination

a. To control the implementation of academic activities in each semester.
b. To find out the student body and the number of students who actively participate in academic activities in each semester.
c. To get data about student activities and status.

5.3.2 Type of Student Registration

a. Administration Registration

Administrative registration is an activity to obtain registered status as a student at the Faculty of Agricultural Technology, Universitas Brawijaya. Administrative registration activities must be carried out by all students in an orderly manner at the beginning of each semester in accordance with the provisions of the academic calendar.

1. New Student Prospective Administration Registration

a) Undergraduate Program Registration Requirements

1) Each prospective new student is required to come alone to complete the administrative registration.
2) Submit an entrance examination card.
3) Bring the original certificate / STTB and submit a copy / photocopy.
4) Bring the original report card and submit a copy/photocopy.
5) Bring the National Examination Score and submit a copy / photocopy of it.
6) Bring a birth certificate / birth certificate and submit a copy / photocopy of it.
7) Bring a certificate of citizenship for citizens of foreign descent and submit a copy/photocopy of it.
8) Submit a Health Certificate from the Universitas Brawijaya Health Team.
9) Fill out the administrative registration form for new student candidates and sign the Statement Letter issued by Universitas Brawijaya on a seal.
10) Submit proof of tuition payments and other payments in accordance with established regulations.
11) Submit a copy/photocopy of other documents specified as registration requirements.

b) Master Program Registration Requirements

1) Must meet all the administrative requirements as a new student.
2) Have fulfilled all the academic requirements specified by bringing complete original documents and submitting copies/photocopies including:
   - Bachelor's degree (S1) with a Grade Point Average > 2.75 on a scale of 0-4) or > 6.25 (on a scale of 0-10).
   - Academic Potential Test Certificate (TPA) OTO Bappenas with a minimum score of 450.
   - Certificate of English equivalent to TOEFL with a minimum score of 500 issued by an institution appointed by Universitas Brawijaya

- PAT certificates for students with undergraduate programs are not linear.

c) Doctoral Program Registration Requirements
   1) Must meet all the administrative requirements as a new student.
   2) Have fulfilled all the academic requirements specified by bringing complete original documents and submitting copies/photocopies including:
      - Master's Degree (S2) with a Grade Point Average > 3.0 on a scale of 0-4).
      - Academic Potential Test Certificate (TPA) OTO Bappenas with a minimum score of 500.
      - Certificate of English equivalent to TOEFL with a minimum score of 500 issued by an institution appointed by Universitas Brawijaya
      - PAT certificates for students with master's programs are not linear.

d) Penalty
   1) Any prospective student who does not meet the specified requirements, cannot be accepted as a student of the Faculty of Agricultural Technology, Universitas Brawijaya.
   2) Any prospective student who is late for administrative registration, for any reason cannot be justified and is considered to have resigned.
   3) Any prospective students who provide incorrect information can have their administrative registration canceled or expelled from the Faculty of Agricultural Technology, Universitas Brawijaya.
   4) There is no extension of time for administrative registration.

2. Registration (re-registration) of old student administration

a) Undergraduate and Postgraduate Program Registration Requirements
   Each old student is required to come alone to complete the registration by submitting:
   1) Completed administrative registration form.
   2) Student Identity Card for the previous semester.
   3) Proof of payment of tuition fees for the previous academic year.
   4) Evidence of payment of tuition fees for the semester/academic year concerned.
   5) Two passport photos measuring 3x3 cm.

6) For students who were not registered in the previous semester, they must obtain permission to re-register administration from the Chancellor.

b) Penalty
   1) Existing students who do not carry out administrative registration in a certain semester are declared unregistered in that semester and will still be counted as study period.
   2) Old students who are late for administrative registration for any reason cannot be justified and in that semester they are declared not to be registered as students of the Faculty of Agricultural Technology, Universitas Brawijaya.
   3) Old students who are not registered as in number 2 can apply for academic leave to the Chancellor no later than 1 (one) week from the closing of administrative registration.
   4) Old students who are not registered for 2 (two) cumulative semesters are considered to have resigned as students of the Faculty of Agricultural Technology, Universitas Brawijaya.
   5) Old students of the Postgraduate Program are required to register on a predetermined schedule, for students who do not register in the current semester are declared to have resigned.
   6) There is no extension of time for administrative registration.

b. Academic Registration

Academic registration is registration to obtain the right to participate in certain semester academic activities.

1. Academic registration activities include, among others:
   a) Completion and validation of Study Plan Card (KRS)
   b) Filling in the Study Plan Change Card (KPRS)
   c) Course cancellation
2. Consultation on study plans is an activity that must be carried out between students and academic advisory lecturers (PA) according to the academic calendar.
3. A student can become a participant in a course if he has fulfilled the applicable provisions and approved by the PA lecturer.
4. To get the approval of the PA lecturer, students must consult. Consultation methods, whether face-to-face, remotely, and others, are fully entrusted to the authority of the PA lecturer
5. PA lecturers must validate the course programs to be taken by students through the Lecturer Academic Information System (Siado)
6. KRS can be printed and signed by the PA lecturer after the MK to be taken is approved by the PA lecturer

7. The KRS that has been approved by the PA lecturer must be immediately submitted to the Academic Sub-Division of the Faculty of Agricultural Technology in accordance with the specified time.
8. If the student is unable to submit the KRS for justifiable reasons, the KRS is collected according to the schedule and may be collected by others by bringing a power of attorney
9. **KPRS procedure**
   a. Students are allowed to make changes to their study plans due to:
      - The course schedule for this course clashes with the schedule for other courses
      - The number of students taking these courses does not meet the set quota, which is a minimum of 10 students
   b. Students must consult with their academic supervisor regarding changes to the study plan by bringing their KPRS
   c. If the academic supervisor agrees to change the study plan, he must sign the KPRS
   d. Students submit their KPRS to the academic and class service department
   e. Class service will transfer student attendance from the previous class to the new class
   f. KPRS can be done no later than 2 weeks after the lecture runs
   g. If the student does not report to the academic and class service sub-section, then the KPRS is invalid and cannot be processed
   h. The transfer of attendance must be done and if it is not done it will cause the student to be considered absent from college and can have an impact on not being allowed to take UAS if attendance is less than 80%

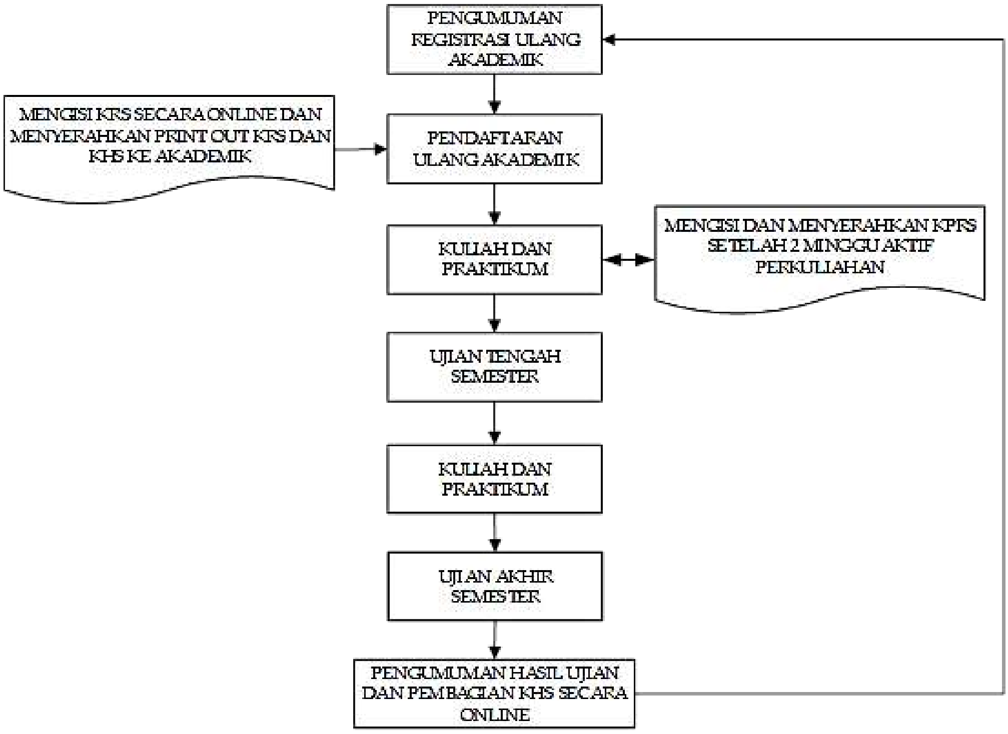


Figure 5.1. Completion of Academic Registration in One Semester

As shown in Figure 5.1, three activities that must be carried out by students before attending lectures are re-registration, filling out and submitting KRS and KPRS (if needed).

5.4 TERMS OF PAYING STUDY FEES

5.4.1 New students

Every new student who is accepted at the Faculty of Agricultural Technology, Universitas Brawijaya through the SBMPTN and SNMPTN channels, pays tuition fees in the form of a Single Tuition Fee (UKT). Meanwhile, new students who are accepted through the independent pathway are required to pay the Educational Development Contribution (SPP), the Educational Facility and Development Contribution (SPFP) and other costs, the amount of which is determined by the Rector's Decree. Payment of these fees at the time of administrative registration, where the SPP can be paid at once in one year or in two stages at the beginning of each odd and even semester. Meanwhile, SPFP and SPIP fees and other costs are paid once while being a student and paid in full at the time of the new student administration registration activity.

5.4.2 Old Student

a. Every student who carries out administrative registration is required to pay tuition fees which can be paid at once in one year or in two stages at the beginning of each odd and even semester.
b. For students who do not re-register for 1 semester without the permission of the Chancellor, they are still required to pay tuition as long as the person concerned is inactive and the payment is made at the time of registration where the person concerned will be active again by submitting an active application again.
c. If a student obtains the Chancellor's permission for academic leave, he/she is freed from the obligation to pay tuition fees during the academic leave. If an academic leave permit is granted after the deadline for applying for academic leave, it is still required to pay tuition fees. This provision also applies to new students.
d. The amount of the SPP is determined by the Rector's Decree.

5.5 STUDENT IDENTIFICATION CARD (KTM)

Registered students will have a KTM in a physical plastic card with a "barcode number" and an RFID registration confirmation with a "hot stamp".

a. KTM is accepted to students who have completed complete administrative registration.
b. If there is an error in filling out the KTM, the student must report it to the Bureau
c. Academic Administration and Cooperation (BAAK) to be replaced with a new KTM.
d. KTM is proof of being registered as a student of Universitas Brawijaya in the semester concerned.

5.6 STUDENT MUTATIONS

Student transfer is a change in student status which includes academic and administrative status. Student mutations can be grouped as follows:

5.6.1 Academic Leave

a. Academic leave is a postponement of administrative registration within a certain period of time with the permission of the Chancellor and can be carried out starting in the third semester.
b. A student can apply for academic leave of a maximum of 4 (four) semesters for vocational, undergraduate, double degree programs and a maximum of 2 (two) semesters for postgraduate programs including specialists.
c. The period of academic leave is not counted as the study period and the study period is still taken into account for students who do not re-register without the permission of the Chancellor.
d. Students can take academic leave for the following reasons:
    1. Health problems / illness for a long time.
    2. Maternity leave.

3. Domiciled/worked in a place where it is not possible to carry out the learning process.
4. Other acceptable reasons.

e. Applications for academic leave are submitted to the Chancellor accompanied by strong reasons, known by the Dean and parents/guardians/student institutions concerned. This submission is no later than 1 (one) week from the closing of academic registration.

5.6.2 Student Assignments

Faculty of Agricultural Technology Universitas Brawijaya accepts students as study assignments from Government/private Agencies with the following requirements:

a. Certified Academic/Bachelor/Bachelor/Master of State University.
b. Meet the academic and administrative requirements specified.
c. Comes from the appropriate Faculty or study program.
d. Acceptance of study assignments is carried out by the Chancellor at the discretion of the Dean/Director of the Postgraduate Program and is carried out as long as the capacity allows. Study assignment students are required to submit a written application to the Chancellor with a copy to the Dean/Director of the Postgraduate Program no later than 1 (one) month before the start of the new academic year lectures.
e. Letter of Recommendation from the relevant agency/Government.

5.6.3 Transferring to Another College

a. Students of the Faculty of Agricultural Technology, Universitas Brawijaya who will transfer to other universities, must submit an application to the Chancellor with a copy to the Dean, along with the reasons for the move.
b. Students who have transferred to other universities cannot be re-admitted as students of the Faculty of Agricultural Technology, Universitas Brawijaya.

5.6.4 Drop Out (Drop Out)

Dropout students are students who do not meet the requirements for evaluating the success of studies at the end of each year and at the end of the study, or students who are not registered because they do not register according to the provisions of the faculty/programme.

a. The number of students dropping out of college each semester is reported by the Dean to the Chancellor.
b. The Chancellor issues a Decision Letter on dropping out of college for the student concerned.

5.6.5 Die

If a student dies, the Dean reports to the Chancellor.

5.6.6 Dismissal as a Universitas Brawijaya Student

Students can be permanently or temporarily dismissed if they violate the UB Chancellor's Regulation Number 328/PER/2011 concerning the Student Code of Ethics, as well as other provisions that apply at Universitas Brawijaya.

5.7 STUDENTS TRANSFER TO UNIVERSITAS BRAWIJAYA

5.7.1 Terms

a. As a transfer student who can be accepted are:
   1. For the Undergraduate Program, have attended education continuously for at least 2 semesters and a maximum of 4 semesters and have collected:
      a) For 2 semesters, 40 credits with a minimum GPA of 3.00.
      b) For 4 semesters, 80 credits with a minimum GPA of 3.00.
   2. For the Postgraduate Program, it has been listed in the Universitas Brawijaya Handbook.
b. Comes from a state university that has the same field of study and program as the original study program, accredited by BAN PT at least with an A predicate.
c. Not dropping out of college because they do not meet academic requirements.
d. Never violated the original College rules.
e. Approval to move from the original faculty.
f. The Dean of the Faculty of Agricultural Technology stated in writing his willingness to accept.
g. Transfer students who are accepted at the Faculty of Agricultural Technology, Universitas Brawijaya have the obligation to pay tuition fees like new students and fulfill the conditions set by the Faculty.

5.7.2 Procedure for Submitting a Transfer Application

The procedure for submitting a transfer application is as follows:

a. The application for transfer is submitted in writing with strong reasons to the Rector of Universitas Brawijaya with a copy to the Dean of the Faculty of Agricultural Technology.
b. The application must be accompanied by:
   1. List of original grades obtained from the original university, with its GPA.
   2. Transfer letter from the original university.
   3. Parental/guardian/agency approval.
   4. Certificate of never violating the original higher education regulations.

5.7.3 Transfer Application Time

a. The transfer application must be received by Universitas Brawijaya no later than 1 (one) month before the start of the new academic year (odd semester) lectures.

b. The transfer application will not be considered if the time limit as referred to in point (a) is exceeded.

5.8 TRANSFER OF STUDENTS BETWEEN FACULTY IN UNIVERSITAS BRAWIJAYA

Transfer of students between faculties can be done by taking into account the following conditions:

a. Prospective students who can be accepted as transfer students are:
b. For the Undergraduate Program, have attended education continuously for at least 2 semesters and a maximum of 4 semesters and have collected:
    1. For 2 semesters, 24 credits with a minimum GPA of 3.50.
    2. For 4 semesters, 48 credits with a minimum GPA of 3.50.
c. Not dropping out (drop out) because it does not meet the academic requirements of the original faculty.
d. Never violate the rules of the original Faculty.
e. Approval to move from the original faculty.
f. The Dean of the Faculty of Agricultural Technology stated in writing his willingness to accept.
g. Transfer of students between faculties may only be 1 (one) time as long as the person concerned is a student of Universitas Brawijaya.

5.8.1 Procedure for submitting a Transfer Application

The procedure for applying for a transfer between faculties is as follows:

a. The application for transfer is submitted in writing with strong reasons to the Rector of Universitas Brawijaya with a copy to the Dean of the Faculty of Agricultural Technology, Universitas Brawijaya.
b. The application must be accompanied by:
    1. List of original grades obtained from the original Faculty with their GPA.
    2. Transfer letter from the original faculty.
    3. Parental/guardian/agency approval.
    4. Certificate of never violating the original Faculty regulations.

5.8.2 Time to submit a Transfer Application

a. The transfer application must be received by the Chancellor at least 1 (one) month before the lecture starts.
b. Transfer applications will not be considered if such time limit is exceeded.

5.9 TRANSFER OF STUDENTS BETWEEN DEPARTMENTS / STUDY PROGRAM IN THE FACULTY OF AGRICULTURAL TECHNOLOGY UNIVERSITAS BRAWIJAYA

Transfer of students between Departments/Study Programs can be done by taking into account the following conditions:

a. Prospective students who can be accepted as transfer students are: For the Bachelor program, have attended continuous education for a minimum of 2 semesters and a maximum of 4 semesters, and have collected:
    1. For 2 semesters, 24 credits with a minimum GPA of 3.50.
    2. For 4 semesters, 48 credits with a minimum GPA of 3.50.
b. Not dropping out of college because it doesn't meet academic requirements.
c. Have a linear scientific competence.
d. Original study program, accredited by BAN PT at least with an A . predicate
e. Never violate the regulations of the original Department/Study Program. f. Approval to move from the original Department/Study Program.
f. The Head of the designated Department/KPS stated in writing his willingness to accept.
g. Transfer of students between Departments/Study Programs may only be 1 (one) time as long as the person concerned is a student of Universitas Brawijaya.

5.9.1 Procedure for Transfer Application

The procedure for applying for a transfer between departments/PS is as follows:

a. The application for transfer is submitted in writing with strong reasons to the Dean of the Faculty of Agricultural Technology with a copy to the Head of the Department/KPS intended.
b. The application must be accompanied by:
    1. List of original grades with their GPAs.
    2. Transfer letter from the original Department/PS.
    3. Parental/guardian/agency approval.
    4. Certificate of never violating the rules during college.

5.9.2 Time to submit a Transfer Application

a. The transfer application must be received by the Dean of the Faculty of Agricultural Technology at least 1 (one) month before the lecture starts.
b. A transfer application will not be considered if it exceeds this time limit.

5.10 COURSE CODE AND COURSE NUMBER

5.10.1 Course Code

For convenience, the code for each course is as follows:

a. MPK - Courses that are managed by the Central Team MPK (Personality Development Courses) UB
b. TPF - Courses taught by the Faculty of Agricultural Technology
c. TPP - Courses taught by the Department of Food Science and Biotechnology

d. TPE - Courses taught by the Department of Agricultural and Biosystems Engineering
e. TPI - Courses taught by the Department of Agroindustrial Technology
f. TPB - Courses taught by the Biotechnology Study Program
g. TPL - Courses taught by the Environmental Engineering Study Program
h. TPO - Courses taught by the Bioprocess Technology Study Program

5.10.2 Course Number

Faculty and Postgraduate course numbers consist of 8 (eight) digits.

a. The 1st, 2nd, and 3rd digits are 3 (three) alphabetical codes for UB/Faculty/Department/Study Program/Interest;
b. The 4th digit is the code for the level of the study program, consisting of:
   3 (three) for Diploma 1 level;
   5 (five) for Diploma 3 level;
   6 (six) for Diploma 4 and Bachelor level;
   8 (eight) for Master level;
   9 (nine) for Doctoral level;
   7 (seven) or 8 (eight) for the level of Professional Education; and
   8 (eight) or 9 (nine) for Specialist Education level.

c. Dthe 5th digit is the semester offered for the course, consisting of:
   0 (zero) for courses offered in odd and even semesters;
   1 (one) for courses offered in odd semesters; and
   2 (two) for courses offered in even semesters.

d. The 6th, 7th, and 8th digits are the serial numbers of the courses.

VI. ACADEMIC COUNSELING AND ADVISORY GUARANTEE

6.1. ACADEMIC COUNSELING AND CONSIDERATION AGENCY (BKPA)

1. The Counseling and Academic Advisory Board (BKPA) is a unit that carries out activities to help students understand themselves and their world in realizing optimal self-development and independence, with the nature of humanity as servants of God Almighty, as individual beings and social beings in dealing with humans and the universe. In addition, it is also intended to facilitate self-development and independence of students so that they can live their daily lives as students effectively, creatively and dynamically and have life skills for their future careers.
2. The Counseling and Academic Advisory Board (BKPA) plays a role in helping self-development and carrying out preventive activities against various kinds of problems that interfere with the success of student studies, by detecting these problems early, and then helping to solve the problems.
3. The Counseling and Academic Consideration Board (BKPA) consists of several lecturers in the FTP environment assisted by professionals/psychologists from outside the FTP.
4. BKPA as a unit has an important role in increasing the success of student studies, in collaboration with the Department has the obligation to make periodic reports related to the progress of student studies to the Faculty through the Vice Dean for Academic Affairs.
5. Periodic reports are carried out every semester to effectively monitor and evaluate the progress of student studies.

6.2. ACADEMIC HANDBOOK

Academic Handbook is guidance carried out by higher education providers in the academic field to facilitate the student's study process. Academic Handbook is carried out by the Academic Advisor.

Academic Advisor (PA) is a lecturer who provides assistance in the form of academic and non-Academic Handbook and advice to students based on the potential possessed by students so that students can complete their studies on time.

1. Academic Advisor Duties:
   a. Provide information on the use of supporting facilities and infrastructure for academic and non-academic activities.
   b. Helping students in overcoming academic problems.
   c. Helping students in developing good study attitudes and habits so that independent learning grows as an expert.
   d. Provide recommendations on the level of student learning success for certain purposes.
   e. Helping students in developing their personality towards the realization of a complete Indonesian human being who is insightful,

thinks and behaves in accordance with religious values, Pancasila, customs and others.

f. Helping students develop scientific learning insights independently throughout their life.
g. Give warnings to students whose GPA (Gradual Achievement Index) is less than 2, at the end of every odd semester (1, 3, 5, and 7).
h. Give a warning about the academic evaluation/achievement index (IP) to students whose GPA for 2 (two) consecutive semesters is less than 2 (two), which is carried out at the end of every odd semester (1, 3, 5, and 7) .

2. Duties of Academic Advisor
   At the time of academic registration at the beginning of each semester, the academic advisor is obliged to carry out tasks with activities including:
   a. Determine the correctness of the number of credits that students may take in the semester concerned by taking into account the applicable regulations.
   b. Researching and giving approval to semester studies prepared by students in KRS.
   c. When deciding the amount of study load, the PA lecturer is obliged to provide sufficient explanation of the decision so that students can realize and accept the decision with full attention.
3. In carrying out their duties based on the rules, the Academic Handbook process each semester takes into account the learning outcomes of:
   a. Foster students individually or in groups.
   b. All students of the department concerned in groups for the class of the year concerned or earlier.
4. Academic advisors can request assistance from other work units such as Counseling and Academic Consideration (BKPA) at the faculty level or Counseling Guidance at the University level in the context of Academic Handbook.
5. Guidance activities in the academic field are coordinated by the Vice Dean for Academic Affairs, while in non-academic matters are coordinated by the Deputy Dean for Student Affairs.
6. Every Academic Advisor lecturer must always pay attention to the Code of Ethics for Campus Life.
7. Advisory administration is developed through various lists and cards. The types and uses of such lists and cards should be understood by the Academic Advisor lecturer. The list in question is:
   a. List of student names
   b. Student lecture attendance list
   c. List of test scores

   The cards in question are:
   a. Study Plan Card (KRS)
   b. Study Plan Change Card (KPRS)
   c. Study Result Card (KHS)

8. Academic Advisors are required to report the progress of their foster students to the Department periodically (every semester).

VII. ORGANIZATION

7.1. ORGANIZATION

The organization and working relations at the Faculty of Agricultural Technology, Universitas Brawijaya have been adjusted to Government Regulation number: 5 of 1980, concerning the Principles of Organization of State Universities/Institutes, which were later refined in accordance with Government Regulation number: 30 of 1990 and Minister of Education and Culture Decree number: 0125 /0/1993 and based on PERMENRISTEKDIKTI No. 4 of 2016 concerning Organization and Work Procedure of Universitas Brawijaya. Along with the change in the status of Universitas Brawijaya from a Public Service Agency (BLU) PTN to a Legal Entity State University (PTNBH) based on the President's approval in accordance with Government Regulation (PP) Number 108 of 2021, the organizational structure at the faculty level adjusts to the provisions in the PP.

1. The Faculty of Agricultural Technology Universitas Brawijaya is led by a Dean as the sole person in charge who reports directly to the Rector of Universitas Brawijaya. The Dean in carrying out his duties is assisted by the Deputy Deans. The Dean is appointed by the Rector of Universitas Brawijaya by taking into account the proposals and suggestions from the Academic Senate of the Faculty of Agricultural Technology (SAF) of Universitas Brawijaya for a term of office of 4 (four) years and can be re-elected for the next four years. The Vice Dean is appointed by the Rector of Universitas Brawijaya by considering the suggestions and suggestions of the Dean and Senate of the Faculty of Agricultural Technology, Universitas Brawijaya for a term of office of 4 (four) years and can be re-elected for the next four years.
2. Faculty of Agricultural Technology Universitas Brawijaya oversees Departments, Study Programs, Agencies and Work Units that can be formed according to the needs, abilities and developments of the Faculty of Agricultural Technology Universitas Brawijaya. Departments, Study Programs, and Work Units under the auspices of the Faculty are led by the Chair and assisted by staff as needed.
3. Head of Department, Secretary of Department, Head of Study Program, and Head of Laboratory are appointed by the Chancellor for a term of office of 4 (four) years and can be re-elected for another four year term. While the work units under the Faculty of Agricultural Technology such as the Quality Assurance Group (GJM), the Agency for Research and Community Service (BPPM), the Counseling and Academic Consideration Agency (BKPA), the Information Systems and Public Relations Manager (PSIK), the Journal Publishing Agency (BPJ), Quality Assurance Unit (UJM), English Language Service Unit (ULBI), Counseling and Academic Advisory Board (BKPA), Integrated Service Unit (ULT), Sexual Violence and Bullying Integrated Service Unit (ULTKSP), International Relations Office (IRO) appointed by Dean.

4. Compartment is a group of functional positions of lecturers based on the field of science/skills, whose task is to develop lecturers' knowledge through study, research, and community service which are located under the department.
5. The Ethics Commission is a commission tasked with assisting the Dean in enforcing the code of ethics at the Faculty of Agricultural Technology.
6. The implementation of educational administration services at the Faculty of Agricultural Technology is led by the Coordinator of the Administrative Section who is directly responsible to the Dean. In carrying out daily tasks, the Head of the Administrative Section is assisted by the Sub Division Coordinator.
7. The Faculty of Agricultural Technology, Universitas Brawijaya has a complete normative organization, namely the Faculty Senate which consists of the Dean, Professor, Head of Department and two representatives of teaching staff from each department. The Faculty Senate is formed by the Decree of the Chancellor.

7.2. ORGANIZATIONAL ORGANIZATION AND PERSONNEL

Dean : Prof. Dr. Ir. Imam Santoso, MP
vice dean of academic fields : Prof. Dr. Teti Estiasih, STP, MP
Deputy Dean for General Affairs and : Dr. Dodyk Pranowo, STP, M.Si
Finance
Vice Dean for Division : Prof. Yusuf Hendrawan, STP, Student
Affairs M.App.Life.Sc, Ph.D

7.3. SUPPORTING WORK UNITS UNDER THE FACULTY OF AGRICULTURAL TECHNOLOGY

Quality Assurance Group of the Faculty of Agricultural Technology (GJM)
Chairman : Ahmad Zaki Mubarok, STP, M.Si, Ph.D

Agency for Research and Community Service (BPPM)
Chairman : Kiki Fibrianto, STP, M.Phil, Ph.D

Counseling and Academic Advisory Board (BKPA)
Chairman : Sakunda Anggarini, STP, MP, M.Sc., Ph.D

Information Systems and Public Relations Manager (PSIK)
Chairman : Mas'ud Effendi, STP, MP

English Language Service Unit (ULBI)
Chairman : Dian Widya Ningtyas, STP, MP, PhD

Journal Publishing Agency (BPJ)
Chairman : Dr.Retno Astuti, ST, MT

Pilot Plant Laboratory
Chairman : Ahmad Zaki Mubarok, STP, M.Si, Ph.D

Entrepreneurship Laboratory
Chairman : Arif Hidayat, STP, M.AIT

Education Laboratory
Chairman : Mochamad Nurcholis, STP, MP, Ph.D

Administration Section

Administrative Coordinator	:	Tedjo Wahono Adiputri, SE
Coordinator of Academic, Student Affairs, Alumni, Cooperation, and Student Entrepreneurship Sub Divisions	:	Dwi Setyo Handoko, SP
Coordinator of Sub Division of Finance and Personnel	:	Lestari Wahyu Ristiani, SE
General and Asset Sub Division Coordinator	:	Dra. Yuniarni Retno Daryanti

7.4. DEPARTMENT OF FOOD SCIENCE AND BIOTECHNOLOGY

Chairman :Dr. Widya Dwi Rukmi, STP, MP
Secretary : Wenny Bekti Sunarharum, STP, M.Food.St, Ph.D

Food Science and Technology S1 Study Program
Chairman : Dr. Siti Narsito Wulan, STP, MP

Biotechnology Undergraduate Study Program
Chairman :Tunjung Mahatmanto, STP, M.Si, Ph.D

Agricultural Product Technology Master's Program
Chairman : Ir. Aji Sutrisno, M.Sc, Ph.D

Food Science Doctoral Program
Chairman : Fithri Choirun Nisa, STP, MP, Ph.D

Laboratory of the Department of Food Science and Biotechnology

Head of the Lab. Food Processing Technology and Biomass	:	Erni Sofia Murtini, STP, MP, Ph.D
Head of the Lab. Food and Agricultural Products Chemistry and Biochemistry	:	Latifa Putri Aulia, STP, M.Sc

Head of the Lab. Food Microbiology	:	Rhytia Ayu Cristianty, STP, MP, M.Sc
Head of the Lab. Biotechnology	:	Agustin K. Wardani, STP, M.Si, Ph.D
Head of the Lab. Food Nutrition	:	Prof. Dr. Ir. Tri Dewanti W., M.Kes
Head of the Lab. Food Quality and Safety Test	:	Dr. Ir. Sudarminto Setyo Y., M.App.Sc
Head of the Lab. Sensory Science and Applied Food	:	Kiki Fibrianto, STP, M. Phil., Ph.D

Quality Assurance Unit of the Department of Food Science and Biotechnology
Chairman : Feronika Heppy Sriherfyna, STP, MP, Ph.D

7.5. DEPARTMENT OF BIOSYSTEM ENGINEERING

Chairman :Dr. Eng. Achmad Adi Sulianto, STP, MT, M.Eng
Secretary : Dr. Mochamad Bagus Hermanto, STP, M.Sc

Agricultural Engineering S1 Study Program
Chairman :Dr. Ir. Musthofa Lutfi, MP

Environmental Engineering S1 Study Program
Chairman :Fajri Anugroho, STP, M.Agr, Ph.D

Bioprocess Technology S1 Study Program
Chairman :Dr. Yusuf Wibisono, STP, M.Sc.

Agricultural Engineering Masters Study Program
Chairman : Dr. Ir. Sandra Malin Sutan, MP

Laboratory of the Department of Biosystems Engineering

Head of the Lab. Food Processing Techniques and Agricultural Products	:	La Choviya Hawa, STP, MP, Ph.D
Head of the Lab. Agricultural Power and Machinery	:	Darmanto, ST, MT
Head of the Lab. Natural Resources and Environmental Engineering	:	Dr. Ir. A. Stump Sutan Haji, MT
Head of the Lab. Biosystem Mechatronics	:	Dr.Agr.Sc. Dimas Firmanda Al Riza, ST, M.Sc
Plt. Head of the Lab. Water Quality and Waste Treatment	:	Satwika Desantina Muktiningsih, ST, MT
Plt. Head of the Lab. Solid Waste Remediation and Treatment	:	Yasa Palaguna Umar, STP, M.Sc., Ph.D

Head of the Lab. Bioprocess Engineering	:	Wahyunanto Agung Nugroho, STP, M.Eng., Ph.D

Agricultural Engineering Department Quality Assurance Unit
Chairman : Rini Yulianingsih, STP, MT, Ph.D

7.6. DEPARTMENT OF AGROINDUSTRIAL TECHNOLOGY

Chairman : Dr. SitiAsmaul Mustaniroh, STP, MP
Secretary : Sri Suhartini, STP,M.Env.Mgt, Ph.D

Agroindustrial Technology S1 Study Program
Chairman : Wike Agustin Prima Dania, STP,M.Eng, Ph.D

Masters Study Program in Agroindustrial Technology
Chairman : Dr. Sucipto, STP, MP

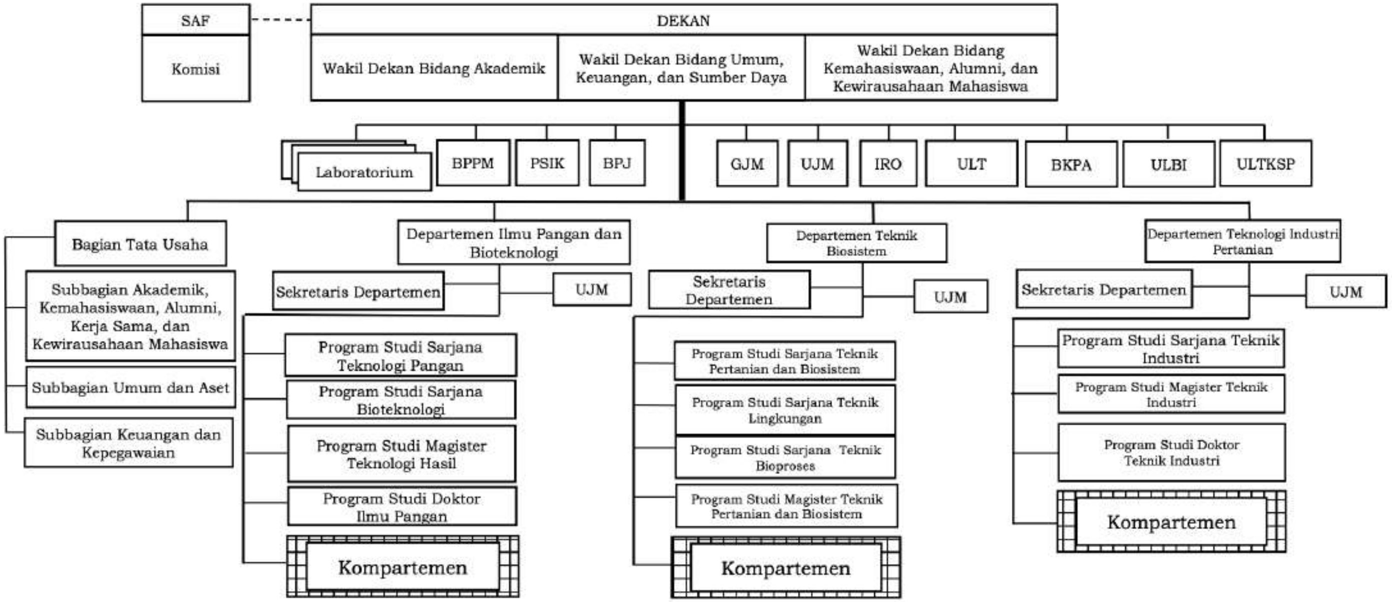
Agroindustrial Technology Doctoral Study Program
Plt. Chairman :Irnia Nurika, STP, MP, Ph.D

Laboratory of the Department of Agroindustrial Technology

Head of the Lab. Agroindustrial Process Engineering	:	Hendrix Yulis Setyawan, STP, M.Sc., Ph.D
Head of the Lab. Bio Industry	:	Sakunda Anggarini, STP, MP, M.Sc., Ph.D
Head of the Lab. Computing and Agroindustrial Systems	:	Aunur Rofiq Mulyarto, STP, M.Sc.
Head of the Lab. Agroindustry Management	:	Isti Purwaningsih, STP, MT

Quality Assurance Unit of the Department of Agroindustrial Technology
Chairman : Vitta Rizky Permatasari, STP, M.Si

7.7. ORGANIZATIONAL STRUCTURE FACULTY OF AGRICULTURAL TECHNOLOGY



REKTOR UNIVERSITAS BRAWIJAYA,

TTE oleh :
NUHFIL HANANI AR.
22 Februari 2022 07:09

Verifikasi melalui
https://sco.ub.ac.id

NUHFIL HANANI AR

VIII. EDUCATION PROGRAM CURRICULUM AT FACULTY OF AGRICULTURAL TECHNOLOGY UNIVERSITAS BRAWIJAYA

8.1 STRUCTURE OF THE CURRICULUM OF THE GRADUATE PROGRAM (S1)

8.1.1 DEPARTMENT OF FOOD SCIENCE AND BIOTECHNOLOGY

1. Bachelor of Food Science and Technology Study Program

Competence of graduates

The competencies of graduates of the Food Science and Technology Study Program are as follows:

a. Able to solve problems related to food in general as well as problems in the food industry and small and medium enterprises in the food sector
b. Have professional skills, initiative, leadership, communication, cooperation and be responsible for organizational goals
c. Have creativity, the ability to adapt to dynamic changes, develop themselves and uphold ethics

Graduate Learning Outcomes (CPL)

Learning Outcomes of Graduates (CPL) of Food Science and Technology PS there are 13, namely as follows:

a. Mastering basic concepts and knowledge of basic sciences relevant to food science, namely: basic chemistry, organic chemistry, biochemistry, physics, biology, calculus, human nutrition, statistics and scientific methods
b. Mastering basic concepts and knowledge in the field of chemistry and food analysis
c. Mastering basic concepts and knowledge in the field of food microbiology
d. Mastering basic concepts and knowledge in the field of food safety
e. Mastering basic concepts and knowledge in the field of food processing engineering and technology
f. Mastering basic concepts and knowledge in the field of food sensory science
g. Mastering basic concepts and knowledge in the field of quality control and food quality assurance systems
h. Mastering basic concepts and knowledge in the field of regulations related to food production and trade at national and international levels
i. Able to integrate knowledge and apply the principles of food science and technology in designing an integrated food processing unit to produce safe, quality and nutritious food products.
j. Mastering the methodological competencies of food science and technology and applying them to solve food-related problems in various contexts.

k. Able to communicate orally and in writing related to technical and non-technical aspects for various audiences.
l. Able to work effectively both independently and in a team, able to lead and be responsible for achieving organizational goals.
m. Committed to professionalism, ethics, diversity and inclusion.

Code	Course	SKS			Prerequisite
		K	P/T	□	
SEMESTER I					
MPK60007	Indonesian	2	0	2	
MPK60008	Pancasila	2	0	2	
TPF60007	Personality Development and Professional Ethics	2	0	2	
TPF61001	Biology	2	0	2	
TPF61002	Biology Practicum	0	1	1	
TPF61005	Basic Physics	2	0	2	
TPF61006	Basic Physics Practicum	0	1	1	
TPP61001	Basic Chemistry I	2	0	2	
TPP61002	Basic Chemistry Practicum I	0	1	1	
TPP61003	Calculus	3	0	3	
TPP61004	Introduction to Food Science and	2	0	2	
Total		**17**	**3**	**20**	
SEMESTER II					
MPK60001	Islam	2	0	2	Taking according to the religion of the student
MPK60002	Catholicism	2	0	2	
MPK60003	Protestant Religion	2	0	2	
MPK60004	Hindu religion	2	0	2	
MPK60005	Buddhism	2	0	2	
MPK60006	Citizenship	2	0	2	
TPF60010	Statistics	3	0	3	
TPF62008	Organic Chemistry	2	0	2	
TPF62009	Organic Chemistry Practicum	0	1	1	
TPP62001	Basic Chemistry II	3	0	3	
TPP6202	General Microbiology	2	0	2	

TPP62003	General Microbiology Practicum	0	2	2	
TPP62004	Communication Skills	2	0	2	
TPP62005	Processing Engineering 1	2	1	3	
Total		**18**	**4**	**22**	

Code	Course	SKS			Keterwish/ Prerequisite
		K	P/T	□	
SEMESTERR III					
UBU60004	English	2	0	2	
TPF61014	Scientific Method	2	0	2	
TPP61005	Biochemistry	4	0	4	TPF62008
TPP61006	Nutrient Physiology and Metabolism	2	0	2	
TPP61007	Food Chemistry	3	0	3	
TPP61008	Food Physical Chemistry	2	0	2	
TPP61009	Processing Engineering 2	2	1	3	TPP62005
TPP61010	Food Microbiology 1	2	0	2	TPP6202
TPP61011	Food Material Science	3	0	3	
Total		**22**	**1**	**23**	
SEMESTERR IV					
TPP62006	Food Nutrition Evaluation	2	0	2	
TPP62007	Food Microbiology 2	2	0	2	TPP6202, TPP61010
TPP62008	Food Analysis	3	0	3	
TPP62009	Practicum of Biochemistry and Food Analysis	0	2	2	
TPP62010	Processing Engineering 3	3	0	3	TPP62005
TPP62011	Food Processing Technology	3	0	3	TPP62005
TPP62012	Food Processing Technology Practicum	0	2	2	
TPP62013	Sanitation and Waste Treatment	3	0	3	
TPP62014	Quality Management System and Halal Assurance	2	0	2	
TPP62015	Enzymology	2	0	2	
Total		**20**	**4**	**24**	

Code	Course	SKS			Keterwish/ Prerequisite
		K	P/T	□	
SEMESTERRV					
TPP61012	Experimental design	2	0	2	
TPP61013	Food Nutrition Evaluation Practicum	0	1	1	
TPP61014	Food Microbiology Practicum	0	2	2	TPP6202, TPP61010, TPP62007
TPP61015	Sensory Analysis	2	0	2	TPF60010
TPP61016	Sensory Analysis Practicum	0	1	1	
TPP61017	Quality Control	2	0	2	TPF60010, TPP62008, TPP62011, TPP62014
TPP61018	Food Additives and Ingredients	3	0	3	TPP61007, TPP62011
TPP61019	Packaging and Storage	3	0	3	
	Choice of Courts 1, 2, 3, 4 (1, 2, 3, or 4 Courts)	8	0	8	Total Credits 3-4 Elective Courses
Total		**20**	**4**	**24**	
SEMESTER VI					
UBU60003	Entrepreneurship	2	0	2	
TPF60015	Entrepreneurship Practicum	0	1	1	
TPP62016	Product Development	2	0	2	TPP61012,TPP62014, TPP61017
TPP62017	Food Regulation	2	0	2	
TPP62018	Food Safety and Toxicology	3	0	3	TPP6202, TPP62007
TPP62019	Processing Unit Planning	3	1	4	TPP61009, TPP62010, TPP62011
	Optional Constitutional Court 1,2,3,4,5 (1-5 Preferred Court)	10	0	10	Total Credits 4-5 Selected

Code	Course	SKS			Keterwish/ Prerequisite
		K	P/T	□	
Amount		**22**	**2**	**24**	
ODD/EVEN SEMESTER					
TPF60016	Field Work Practice	0	3	3	Already taken 80 credits
TPF 60119	Bachelor thesis seminar	0	1	1	Already taken 110 credits
TPF 60120	Bachelor thesis manuscript writing	0	1	1	Already taken 110 credits
UBU60001	Thesis	0	6	6	Already taken 110 credits
UBU60005	Community Service (PKM)	0	4	4	Already taken 80 credits
	Amount	**0**	**15**	**15**	
	Total Number of Compulsory Courses	**101**	**18**	**119**	
	Minimum Number of Elective Courses	**10**	**0**	**10**	
	Total Credits	**111**	**33**	**144**	

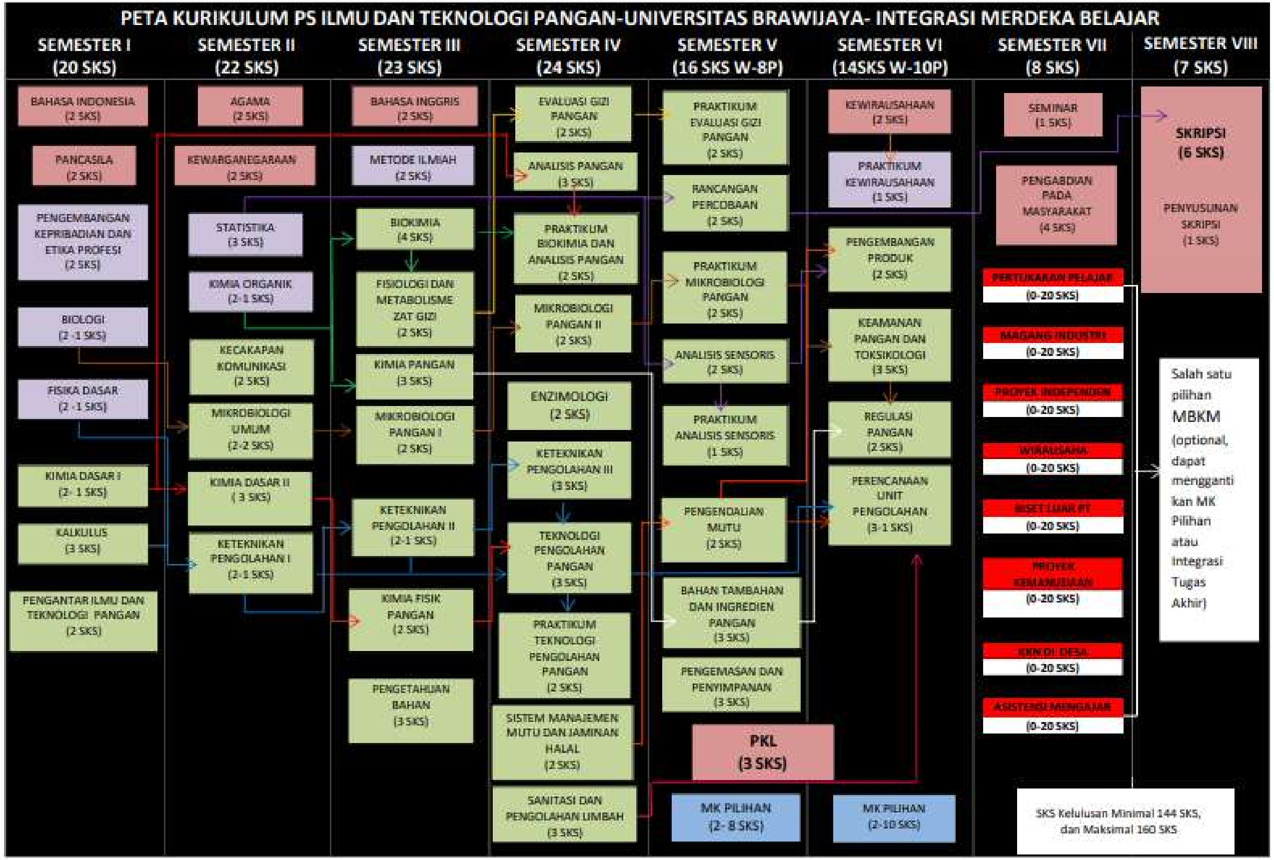
**Prerequisite courses (courses that must be taken in the previous semester to take certain courses in the following semester).*

Elective Courses for the Undergraduate Food Science and Technology Study Program

Code	Course	SKS			Keterwish/ Prerequisite
		K	P/T	□	
SEMESTERR ODD					
TPP61020	Animal Products Processing Technology	3	0	3	
TPP61021	Nutracetics and Functional Food	2	0	2	
TPP61022	Culinary Management	2	0	2	
TPP61023	Plantation Product Technology	2	0	2	

TPP61024	Polysaccharide and Sugar Technology	2	0	2	
TPP61025	Fat and Oil Technology	2	0	2	
TPP61026	Snack Food and Confectionery Technology	2	0	2	
TPP61027	Molecular Gastronomy	2	0	2	
TPP61028	Technological Innovation and Food	3	0	3	
TPP61029	Spice and Essential Oil Technology	2	0	2	
TPP61030	Thermobacteriology	2	0	2	
TPP61031	Fermented Food	3	0	3	
	Total Number of Elective Courses	**27**	**0**	**27**	
SEMESTERR EVEN					
TPP62020	Postharvest Physiology and Technology	2	0	2	
TPP62021	Nutrition and Public Health	2	0	2	
TPP62022	Food and Nutrition Trends	2	0	2	
TPP62023	Food and Nutrition Intervention	2	0	2	
TPP62024	Consumer Studies	2	0	2	
TPP62025	Natural Preservative	2	0	2	
TPP62026	Food Crop Yield Technology	3	0	3	
TPP62027	Horticultural Technology	3	0	3	
TPP62028	Food Nutrition Bioassay	2	0	2	
TPI62061	Occupational Safety and Industrial	2	0	2	
	Total Number of Elective Courses	**22**	**0**	**22**	

Curriculum Map for Undergraduate Program in Food Science and Technology, Faculty of Agricultural Technology



2. Biotechnology Undergraduate Study Program

Competencies of Graduates of PS Biotechnology, Universitas Brawijaya

1. Mastering knowledge and technical skills in the field of industrial biotechnology and having the ability to use these competencies to solve problems in the field of industrial biotechnology which includes (but is not limited to) the food, feed, pharmaceutical, chemical, materials, and energy industries
2. Have professional skills: the ability to communicate effectively, work in a team, and lead under pressure; uphold the ethics of professionalism; and be responsible.
3. Have the ability to develop themselves into lifelong learners to face future challenges.

Learning Outcomes of Graduates of PS Biotechnology, Universitas Brawijaya

1. Mastering the basic concepts of mathematics and statistics and understanding their relevance to the field of industrial biotechnology.
2. Mastering the basic concepts of natural science (biology, chemistry, and physics) and understanding their relevance to the field of industrial biotechnology.
3. Mastering the basic concepts of biotechnology and microbiology.
4. Mastering knowledge about biomass (organic materials such as molecules, cells, tissues, and organisms) as a material or agent for making bioproducts.
5. Mastering knowledge about the process (physical, chemical, and biological) of converting biomass into bioproducts on a lab, pilot, and industrial scale.
6. Mastering knowledge about products (goods and services) of the biotechnology industry.
7. Have knowledge and technical skills (laboratory) that support work in the field of industrial biotechnology.
8. Have research skills (able to think critically, solve problems, manage projects, and communicate scientifically effectively), entrepreneurship (capable of leading, working in teams, developing products, and managing businesses), as well as social and interpersonal (able to communicate orally and in writing with kind, respectful of others, and responsible)

Curriculum Structure

The 2020 curriculum for PS Biotechnology is designed to support the achievement of competencies and learning achievement targets for Biotechnology PS graduates, Universitas Brawijaya. The 2020 PS Biotechnology curriculum is composed of five main modules consisting of courses that support certain learning outcomes.

1. **Basic Module (25 credits): compulsory courses to build a foundation of knowledge of mathematics and science relevant to the field of biotechnology**126copper126.

2. **Core Modules (62 credits): compulsory courses to build theoretical and applicable concepts in the field of biotechnology**127copper127.
3. **Personality Module (12 credits): compulsory courses to foster nationalism and shape personality.**
4. **Final Project Module (13 credits): compulsory courses to develop research skills, entrepreneurship,**127embag, and interpersonal.
5. **Elective Modules (32 credits)**: elective courses to enrich knowledge and skills in various fields according to student interests.

The descriptions and contents of the five main modules above are given as follows.

Basic Module (25 credits)	
Description	The Foundation Module is designed to equip students with knowledge and skills in math and science and to prepare students for other modules in the programme. This module is divided into two: Basic Science and Basic Biotechnology.
Sub Module 1: Basic Science	
Subject	Biology (and its practicum); Basic Chemistry (and practicum); Organic Chemistry (and its practicum); Basic Physics (and practicum); Mathematics; Statistics (and tutorials)
Contents	In this sub-module, students learn the basic concepts of biology, chemistry, physics, mathematics, statistics, and their relevance to the field of Biotechnology.127copper127.
Sub Module 2: Basic Biotechnology	
Subject	General Microbiology (and its practicum); Introduction to Biotechnology
Contents	In this sub-module, students learn the basic concepts of microbiology and biotechnology that underlie the field of biotechnology127copper127.
Core Module I: Biomass (24 Credits)	
Description	Core Module I is designed to equip students with knowledge and skills in the fields of biology, chemistry, and biomass physics. In this module, biomass is generally defined as matter127any copper from any taxa (viruses, archaea, bacteria, protists, fungi, animals, and plants) and is not limited to material127copper derived from plants as generally defined in the field of renewable energy. In this context, biomass can act as a raw material (material) and as an agent to make products from the bioconversion process. This module is divided into four: Biomaterials, Biomolecules and Cells, Bioanalysis, and Biological Engineering.
Sub Module 1: Biomaterials	
Subject	Biomaterials (and their practicum)
Contents	In Biomaterials, students study the biological, physical, and chemical properties of biomaterials (as materials, agents, and products of biotechnology) and their applications in various fields.
Sub Module 2: Biomolecules and Cells	
Subject	Biochemistry; Enzymology; Genetics; Cell and Molecular Biology

Contents	In Biochemistry, students study the chemical aspects of biomolecules (from carbohydrates to nucleic acids). In Enzymeology, students learn the principles of how enzymes work. In Genetics, students study the principles of inheritance. In Cell and Molecular Biology, students study the molecular mechanisms that underlie how cells work.
Sub Module 3: Bioanalysis	
Subject	Biochemistry and Enzymology Practicum; Analytical Engineering in Biotechnology (and its practicum)
Contents	In the Biochemistry and Enzymeology Practicum, students learn the general principles of biomolecular analysis. In Analytical Engineering in Biotechnology, students learn the principles of modern biomass analysis.
Sub Module 4: Biological Engineering	
Subject	Introduction to Bioinformatics; Genetic Engineering (and its practicum)
Contents	In Introduction to Bioinformatics, students learn about biological databases and how to analyze data from these databases. In Genetic Engineering, students learn the principles of microorganism engineering and how to design plasmids to achieve specific goals.
Core Module II: Bioprocess (19 credits)	
Description	Core Module II is designed to equip students with knowledge and skills in the field of bioconversion process engineering. This module is divided into two: Bioprocess Engineering and Bioprocess Technology.
Sub Module 1: Bioprocess Engineering	
Subject	Basic Bioprocess Engineering; Bioprocess Operation Unit 1; Bioprocess Operations Unit 2; Bioprocess Unit Design
Contents	In Basic Bioprocess Engineering, students learn the principles of process engineering including mass and energy balance, fluid flow, mass transfer and heat transfer. In Unit Operations Bioprocess 1, students learn the principles of reaction kinetics, psychometry, drying, lyophilization, thermal processes, cooling and freezing, distillation, and crystallization. In Bioprocess Operations Unit 2, students learn the basic principles of biomass conversion technology into bioproducts, which include extraction, adsorption and absorption, cell separation, cell disruption, concentration and purification. In Bioprocess Unit Design, students learn the theory that underlies the process of planning a bioprocess processing unit, process flow diagrams, mass and energy balances, processing equipment and machinery planning, organizational planning and work safety, quality management,
Sub Module 2: Bioprocess Technology	
Subject	Introduction to Bioprocess Technology; Industrial Microbiology and Biotechnology (and its practicum); Enzyme Technology
Contents	In Introduction to Bioprocess Technology, students learn the principles of fermentation technology and its upstream and downstream processes. In Industrial Microbiology and Biotechnology, students learn the principles of biorefinery to support sustainability128copper128biotechnology. In Enzyme Technology, students learn the basics of enzymes128copper128, from discovery to application.

Core Module III: Bioproducts (13 credits)	
Description	Core Module III is designed to equip students with knowledge and skills in the field of management and business of biotechnology products.
Subject	Product Development and Regulation of Biotechnology; Quality Control; Quality Management System and Halal Assurance; Engineering Economics; Entrepreneurship (and its practicum)
Contents	In Biotechnology Product Development and Regulation, students learn the principles of biotechnology product development and regulation. In Quality Control, students learn the principles129process institute to produce products that meet quality standards. In Quality Management System and Halal Assurance, students learn the basics129Ebag quality assurance and halal. In Engineering Economics, students study the application of economic principles in management/decision analysis.129embag. In Entrepreneurship, students learn to develop a successful entrepreneurial spirit and learn entrepreneurship in groups.
Core Module IV: Supporting Final Project (6 Credits)	
Description	Core IV modules are designed to equip students with knowledge and skills in the field of129development of scientific and effective communication as well as to prepare students for their final assignments (PKL, KKN, and thesis).
Subject	Scientific Method; Experimental design; Biotechnology Seminar
Contents	In the Scientific Method, students study the norms of scientific behavior and129scientific writing embag to write proposals and final project reports. In Experimental Design, students learn the principles and129Embag designed the experiment using qualitative and quantitative approaches. At the Biotechnology Seminar, students learn how to make129embas and scientific pictures, effective posters and presentation slides, and how to present their work in a short seminar format.
Personality Module (12 Credits)	
Description	The Personality module is designed to equip students with the knowledge and skills for personal and professional character development. This module is divided into two: Personal Character and Professional Character.
Sub Module 1: Personal Character	
Subject	Religion; Citizenship; Pancasila; Indonesian; English
Contents	In Religion, students learn noble personal characters based on their religious values. At Citizenship, students study both theoretical and practical aspects of citizenship. In Pancasila, students learn the national character based on the values of Pancasila. In Indonesian and English, students learn how to use129embag to communicate effectively.
Sub Module 2: Professional Character	
Subject	Personality Development & Professional Ethics
Contents	In Personality Development & Professional Ethics, students learn how to develop their personality to work effectively129copper129129final.
Final Project Module (13 credits)	

Description	The Final Project Module is designed to equip students with research, entrepreneurship,130embag, and inter-personal to work independently130copper130130final.
Subject	Field Work Practice; KKN; Thesis
Contents	In Field Work Practice, students learn to work independently130copper130130nal doing special tasks under the guidance of lecturers and partners130copper130/institution/130copper. In KKN, students learn to provide services to the community under the guidance of lecturers to help solve certain problems in partners130copper130/institution/130copper. In Thesis, students learn to do research under the guidance of a lecturer.
Elective Module (32 Credits)	
Description	Elective modules are designed to enrich students' knowledge and skills in specific fields according to the student's choice of interests (in consultation with their respective academic supervisors). This module can be taken at the original PS or outside the PS from the student.
Subject	Elective courses or other learning activities offered by the original PS or by another PS.
Contents	Student learning experiences will vary according to the choices they make.

Code	**Subject**	**credits**			**Precondition**
		K	**P/N**	□	
SEMESTER I					
MPK60007	Indonesian	2	0	2	
UBU60004	English	2	0	2	
TPF61001	Biology	2	0	2	
TPF61002	Biology Practicum	0	1	1	
TPF61003	Basic chemistry	2	0	2	
TPF61004	Basic Chemistry Practicum	0	1	1	
TPF61005	Basic Physics	2	0	2	
TPF61006	Basic Physics Practicum	0	1	1	
TPB61001	Math	3	0	3	
TPB61002	Introduction to Biotechnology	3	0	3	
Amount		**16**	**3**	**19**	
SEMESTER II					
MPK6000x	Religion	2	0	2	
MPK60006	Citizenship	2	0	2	
TPF62008	Organic Chemistry	2	0	2	
TPF62009	Organic Chemistry Practicum	0	1	1	
TPF60010	Statistics	2	1	3	
TPP6202	General Microbiology	2	0	2	
TPP62003	General Microbiology Practicum	0	2	2	

Code	Subject	credits			Precondition
		K	P/N	□	
TPB62001	Genetics	2	0	2	
TPB6202	Introduction to Bioprocess Technology	2	0	2	
TPB62003	Basic Bioprocess Engineering	3	0	3	
Amount		**17**	**4**	**21**	
SEMESTER III					
TPF61012	Biomaterials	2	0	2	
TPF61013	Biomaterials Practicum	0	1	1	
TPP61005	Biochemistry	4	0	4	
TPP62015	Enzymology	2	0	2	
TPB61003	Biochemistry and Enzymology Practicum	0	1	1	
TPB61004	Analytical Engineering in Biotechnology	2	0	2	
TPB61005	Analytical Engineering Practicum in Biotechnology	0	1	1	
TPB61006	Cell and Molecular Biology	3	0	3	
TPB61007	Bioprocess Operation Unit 1	2	0	2	
TPB61008	Bioprocess Operation Unit 2	3	0	3	
Amount		**18**	**3**	**21**	
SEMESTER IV					
TPB62004	Introduction to Bioinformatics	2	0	2	
TPB62005	Genetical manipulation	3	0	3	
TPB62006	Genetic Engineering Practicum	0	1	1	
TPB62007	Enzyme Technology	3	0	3	
TPB62008	Industrial Microbiology and Biotechnology	2	0	2	
TPB62009	Industrial Microbiology and Biotechnology Practicum	0	1	1	
TPB62010	Biotechnology Product Development and Regulation	3	0	3	
TPP61017	Quality Control	2	0	2	
TPP62014	Quality Management System and Halal Assurance	2	0	2	
TPF60011	Engineering Economics	3	0	3	
Amount		**20**	**2**	**22**	
SEMESTER V					
TPB61009	Bioprocess Unit Design	3	0	3	
TPF61014	Scientific Method	2	0	2	
TPB61010	Experimental design	2	0	2	
TPB61011	Biotechnology Seminar	2	0	2	

Code	Subject	credits			Precondition
		K	P/N	□	
UBU60003	Entrepreneurship	2	0	2	
TPF60015	Entrepreneurship Practicum	0	1	1	
TPF60007	Personality Development and Professional Ethics	2	0	2	
MPK60008	Pancasila	2	0	2	
	Elective Course (free to choose from inside or outside PS)	x	x	8	
Amount		**x**	**x**	**24**	
ODD/EVEN SEMESTER					
	Elective Course (free to choose from inside or outside PS)	x	x	22	
TPF60016	Field Work Practice**(PKL)**	0	3	3	Already taken 80 credits
UBU60005	Community Service (PKM)	0	4	4	
TPF 60119	Bachelor thesis seminar	0	1	1	Already taken 110 credits
TPF 60120	Bachelor Thesis Manuscript Writing	0	1	1	Already taken 110 credits
UBU60001	Bachelor thesis	0	6	6	Already taken 110 credits
Amount		**x**	**x**	**37**	
Total		**x**	**x**	**144**	

Biotechnology Undergraduate Study Program Elective Courses

Code	Elective courses	credits			Precondition
		K	P/N	□	
ODD SEMESTER					
TPB61012	Immobilization Technique	2	0	2	
TPB61013	Applied Microbiology	3	0	3	
TPB61014	Food Biotechnology	2	0	2	
TPB61015	Nutrigenomics	2	0	2	
TPB61016	Introduction to Immunology	2	0	2	
TPB61017	Cell and Tissue Culture	2	0	2	
Amount		**13**	**0**	**13**	
EVEN SEMESTER					
TPB62011	Environmental Biotechnology	3	0	3	

Code	Elective courses	credits			Precondition
		K	**P/N**	□	
TPB62012	Biosensor	2	0	2	
TPB62013	Nanobiotechnology	2	0	2	
TPB62014	Protein Biotechnology	2	0	2	
TPB62015	Biopharmaceutical	2	0	2	
TPB62016	Aroma Technology	2	0	2	
Amount		**13**	**0**	**13**	

Curriculum Map for Undergraduate Program in Biotechnology, Faculty of Agricultural Technology

Semester/Mata Kuliah (sks)							
I (19)	II (21)	III (21)	IV (22)	V (16+)	VI (x)	VII (x)	VIII (x)
Bahasa Indonesia (2)	Agama (2)	Biomaterial (2)	Pengantar Bioinformatika (2)	Perancangan Unit Bioproses (3)	MK Pilihan atau MBKM (24–40)		
Bahasa Inggris (2)	Kewarganegaraan (2)	Praktikum Biomaterial (1)	Rekayasa Genetika (3)	Metode Ilmiah (2)	Praktik Kerja Lapang (3)		
Biologi (2)	Kimia Organik (2)	Biokimia (4)	Praktikum Rekayasa Genetika (1)	Rancangan Percobaan (2)	Pengabdian kepada Masyarakat (4)		
Praktikum Biologi (1)	Praktikum Kimia Organik (1)	Enzimologi (2)	Teknologi Enzim (3)	Seminar Bioteknologi (2)	Skripsi (6)		
Kimia Dasar (2)	Statistika (3)	Praktikum Biokimia dan Enzimologi (1)	Mikrobiologi dan Bioteknologi Industri (2)	Kewirausahaan (2)			
Praktikum Kimia Dasar (1)	Mikrobiologi Umum (2)	Teknik Analisis dalam Bioteknologi (2)	Praktikum Mikrobiologi dan Bioteknologi Industri (1)	Praktikum Kewirausahaan (1)			
Fisika Dasar (2)	Praktikum Mikrobiologi Umum (2)	Praktikum Teknik Analisis dalam Bioteknologi (1)	Pengembangan Produk dan Regulasi Bioteknologi (3)	Pengembangan Kepribadian dan Etika Profesi (2)			
Praktikum Fisika Dasar (1)	Genetika (2)	Biologi Sel dan Molekuler (3)	Pengendalian Mutu (2)	Pancasila (2)			
Matematika (3)	Pengantar Teknologi Bioproses (2)	Unit Operasi Bioproses 1 (2)	Sistem Manajemen Mutu dan Jaminan Halal (2)	MK Pilihan atau MBKM (x, hingga 8)			
Pengantar Bioteknologi (3)	Dasar Keteknikan Bioproses (3)	Unit Operasi Bioproses 2 (3)	Ekonomi Teknik (3)				

8.1.2 DEPARTMENT OF BIOSYSTEM ENGINEERING

1. Agricultural Engineering Undergraduate Study Program

Code	Subject	credits				Description/ Prerequisites
		K	pr	R	Σ	
SEMESTER I						
MPK60001	Islamic education	2	0	0	2	Taking according to the religion of the student
MPK60002	Catholic Religious Education	2	0	0	2	
MPK60003	Protestant Christian Religious Education	2	0	0	2	
MPK60004	Hindu Religious Education	2	0	0	2	
MPK60005	Buddhist Education	2	0	0	2	
MPK60006	Citizenship	2	0	0	2	
UBU60004	English	2	0	0	2	
TPE61001	Introduction to Agricultural and Biosystem Engineering	2	0	0	2	
TPE61002	Basic mathematic	2	0	0	2	
TPE61003	Physics	3	0	0	3	
TPF61006	Basic Physics Practicum	0	1	0	1	
TPF61003	Basic chemistry	2	0	0	2	
TPF61004	Basic Chemistry Practicum	0	1	0	1	
TPF61001	Biology	2	0	0	2	
TPF61002	Biology Practicum	0	1	0	1	
	Amount	**17**	**3**	**0**	**20**	
SEMESTER II						
MPK60008	Pancasila	2	0	0	2	
MPK60007	Indonesian	2	0	0	2	
TPF62008	Organic Chemistry	2	0	0	2	
TPF62009	Organic Chemistry Practicum	0	1	0	1	
TPE62004	Calculus 1	2	0	0	2	TPE61002
TPF60010	Statistics	2	0	1	3	
TPE62005	Agricultural Science and Biosystems	2	0	0	2	
TPE62006	Agricultural and Biosystem Science Practicum	0	2	0	2	
TPE62007	Computer Application	1	0	0	1	
TPE62008	Computer Application Practicum	0	1	0	1	

Code	Subject	credits				Description/ Prerequisites
		K	pr	R	Σ	
TPE62009	Agricultural Material Knowledge	2	0	0	2	
	Amount	**15**	**4**	**1**	**20**	
SEMESTER III						
TPE61010	Thermodynamics	2	0	1	3	TPE61002, TPE61003, TPF61006
TPE61011	Statics and Dynamics	2	0	1	3	
TPE61012	Fluid Mechanics	2	0	0	2	TPE61003, TPF61006
TPE61013	Fluid Mechanics Practicum	0	1	0	1	
TPE61033	Business management	2	0	0	2	
TPE61014	Drawing techniques	2	0	0	2	
TPE61015	Technical Drawing Practicum	0	1	0	1	
TPE61016	Environmental Measurement	2	0	0	2	
TPE61017	Environmental Measurement Practicum	0	1	0	1	
TPF60011	Engineering Economics	3	0	0	3	
TPE61018	Calculus 2	2	0	1	3	TPE62004
	Amount	**17**	**3**	**3**	**23**	
SEMESTER IV						
TPE62019	Applied mathematics	2	0	1	3	TPE62004
TPE62020	Material Strength	2	0	0	2	TPE61011
TPE62021	Material Strength Practicum	0	1	0	1	TPE61011
TPE62022	Control System	2	0	0	2	TPE61016, TPE61017
TPE62023	Control System Practicum	0	1	0	1	TPE61016, TPE61017
TPE62024	Engineering Material Knowledge	2	0	0	2	
TPE62025	Heat Transfer	2	0	0	2	TPE61010
TPE62026	Heat Transfer Practicum	0	1	0	1	TPE61010
TPE62027	Power in Agriculture 1	2	0	0	2	TPE61010
TPE62028	Power Practicum in Agriculture 1	0	1	0	1	TPE61010
TPE62029	Ergonomics, Occupational Health and Safety	2	0	0	2	

Code	Subject	credits				Description/ Prerequisites
		K	pr	R	Σ	
TPE62030	Physical Properties of Food Ingredients	2	0	0	2	
	Amount	**14**	**4**	**1**	**21**	
SEMESTER V						
TPE61031	workshop	2	0	0	2	
TPE61032	Workshop Practicum	0	1	0	1	
TPE61034	Food Processing Techniques and Agricultural Products	2	0	0	2	TPE62025, TPE62026
TPE61035	Practicum of Food Processing and Agricultural Products	0	1	0	1	TPE62025, TPE62026
TPE61036	Numerical Method	2	0	0	2	TPE62004
TPE61037	Machine Element Planning	2	0	0	2	TPE62020
TPE61038	Agricultural Energy and Electricity	2	0	0	2	
TPE61039	Agricultural Energy and Electricity Practicum	0	1	0	1	
TPF61014	Scientific Method	2	0	0	2	
TPE61040	Agricultural Building	2	0	0	2	
TPE61041	Operation Unit	2	0	0	2	TPE62025, TPE62026
UBU60005	Community Service (PKM)	0	4	0	4	
	Amount	**14**	**7**	**0**	**23**	
SEMESTER VI						
TPF60007	Personality Development and Professional Ethics	2	0	0	2	
UBU60003	Entrepreneurship	2	0	0	2	
TPF60015	Entrepreneurship Practicum	0	1	0	1	
TPE62042	Agricultural Equipment and Machinery Design	2	0	1	3	TPE61037
TPE62043	Operations Research	2	0	0	2	
TPE62044	Agricultural Cultivation Tools and Machinery	2	0	0	2	TPE62027, TPE62028
TPE62045	Agricultural Cultivation Equipment and Machinery Practicum	0	1	0	1	TPE62027, TPE62028
TPE62046	Geometry	2	0	0	2	

Code	Subject	credits				Description/ Prerequisites
		K	pr	R	Σ	
TPE62047	Praktkum Area Measurement	0	1	0	1	
TPE62048	System Engineering	2	0	0	2	
TPF60016	Field Work Practice (PKL)	0	3	0	3	Already taken 80 credits
	Amount	**14**	**6**	**1**	**21**	
SEMESTER VII						
TPF 60119	Seminar	0	1	0	1	
	Elective Course 1	3	0	0	3	
	Elective Course 2	2	0	0	2	
	Amount	**5**	**1**	**0**	**6**	
SEMESTER VIII						
TPF 60120	Bachelor Thesis Manuscript Writing	1	0	0	1	Already taken 110 credits
UBU60001	Thesis/Final Project	0	6	0	6	
	Elective Course 1	2	0	0	2	
	Elective Course 2	2	0	0	2	
	Amount	**5**	**6**	**0**	**11**	
	Total Credits				**144-160**	

**Prerequisite courses (courses that must be taken in the previous semester to take certain courses in the following semester).*
***Prerequisite courses for taking elective courses.*

Elective Courses in Agricultural Engineering Undergraduate Programs

Code	Subject	credits				Description / Prerequisites
		K	pr	R	Σ	
ODD SEMESTER						
TPE61049	Post Harvest Handling Technology	2	0	0	2	
TPE61050	Soil and Water Conservation	2	0	0	2	
TPE61051	Soil and Water Conservation Practicum	0	1	0	1	
TPE61052	Engine and Soil Dynamics	2	0	0	2	
TPE61053	Mechanical and Soil Dynamics Practicum	0	1	0	1	
TPE61054	Mechanization of Plantation Cultivation	2	0	0	2	

TPE61055	Irrigation and Drainage Engineering	2	0	0	2	
TPE61056	Irrigation and Drainage Engineering Practicum	0	1	0	1	
TPE61057	Factory Design	3	0	0	3	
EVEN SEMESTER						
TPE62058	Biosystem Robotics	2	0	0	2	TPE62022, TPE62023 Or TPO62017, TPO62018
TPE62059	Biosystem Robotics Practicum	0	1	0	1	TPE62022, TPE62023 Or TPO62017, TPO62018
TPL62017	Experimental design	2	0	0	2	
TPE62060	Pumps and Compressors	2	0	0	2	
TPE60061	Drying and Cooling Technique	2	0	0	2	TPE61034, TPE61035
TPE62062	The Relationship of Soil, Water and Plants	2	0	0	2	
TPE62063	Modeling and Simulation Techniques	2	0	1	3	TPE61036
TPE62064	Power in Agriculture 2	2	0	0	2	TPE62027, TPE62028
TPE62065	Power Practicum in Agriculture 2	0	1	0	1	TPE62027, TPE62028
TPE62066	Bioenergy Engineering	2	0	0	2	

2. Environmental Engineering Undergraduate Study Program

CODE	SUBJECT	credits				Description/ Prerequisites
		K	pr	R	Σ	
SEMESTER I						
UBU60004	English	2	0	0	2	
TPE61004	Math 1	3	0	0	3	
TPF60010	Statistics	2	0	1	3	
TPE61003	Physics	2	0	0	2	
TPF61006	Basic Physics Practicum	0	1	0	1	
TPF61001	Biology	2	0	0	2	
TPF61002	Biology Practicum	0	1	0	1	
TPF61003	Basic chemistry	2	0	0	2	

CODE	SUBJECT	credits				Description/ Prerequisites
		K	pr	R	Σ	
TPF61004	Basic Chemistry Practicum	0	1	0	1	
TPL61001*	Introduction to Environmental Engineering	3	0	0	3	
	Amount	**17**	**3**	**1**	**21**	
SEMESTER II						
MPK60007	Indonesian	2	0	0	2	
TPE6202*	Math 2	3	0	0	3	TPL61002
TPL62004*	Climatology	2	0	0	2	TPE61003, TPF61006
TPL62005	Climatology Practicum	0	1	0	1	TPE61003, TPF61006
TPL62006*	Fluid Mechanics 1	2	0	0	2	TPE61003, TPF61006
TPL62007*	Fluid Mechanics Practicum 1	0	1	0	1	TPE61003, TPF61006
TPL62008*	Chemical environment	2	0	0	2	TPF61003, TPF61004
TPL62009*	Environmental Chemistry Practicum	0	1	0	1	TPF61003, TPF61004
TPL62010$^{\alpha}$	Ecology	2	0	0	2	TPL61001
TPL62011$^{\alpha\beta}$	Environmental Laboratory	2	0	0	2	TPF61003, TPF61004
TPL62012$^{\alpha\beta}$	Environmental Laboratory Practicum	0	1	0	1	TPF61003, TPF61004
TPE62007	Computer Application	1	0	0	1	
TPE62008	Computer Application Practicum	0	1	0	1	
	Amount	**16**	**5**	**0**	**21**	
SEMESTER III						
TPL61013*	Engineering Mathematics 1	2	0	1	3	TPL62003
TPL61014*$^{\alpha}$	Hydrology	2	0	0	2	TPL62004
TPL61015*	Fluid Mechanics 2	2	0	0	2	TPL62006, TPL62007
TPL61016*	Fluid Mechanics Practicum 2	0	1	0	1	TPL62007

CODE	SUBJECT	credits				Description/ Prerequisites
		K	pr	R	Σ	
TPL61017	Soil Mechanics	2	0	0	2	TPE61003
TPL61018	Environmental Microbiology	2	0	0	2	TPF61001, TPF61002
TPL61019	Environmental Microbiology Practicum	0	1	0	1	TPF61001, TPF61002
TPL61020$^{\alpha}$	Mapping	2	0	0	2	
TPL61021$^{\alpha}$	Mapping Practicum	0	1	0	1	
TPE61014$^{\beta}$	Drawing techniques	2	0	0	2	
TPE61015$^{\beta}$	Technical Drawing Practicum	0	1	0	1	
TPL61041	Occupational Health and Safety (K3)	2	0	0	2	
	Amount	**16**	**4**	**1**	**21**	
SEMESTER IV						
TPL62022	Engineering Mathematics 2	2	0	1	3	TPL61013
TPL62023	Experimental design	2	0	0	2	
TPL62024$^{\beta}$	Structural Mechanics	2	0	0	2	TPE61003, TPF61006
TPL62025$^{\beta}$	Structural Mechanics Practicum	0	1	0	1	TPE61003, TPF61006
TPL62026$^{\beta}$	Liquid Waste Treatment	2	0	0	2	TPL62008, TPL61018
TPL62027$^{\beta}$	Liquid Waste Practicum	0	1	0	1	TPL62009, TPL61019
TPL62028$^{\beta}$	TL . Operational Unit	2	0	0	2	TPL62008, TPL61018
TPL62029$^{\beta}$	TL . Operations Unit Practicum	0	1	0	1	TPL62009, TPL61019
TPL62030$^{\beta}$	Environmental Conservation Engineering	2	0	0	2	TPL61014
TPL62031$^{\beta}$	Environmental Conservation	0	1	0	1	TPL61014

CODE	SUBJECT	credits				Description/ Prerequisites
		K	pr	R	Σ	
	Engineering Practicum					
TPL62032$^{\beta}$	Environmental Analysis	2	0	0	2	
TPL62033$^{\beta}$	Geographic Information System	2	0	0	2	
	Amount	**16**	**4**	**1**	**21**	
SEMESTER V						
TPF61014	Scientific Method	2	0	0	2	
TPL61034$^{\alpha}$	TL Operasi Operations Research	2	0	0	2	
TPL61035	Clean Water Supply Technique	2	0	0	2	TPL62008, TPL62009
TPL61036	Clean Water Supply Practicum	0	1	0	1	TPL62009
TPL61037$^{\alpha}$	Drainage and Sewage	2	0	0	2	TPL61015, TPL61016
TPL61038$^{\alpha}$	Drainage and Sewage Practicum	0	1	0	1	TPL61016
TPL61039	Air pollution	2	0	0	2	TPL62004, TPL62005
TPL61040	Air Pollution Practicum	0	1	0	1	TPL62005
TPF60011$^{\beta}$	Engineering Economics	3	0	0	3	
TPL61042$^{\alpha}$	Environmental System Analysis	2	0	0	2	
UBU60005	Community Service (PKM)	0	4	0	4	
	Amount	**15**	**7**	**0**	**22**	
SEMESTER VI						
MPK60008	Pancasila	2	0	0	2	
TPF60007	Personality Development and Professional Ethics	2	0	0	2	
UBU60003	Entrepreneurship	2	0	0	2	
TPF60015	Entrepreneurship Practicum	0	1	0	1	

CODE	SUBJECT	credits				Description/ Prerequisites
		K	pr	R	Σ	
TPL62043	Environmental Impact Analysis (AMDAL)	3	0	0	3	Cannot be taken in the previous semester.
TPL62044	Handling of Solid Waste and B3	2	0	0	2	
TPL62045	Project Management	2	0	0	2	
TPL62046	Plumbing	2	0	0	2	TPL62006
TPF60016	Field Work Practice (PKL)	0	3	0	3	Have taken 80 credits
	Amount	**15**	**4**	**0**	**19**	
SEMESTER VII						
MPK60001	Islamic education	2	0	0	2	Taking according to the religion of the student
MPK60002	Catholic Religious Education	2	0	0	2	
MPK60003	Protestant Christian Religious Education	2	0	0	2	
MPK60004	Hindu Religious Education	2	0	0	2	
MPK60005	Buddhist Education	2	0	0	2	
MPK60006	Citizenship	2	0	0	2	
TPL60047$^{\alpha}$	Environmental Management (Capstone Project)	0	2	0	2	
TPL60048$^{\beta}$	Design of Liquid Waste Treatment Building (Capstone Project)	0	2	0	2	
	Elective Course 1	2	0	0	2	
	Elective Course 2	2	0	0	2	
TPF 60119	Seminar	0	1	0	1	Already taken 110 credits
	Amount	**8**	**5**	**0**	**13**	
SEMESTER VIII						
	Elective Course 1	2	0	0	2	
	Elective Course 2	2	0	0	2	

CODE	SUBJECT	credits				Description/ Prerequisites
		K	pr	R	Σ	
TPF 60120	Bachelor Thesis Manuscript Writing	0	1	0	1	Already taken 110 credits
UBU60001	Bachelor Thesis/Final Project	0	6	0	6	
	Amount	**2**	**6**	**0**	**8**	
	Total Credits				**144-160**	

**Prerequisite courses (courses that must be taken in the previous semester to take certain courses in the following semester).*
***Prerequisite courses for taking elective courses.*

Elective Subjects of Environmental Engineering Undergraduate Study Program

Code	Subject	credits				Description/ Prerequisites
		K	pr	R	Σ	
ODD SEMESTER						
TPL61049	Clean Technology	2	0	0	2	
TPL61050	Standardization and Quality Management	2	0	0	2	
TPL61051	Environmental law	2	0	0	2	
TPL61052	Remediation	2	0	0	2	TPF61001, TPF61003
TPL61053	Ecotoxicology	2	0	0	2	
TPL61054	Environmental Sociology	2	0	0	2	
TPL61055	Global Warming and Climate Change	2	0	0	2	
TPL61056	Environmental Audit	2	0	0	2	
EVEN SEMESTER						
TPL61057	Disaster Mitigation and Management	2	0	0	2	
TPL61058	Environmental Health	2	0	0	2	
TPL61059	Pollutant Transport	2	0	0	2	
TPL61060	Natural Resources and Environmental Bioassessment	2	0	0	2	
TPL61061	Plasma Technology	2	0	0	2	

3. Bioprocess Technology Undergraduate Study Program

Code	Subject	credits				Description/ Prerequisites	Independent Curriculum
		K	pr	R	Σ		
	SEMESTER I						
MPK60001	Islamic education	2	0	0	2	Taking according to the religion of the student	**KMLPS**
MPK60002	Catholic Religious Education	2	0	0	2		**KMLPS**
MPK60003	Protestant Christian Religious Education	2	0	0	2		**KMLPS**
MPK60004	Hindu Religious Education	2	0	0	2		**KMLPS**
MPK60005	Buddhist Education	2	0	0	2		**KMLPS**
MPK60006	Civic education	2	0	0	2		**KMLPS**
UBU60004	English	2	0	0	2		**KMLPS**
TPF61003	Basic chemistry	2	0	0	2		**KMLPS**
TPF61004	Basic Chemistry Practicum	0	1	0	1		**KMLPS**
TPF61001	Biology	2	0	0	2		**KMLPS**
TPF61002	Biology Practicum	0	1	0	1		**KMLPS**
TPO61001	Introduction to Bioprocess Engineering	2	0	0	2		
TPE61002*$^{\phi}$	Basic mathematic	2	0	0	2		**KMLPS**
TPE61003*	Physics	3	0	0	3		**KMLPS**
TPF61006	Basic Physics Practicum	0	1	0	1		**KMLPS**
	Amount	**17**	**3**	**0**	**20**		
	SEMESTER II						
MPK60007	Indonesian	2	0	0	2		**KMLPS**
MPK60008	Pancasila	2	0	0	2		**KMLPS**
TPF62008	Organic Chemistry	2	0	0	2		**KMLPS**

TPF62009	Organic Chemistry Practicum	0	1	0	1		**KMLPS**
TPO6202	Engineering Mechanics	2	0	1	3		
TPO62003	Food Chemistry	2	0	0	2		
TPO62004*	Essential Microbiology	2	0	0	2		
TPO62005	Essential Microbiology Practicum	0	2	0	2		
TPO62006**	Introduction to Computer Applications	2	0	0	2		
TPO62007	Practical Introduction to Computer Applications	0	1	0	1		
TPE60004*$^{\phi}$	Calculus 1	2	0	0	2	TPE61002	**KMLPS**
	Amount	**16**	**4**	**1**	**21**		
	SEMESTER III						
TPF60011	Engineering Economics	3	0	0	3		**KMLPS**
TPF61012	Biomaterials	2	0	0	2		**KMDLPS**
TPF61013	Biomaterials Practicum	0	1	0	1		
TPO61008**	Transport Phenomenon 1	2	0	0	2	TPE61003	
TPO61009	Computer Aided Design (CAD)	2	0	0	2		
TPO61010	Computer Aided Design (CAD) Practicum	0	1	0	1		
TPO61011*	Automation 1	2	0	0	2		
TPO61012	Automation Practicum 1	0	1	0	1		
TPO61013*	Basic Biochemistry	2	0	0	2		
TPE61010*	Thermodynamics	2	0	1	3	TPE61003, TPF61006	**KMLPS**
TPE61018*$^{\phi}$	Calculus 2	2	0	1	3	TPE60004	**KMLPS**

	Amount	**17**	**3**	**2**	**22**		
	SEMESTER IV						
TPO62014**$^{\phi}$	Bioprocess Applied Mathematics	2	0	1	3	TPE61018	
TPO62015*	Chemical Reaction Engineering	2	0	1	3		
TPO62016	Transport Phenomenon 2	2	0	0	2	TPO61008	
TPO62017**	Automation 2	2	0	0	2	TPO61011	
TPO62018	Automation Practicum 2	0	1	0	1	TPO61012	
TPO62019	Operational Management	2	0	0	2		
TPO62020	Operational Management Practicum	0	1	0	1		
TPO62021	Bioprocess Operation Unit	2	0	0	2		
TPO62022	Bioprocess Operations Unit Practicum	0	1	0	1		
TPE62043	Operations Research	2	0	0	2		**KMLPS**
TPB62007	Enzyme Technology	3	0	0	3		**KMLPS**
	Amount	**17**	**3**	**2**	**22**		
	SEMESTER V						
TPF61014	Scientific Method	2	0	0	2		**KMLPS**
TPO61023**	Bioseparation Engineering	2	0	0	2		
TPO61024	Bioseparation Engineering Practicum	0	1	0	1		
TPO61025$^{\phi}$	Iterative Method	2	0	0	2	TPE60004	
TPO61026*	Basic Fermentation Technology	2	0	0	2	TPO62004, TPO61013	

TPO61027	Analysis Instrument	3	0	0	3		
TPO61028**	Experiment Design	2	0	0	2		
TPO61029	Experimental Design Practicum	0	1	0	1		
TPO61030	Basic Business Management	2	0	0	2		
TPO61031	Basics of Biotechnology	2	0	0	2		
UBU60005	Community Service (PKM)	0	4	0	4		**KMLPS**
	Amount	**17**	**6**	**0**	**23**		
	SEMESTER VI						
TPF60007	Personality Development and Professional Ethics	2	0	0	2		**KMLPS**
UBU60003	Entrepreneurship	2	0	0	2		**KMPLS**
TPF60015	Entrepreneurship Practicum	0	1	0	1		
TPO62032[α]	Bioprocess Reactor Design	3	0	0	3	TPO62015, TPO62021	
TPO62033[α]	Bioprocess Reactor Design Practicum	0	1	0	1	TPO62015, TPO62021	
TPO62034[α]	Bioprocess Industrial Design	3	0	0	3		
TPO62035	Fermentation Technology Application	3	0	0	3	TPO61026	
TPO62036[ϕ]	Biological System Modeling and Optimization	2	0	1	3	TPO62014	
TPO62037	Bioenergy Engineering	2	0	0	2		
UBU60002	Field Work Practice (PKL)	0	3	0	3		**KMLPS**
	Amount	**17**	**5**	**1**	**23**		

	SEMESTER VII						
TPF 60119	Bachelor Thesis Seminar	0	**1**	0	1		
	Elective Course 1	2	1	0	3		**Student exchange 1 semester at partner universities in LN**
	Elective Course 2	2	1	0	3		
	Elective Course 3	2	0	0	2		
	Elective Course 4	2	0	0	2		
	Amount	**8**	**3**	**0**	**11**		
	SEMESTER VIII						
	Elective Course 1	2	1	0	3		**Student exchange 1 semester at partner universities in LN**
	Elective Course 2	2	0	0	2		
	Elective Course 3	2	0	0	2		
TPF 60120	Bachelor Thesis Manuscript Writing	1	0	0	1		
UBU60001	Bachelor Thesis/ Final Project	6	0	0	6		Already taken 110 credits
	Amount	**13**	**1**	**0**	**14**		
	Total Credits				**144-160**		

KMLPS=Free Curriculum Outside Study Program
KMDLPS=Free Curriculum Offered for Outside Study Programs
**Prerequisite courses (courses that must be taken in the previous semester to take certain courses in the following semester).*
***Prerequisite courses for taking elective courses.*
[ϕ]Compulsory subjects based on Engineering Characteristics Mathematics are 15 credits
[α]The capstone course is the main feature of the Bioprocess Technology Study Program

Bioprocess Technology Undergraduate Study Program Elective Courses

Code	Subject	credits				Description/ Prerequisites	Independent Curriculum
		K	pr	R	Σ		
	ODD SEMESTER						
TPO61038	Membrane Technology and Process	2	0	0	2	TPO61023	
TPO61039	Membrane Technology and Process Practicum	0	1	0	1	TPO61023	
TPO61040	Computational Fluid Dynamics	2	0	1	3	TPO61008	
TPO61041	Industrial Waste Treatment	2	0	0	2		**KMDLPS**
TPO61042	Herbal Technology	2	0	0	2		**KMDLPS**
TPO61043	Calibration Technique	2	0	0	2		**KMDLPS**
TPO61044	Calibration Engineering Practicum	0	1	0	1		**KMDLPS**
TPL61043	Clean Technology	2	0	0	2		**KMLPS**
TPB61014	Food Biotechnology	2	0	0	2		**KMLPS**
	EVEN SEMESTER						
TPO62045	Advanced Programming	2	0	0	2	TPO62006	
TPO62046	Non Thermal Processing Technology	2	0	0	2		
TPE62029	Ergonomics, Occupational Health and Safety	2	0	0	2		**KMLPS**
TPE62058	Biosystem Robotics	2	0	0	2	TPO62017, TPO62018	**KMLPS**
TPE62059	Biosystem Robotics Practicum	0	1	0	1	TPO62017, TPO62018	**KMLPS**
TPP62014	Quality Management System and Halal Assurance	2	0	0	2		**KMLPS**
TPB62012	Biosensor	2	0	0	2		**KMLPS**

8.1.3 DEPARTMENT OF AGROINDUSTRIAL TECHNOLOGY

1. Agroindustrial Technology Undergraduate Study Program

A. Independent Professional Profile (Learning Outcome):

a. Become an Agroindustrial engineer who is able to apply systems engineering, process engineering, management engineering, and information technology in designing, running, and evaluating smart-green agro-industry.
b. Become a technopreneur who is able to manage and develop product innovations and sustainable agro-industry businesses based on local wisdom.
c. Become a professional with leadership characteristics, global insight, learning spirit, and able to work together in multidisciplinary and/or multicultural teams.
d. Individuals who have integrity, fighting power, adaptability, communicative, innovative, and intelligence in action (cognitive flexibility).

B. Learning Outcomes (CPL):

a. Able to identify, formulate, analyze, and solve agro-industry problems by applying mathematics, natural and materials knowledge, and information technology to gain a comprehensive understanding that includes systems engineering, process engineering, and engineering management.
b. Able to design system components, systems, processes, and/or products to meet needs in realistic constraints by applying modern engineering methods, skills, and tools in the practice of sustainable, intelligent agro-industry techniques based on local wisdom and with a global perspective.
c. Able to design and conduct laboratory and/or field experiments and be able to analyze and interpret the resulting data from an engineering perspective.
d. Able to work together in multidisciplinary and multicultural teams, build networks, and communicate effectively in writing and orally.
e. Able to be responsible to the community and adhere to ethics and professionalism in identifying, resolving, and evaluating agro-industrial engineering problems and being proactive to the latest issues.
f. Have an awareness of the importance of continuous learning (lifelong learning).
g. Able to apply the principles of technopreneurship in a sustainable creative agro-industry business.

Code	Subject	credits			Description/ Prerequisites
		K	pr	□	
SEMESTER I					
TPF61005	Physics	2	0	2	
TPF61006	Physics Practicum	0	1	1	
TPF60007	Personality Development and Professional Ethics	2	0	2	

Code	Subject	credits			Description/ Prerequisites
		K	pr	□	
TPI61001	Organic and Inorganic Chemistry	2	0	2	
TPI61002	Organic and Inorganic Chemistry Practicum	0	1	1	
TPI61003	General biology	2	0	2	
TPI61004	General Biology Practicum	0	1	1	
TPI61005	Introduction to Agroindustry	2	0	2	
TPI61006	Introduction to Economics	2	0	2	
TPI61007	General Math	2	0	2	
TPI61008	Engineering drawings	2	0	2	
TPI61009	Technical Drawing Practicum	0	1	1	
Amount		**16**	**4**	**20**	
SEMESTER II					
TPF60011	Engineering Economics	3	0	3	
TPI62010	Calculus	2	0	2	
TPI62011	Industrial Microbiology	2	0	2	
TPI62012	Industrial Microbiology Practicum	0	1	1	
TPI62013	Process Engineering Fundamentals	2	0	2	
TPI62014	Computer programming	2	0	2	
TPI62015	Computer Programming Practicum	0	1	1	
TPI62016	Waste Management and Industrial Environment	2	0	2	
TPI62017	Human Resource Management	2	0	2	
TPI62018	Knowledge of Agroindustrial Materials	2	0	2	
TPI62019	Agroindustry Material Knowledge Practicum	0	1	1	
Amount		**17**	**3**	**20**	
SEMESTER III					
UBU60004	English	2	0	2	
TPI61020	Industrial Mathematics	2	0	2	TPI62010

Code	Subject	credits			Description/ Prerequisites
		K	pr	□	
TPI61021	Operation Unit	2	0	2	TPI62013
TPI61022	Operations Unit Practicum	0	1	1	Are or have taken TPI61021
TPI61023	Industry Statistics 1	2	0	2	TPI61007
TPI61024	Industrial Statistics Practicum 1	0	1	1	Are or have taken TPI61023
TPI61025	Product Design and Development	2	0	2	TPI62019
TPI61026	Operations Research	3	0	3	TPI61007
TPI61027	Work Design and Ergonomics	2	0	2	
TPI61028	Practical Work Design and Ergonomics	0	1	1	Are or have taken TPI61027
TPI61029	Waste Technology	2	0	2	
TPI61030	Waste Technology Practicum	0	1	1	Are or have taken TPI61029
TPI61031	Quality Control	2	0	2	TPI61005
Amount		**19**	**4**	**23**	
SEMESTER IV					
MPK60001	Islam	2	0	2	Taking according to the religion of the student
MPK60002	Catholicism	2	0	2	
MPK60003	Protestant Christianity	2	0	2	
MPK60004	Hindu religion	2	0	2	
MPK60005	Buddhism	2	0	2	
MPK60008	Pancasila	2	0	2	
TPI62032	Process Unit	2	0	2	TPI61022
TPI62033	Optimization Techniques	2	0	2	TPI61020
TPI62034	Bioprocess Engineering	2	0	2	TPI62012
TPI62035	Bioprocess Engineering Practicum	0	1	1	Are or have taken TPI62034
TPI62036	Material Handling and Facility Layout Planning	2	0	2	TPI61009, TPI61028
TPI62037	Practical Material Handling and Facility Layout Planning	0	1	1	Are or have taken TPI62036

Code	Subject	credits			Description/ Prerequisites
		K	pr	□	
TPI62038	Production Planning and Inventory Control	2	0	2	TPI61026
TPI62039	Practical Production Planning and Inventory Control	0	1	1	Are or have taken TPI62038
TPI62040	System Modeling and Simulation	3	0	3	TPI61020; TPI61026
TPI62041	Information Systems and Technology	2	0	2	TPI 62015
TPI62042	Information Technology and Systems Practicum	0	1	1	Are or have taken TPI62041
	Amount	**19**	**4**	**23**	
SEMESTER V					
MPK60006	Citizenship	2	0	2	
MPK60007	Indonesian	2	0	2	
UBU60003	Entrepreneurship	2	0	2	TPI61025
TPF60015	Entrepreneurship Practicum	0	1	1	Are or have taken TPF60015
TPF61014	Scientific Method	2	0	2	Have taken 72 credits
TPI61043	Decision Analysis	2	0	2	TPI61026
TPI61044	Factory Design	2	0	2	Taken at least semester 5; TPI62032; TPI62034
TPI61045	Industrial Project Planning	2	0	2	Taken at least semester 5; TPI62017; TPI62037; TPI62039
TPI61046	Industry Statistics 2	2	0	2	TPI61024
	Enrichment 1*	2	0	2	
Amount		**18**	1	19	
SEMESTER VI					
	Enrichment 2*	2	0	2	
	Enrichment 3*	2	0	2	
	Enrichment 4*	2	0	2	

Code	Subject	credits			Description/ Prerequisites
		K	pr	□	
	Enrichment 5*	2	0	2	
	Enrichment 6*	1	0	1	
	Elective Course 1	2	0	2	
	Elective Course 2	2	0	2	
	Elective Course 3	2	0	2	
Amount		**15**	**0**	**15**	
SEMESTER VII					
TPI61047	Agroindustry Project	0	2	2	TPI61044; TPI61045
	Enrichment 7*	1	0	1	
	Enrichment 8*	0	1	1	
	Elective Course 4	2	0	2	
	Elective Course 5	2	0	2	
	Elective Course 6	2	0	2	
	Amount	**7**	**3**	**10**	
ODD/EVEN SEMESTER					
UBU60005	Community service	0	4	4	Have taken 80 credits
TPF60016	Field Work Practice (PKL)	0	3	3	
UBU60001	Thesis	0	6	6	TPF61014; have taken 110 credits
TPF 60119	thesis seminar	0	1	1	
TPF 60120	Bachelor Thesis Manuscript Writing	0	1	1	
Amount		**0**	**15**	**15**	
Total Credits				**145**	

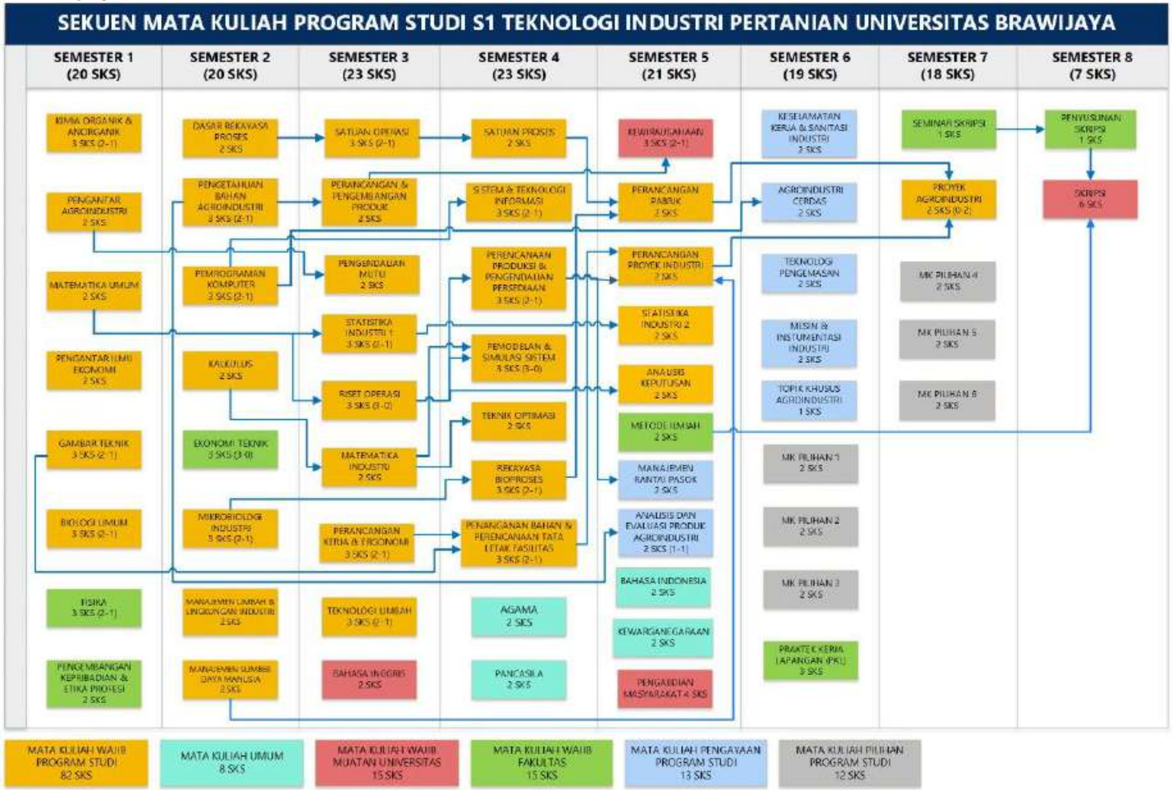
Mor Elective Courses for the Bachelor of Agroindustrial Technology

Code	Subject	credits			Description/ Prerequisites
		K	pr	□	
ODD SEMESTER					
TPI61048	Supply Chain Management*	2	0	2	TPI 62039
TPI61049	Agroindustry Product Analysis and Evaluation*	1	0	1	TPI 62019
TPI61050	Practical Analysis and Evaluation of Agroindustry Products*	0	1	1	Are or have taken TPI 61049
TPI61051	Risk management	2	0	2	TPI 62043

TPI61052	Industrial psychology	2	0	2	TPI62017
TPI61053	Maintenance System	2	0	2	TPI61024
TPI61054	Data Mining	2	0	2	TPI61024
TPI61055	Oil, Emulsion and Oleochemical Process Engineering	2	0	2	TPI62032
TPI61056	Agroindustry Audit	2	0	2	TPI61031
TPI61057	Bioremediation	2	0	2	TPI61030
TPI61058	Enzyme and Microbial Technology	2	0	2	TPI62012
EVEN SEMESTER					
TPI62059	Packaging Technology*	2	0	2	
TPI62060	Industrial Machinery and Instrumentation*	2	0	2	
TPI62061	Occupational Safety and Industrial Environment*	2	0	2	
TPI62062	Smart Agroindustry*	2	0	2	TPI62015
TPI62063	Special Topic Agroindustry*	1	0	1	Already taken 72 credits
TPI62064	Cost Accounting	2	0	2	TPF60011
TPI62065	Productivity Analysis	2	0	2	
TPI62066	Advanced Operations Research	2	0	2	TPI61026
TPI62067	Smart System	2	0	2	TPI62042
TPI62068	Process Engineering of Aromatic Products and Biopharmaceuticals	2	0	2	TPI62032
TPI62069	Process Engineering of Plantation and Forestry Products	2	0	2	TPI62032
TPI62070	Clean Production	2	0	2	TPI62016
TPI62071	Bioenergy	2	0	2	TPI61030
TPI62072	Field Study	0	1	1	

* Enrichment courses: TIP scientific courses that are required to be taken either inside or outside the study program

Curriculum Map for Bachelor Degree in Agroindustrial Technology, Faculty of Agricultural Technology, Universitas Brawijaya



8.2 STRUCTURE OF THE MASTER PROGRAM CURRICULUM (S2)

8.2.1 DEPARTMENT OF FOOD SCIENCE AND BIOTECHNOLOGY

Agricultural Product Technology Master's Program

Compulsory Courses

No.	Code	Subject	credits	Semester
1.	TPP81001	Research Methodology and Statistics in the field of THP	3	1
2.	TPP82001	THP Selected Topic Seminar (*)	2	2
3.	TPP81002	Advanced Food Analysis	3	1
4.	TPP81003	Food Nutritional Value Evaluation Techniques	2	1
5.	TPP81004	Advanced Food Processing Technology	3	1
6.	TPP81005	Advanced Food Microbiology	2	1
7.	TPP81006	Advanced Food Biochemistry	2	1
Amount			**17**	

Elective Courses (minimum 12 credits, free to take MK from 4 Fields of Science)
Food and Agricultural Products Chemistry and Biochemistry Laboratory

No.	Code	Subject	credits	Semester
1.	TPP8202	Bioactive Natural Ingredients	2	2
2.	TPP82003	Advanced Enzyme Technology	2	2
3.	TPP82004	Food Component Chemistry	2	2
4.	TPP82005	Physiology of Agricultural Products	2	2

Food and Agricultural Product Processing and Engineering Laboratory

No.	Code	Subject	credits	Semester
1.	TPP82006	Advanced Food Processing Engineering	2	2
2.	TPP82007	Food Safety Management	2	2
3.	TPP82008	Integrated Quality Control	2	2
4.	TPP82009	Product Development and Innovation Management	2	2
5.	TPP82010	Estimating Shelf Life and Stability of Food Products	2	2
6.	TPP82011	Integrated Sensory Science and Consumer Studies	2	2
7.	TPP82012	Waste Management	2	2

Food and Agricultural Product Microbiology Laboratory

No.	Code	Subject	credits	Semester
1.	TPP82013	Advanced Bioprocess Technology	2	2
2.	TPP82014	Advanced Fermented Food	2	2
3.	TPP82015	Food Safety Microbiology	2	2
4.	TPP82016	Industrial Biotechnology Microbiology	2	2

No.	Code	Subject	credits	Semester
5.	TPP82017	Environmental Biotechnology	2	2
6.	TPP82018	Cell and Molecular Biology	2	2
7.	TPP82019	Genetical manipulation	3	2
8.	TPP82020	Enzymology	3	2
9.	TPP82021	Food Biotechnology	3	2

Food Nutrition and Agricultural Products

No.	Code	Subject	credits	Semester
1.	TPP82022	Epidemiology and Nutritional Status	2	2
2.	TPP82023	Advanced Nutrient Physiology and Metabolism	2	2
3.	TPP82024	Special Nutrition and Diet	2	2
4.	TPP82025	Nutrition and Immunology	2	2
5.	TPP82026	Nutrigenomics	2	2
6.	TPP82027	Development of Functional Foods and Supplements	2	2
7.	TPP82028	Practical Nutrition and Bioactive Compounds	3	2

Final Project (MK Thesis Master Program)

Code	Subject	credits
TPF81001	Thesis Proposal Preparation	2
TPF80001	Thesis Research	4
TPF80002	Thesis Seminar	1
TPF80003	Scientific Publications	2
TPF80004	Thesis Manuscript Writing	3

8.2.2 DEPARTMENT OF BIOSYSTEM ENGINEERING
Agricultural Engineering Masters Study Program

Program Compulsory Courses

Code	Subject	credits
ODD SEMESTER		
TPE81001	Research methodology	3
TPE81002	Agricultural Engineering and Biosystem Management	3
TPE81004	Techno Economics	3
TPE81005	Advanced Modeling and Optimization Techniques	3
TPE81006	Design Engineering	3
Amount		**15**

Compulsory Interest Course in Agro Biosystem Mechanical Engineering

Code	Subject	credits
EVEN SEMESTER		
TPE82019	Agro Biosystem Machinery Design	3
TPE82020	Renewable Alternative Energy	3
TPE82021	Bioproduct Process Technology	3
Amount		**9**

Compulsory Subjects in Natural Resources and Environmental Engineering

Code	Subject	credits
EVEN SEMESTER		
TPE82001	Engineering Hydrology	3
TPE8202	Spatial Technology	3
TPE82003	Natural Resource Management Techniques	3
Amount		**9**

Compulsory Course for Agricultural Mechanization Management

Code	Subject	credits
EVEN SEMESTER		
TPE82004	Decision Making Techniques	3
TPE82005	Agricultural Mechanization System Analysis	3
TPE82006	Power Management and Agricultural Machinery	3
Amount		**9**

Elective Courses for Masters in Agricultural Engineering

Code	Subject	credits
EVEN SEMESTER		
TPE82007	Physical Properties of Agricultural Materials and Products	2
TPE82008	Mechatronics Agricultural Equipment and Machinery	4
TPE82009	Energy Conversion Technique	2
TPE82010	Instrumentation and Testing	2
TPE82011	Advanced Environmental Conservation Engineering	2
TPE82012	Advanced Water Supply and Irrigation	2
TPE82013	Waste Management and Treatment	2
TPE82014	Advanced Drainage	2
TPE82015	Agricultural Mechanization Project Management	3
TPE82016	Sustainable Agricultural Engineering	2
TPE82017	Agricultural Engineering Information System	3
TPE82018	Agricultural Product Marketing Management	3

Final Project (MK Thesis Master Program)

Code	Subject	credits
TPF81001	Thesis Proposal Preparation	2
TPF80001	Thesis Research	4
TPF80002	Thesis Seminar	1
TPF80003	Scientific Publications	2
TPF80004	Thesis Manuscript Writing	3

Minimum Total Credits to be taken: 42 credits

8.2.3 DEPARTMENT OF AGROINDUSTRIAL TECHNOLOGY
Master of Agroindustrial Technology Study Program

Program Compulsory Courses

Code	Subject	credits
SEMESTER I		
TPI81001	Agroindustrial Materials Science	2
TPI81002	Research Methodology and Writing Techniques	2
TPI81003	System Modeling Analysis	2
TPI81004	Agroindustrial Production System	2
	Elective Course – 1	2
	Elective Course – 2	2
	Elective Course – 3	2
	Amount	**14**
SEMESTER II		
TPI82001	Agroindustry Techno Economics	2
TPI8202	Biotransformation Technique	2
TPI82003	Agroindustry Supply Chain Strategy and Management	2
	Elective Course – 4	2
	Elective Course – 5	2
	Elective Course – 6	2
	Amount	**12**
SEMESTER III		
TPI811012	Integrated Agroindustry Development Practicum	2
TPF80001	Thesis	12
	Total Credits	**40**

Elective Courses in Agroindustrial Technology Master Program (minimum 12 credits)

Code	Subject	credits
ODD SEMESTER		
TPI81005	Agroindustry Quality Management and System	2
TPI81006	Agroindustry Innovation and Standardization	2
TPI81007	Human Resource Development	2
TPI81008	Decision Support System	2
TPI81009	Agroindustrial Biotechnology	2
TPI81010	Process Engineering and Secondary Metabolite Products	2
TPI81011	Agroindustrial Waste Management and Technology	2

Code	Subject	credits
EVEN SEMESTER		
TPI82004	Bioenergy and Biorefinery	2
TPI82005	Bioremediation	2
TPI82006	Palma Process Engineering	2
TPI82007	Fatty and Oleochemical Process Engineering	2
TPI82008	Technology Engineering and Process Design	2
TPI82009	Advanced Optimization Techniques	2
TPI82010	Advanced Risk Management	2
TPI82011	Halal Industry	2

Final Project (MK Thesis Master Program)

Code	Subject	credits
TPF81001	Thesis Proposal Preparation	2
TPF80001	Thesis Research	4
TPF80002	Thesis Seminar	1
TPF80003	Scientific Publications	2
TPF80004	Thesis Manuscript Writing	3

8.3 CURRICULUM STRUCTURE OF DOCTOR'S PROGRAM (S3)

8.3.1 Agroindustrial Technology Doctoral Program

No.	Code	Subject	credits	Status	Semester
	MANDATORY COURSES				
1	TPI91001	Science phylosophy	2	W	1
2	TPI91002	Agroindustry Development	2	W	1
3	TPI91003	Agroindustry Innovation System	2	W	1
	SUPPORTING SUPPORTING COURSES				
3	TPI91004	Integrated Quality System	2	P	1
4	TPI91005	Agroindustry Downstream Biotechnology	2	P	1
5	TPI91006	Agroindustry Policy Strategy	2	P	1
6	TPI91007	Downstream Product Technology	2	P	1
7	TPI91008	Agricultural Equipment and Machinery Engineering	3	P	1
8	TPI91009	Industrial Waste Treatment	3	P	1
9	TPI91010	Control Instrumentation and Biosystem	3	P	1
10	TPI91011	Renewable Energy for Industry	3	P	1
	DISSERTATION COURSES				
11	TPF92001	Qualifying Exam	1	W	2
12	TPF9202	Proposal Writing and Proposal Examination	2	W	2
13	TPF91001	Research and Research Results Seminar I	6	W	3
14	TPF92003	Research and Research Results Seminar II	6	W	4
15	TPF91002	International Scientific Publications I	2	W	5
16	TPF91003	Research and Research Results Seminar III	6	W	5
17	TPF92004	International Scientific Publications II	2	W	6
18	TPF92005	Dissertation Writing and Dissertation Examination	5	W	6
Total Credits Required : 42 credits					

8.3.2 Food Science Doctoral Program

No.	Code	Subject	credits	Status	Semester
	MANDATORY COURSES				
1	TPP91001	Philosophy of Science and Research Methods in Food Science	2	WP	1
2	TPP91002	Advanced Food Science	2	WM	1
	Number of Credits		**4**		
	Dissertation SUPPORTING COURSES (take a minimum of 8 credits)				
3	TPP91003	Bioactive Components and Their Utilization	2	P	1
4	TPP91004	Food Component Interaction	2	P	1
5	TPP91005	Derivatization of Food Components	2	P	1
6	TPP91006	Food Processing Technology Innovation	2	P	1
7	TPP91007	Food Sensory Science	2	P	1
8	TPP91008	Capita Selecta Food Processing Technology	2	P	1
9	TPP91009	Bioactive Compound Production Technology	2	P	1
10	TPP91010	Advanced Food Microbiology	2	P	1
11	TPP91011	Food Virology	2	P	1
12	TPP91012	Food Biotechnology	2	P	1
13	TPP91013	Food Microbial Toxicology	2	P	1
14	TPP91014	Molecular Nutrition	2	P	1
15	TPP91015	Bioassay Technique	2	P	1
16	TPP91016	Food Nutrition Physiology	2	P	1
	Number of Credits		**28**		
	DISSERTATION COURSES				
17	TPF92001	Qualifying Exam	1	W	2
18	TPF9202	Proposal Writing and Proposal Examination	2	W	2
19	TPF91001	Research and Research Results Seminar I	6	W	3
20	TPF92003	Research and Research Results Seminar II	6	W	4
21	TPF91002	International Scientific Publications I	2	W	5
22	TPF91003	Research and Research Results Seminar III	6	W	5
23	TPF92004	International Scientific Publications II	2	W	6
24	TPF92005	Dissertation Writing and Dissertation Examination	5	W	6
	Number of Credits		**30**		
Total Credits Required : 42 credits					

IX. COURSE SYLLABUS

9.1. SYLLABUS OF UNDERGRADUATE PROGRAM (S1)

9.1.1 Syllabus of National Content Courses, Universities, and Faculties

A. Syllabus of National Content Courses

MPK60001 ISLAMIC RELIGION 2(2-0)

The Islamic Religion Course is a Personality Development Course (MPK) that examines Islamic teachings as a source of values and guidelines that lead students to develop Islamic professions and personalities. After taking the Islamic Religion course, students can develop their faith and piety, have knowledge and have noble character and make Islamic teachings the basis for thinking and behaving in professional development. Learning Materials/Main Subjects include: (1) Introduction: The Urgency of Islam in Higher Education; (2) Integration of Faith, Islam and Ihsan in Forming Whole Man; (3) Implementation of Islamic Aqeedah in Realizing Happiness in the World and the Hereafter; (4) Islam Rahmatan Lil 'Alamin; (5) The Role of Mosques in Building Human Civilization; (6) Islamic Law in the Indonesian Context; (7) Morals and Modern Problems; (8) Islam and the Challenge of Radicalism; (9) The Qur'anic Paradigm in Facing the Development of Modern Science and Technology; (10) Corruption and its Prevention from an Islamic Perspective; (11) Islamic Economic and Administrative System; (12) Politics and Love for the Homeland in an Islamic Perspective.

MPK60002 CATHOLIC RELIGION 2(2-0)

Increasing understanding of the concept of faith in the Church, living in the church and in society in the context of developing the personal mentality of a Catholic scholar who can dedicate himself to the interests of the Indonesian people as an expression of his faith.

MPK60003 PROTESTANT CHRISTIAN RELIGION 2(2-0)

Develop the application of the basics of Christian faith to equip students to grow as whole persons and new creations in Jesus Christ. Increase responsibility towards God through sensitivity to others and their environment. Thus, as an academic person, they can enter the community with devotion based on service and for the honor and glory of God.

MPK60004 HINDU RELIGION 2(2-0)

The history of the development of Hinduism, the three basic frameworks of Hinduism, tatwa (philosophy), susila (ethics), yadya (ritual). A description of Wada, the basis of Hindu religious faith, five srada, the basis and purpose of human life, dharma sidharta, chess clan yoga, panca maha yadya, asram chess, color chess.

MPK60005 Buddhist Religion 2(2-0)

The beginning of the establishment of Buddhism, epistemology, causality, characteristics of life, karma, rebirth of morality and ethics, nirvana, branching and characteristics of each school, metaphysics, divinity in Buddhism, the position of Buddhism in the repertoire of human knowledge, the relevance of Buddhism to the times modern and development era of Indonesia.

MPK60006 CITIZENSHIP 2(2-0)

Citizenship Course is a national compulsory subject that is included in the Personality Development Course (MPK) of Universitas Brawijaya which functions as student orientation in strengthening the insight and spirit of nationalism, love for the homeland, democracy, legal awareness, respect for diversity and participation in building a nation and state based on Pancasila.

MPK6007 INDONESIAN LANGUAGE 2(2-0)

Indonesian is a Personality Development Course that aims to instill the basic values of love for the homeland through the national language. In particular, understanding and applying good and correct Indonesian in academic writing in various fields of science is a means of developing science and technology that must be mastered by students. The substance of this course is directed at learning Indonesian spoken and written in a systematic and logical manner through listening, reading, writing, and scientific speaking activities. On the technical aspect, this course equips students with the skills to explore ideas (content thoughts), write logically and systematically (organizational thoughts), write scientific and popular writing styles (style thoughts), as well as realize scientific and popular writings in their scientific field (purpose thoughts).). In addition, the rules for scientific writing (scientific conventions) in Indonesian were also introduced which were integrated with efforts to form a scientific paradigm-based mindset. The learning materials/subjects include: (1) the history of the Indonesian language, the function and position of the Indonesian language; (2) Variety of Indonesian; (3) Ethics and Aesthetics in Scientific Forums; (4) Critical reading of texts (scientific field); (5) Writing Quotations, Bibliography, and Plagiarism; (6) Indonesian Spelling and Diction; (7) Effective Sentences in Scientific Writing; (8) Paragraphs in Scientific Writing; (9. Popular Writing; (10) Concept of Scientific Work; (11) Composing Scientific Work. The learning materials/subjects include: (1) the history of the Indonesian language, the function and position of the Indonesian language; (2) Variety of Indonesian; (3) Ethics and Aesthetics in Scientific Forums; (4) Critical reading of texts (scientific field); (5) Writing Quotations, Bibliography, and Plagiarism; (6) Indonesian Spelling and Diction; (7) Effective Sentences in Scientific Writing; (8) Paragraphs in Scientific Writing; (9. Popular Writing; (10) Concept of Scientific Work; (11) Composing Scientific Work. The learning materials/subjects include: (1) the history of the Indonesian language, the function and position of the Indonesian language; (2) Variety of Indonesian language; (3) Ethics and Aesthetics in Scientific Forums; (4) Critical reading of texts (scientific field); (5) Writing Quotations, Bibliography, and Plagiarism; (6) Indonesian Spelling and Diction; (7) Effective Sentences in Scientific Writing; (8) Paragraphs in Scientific Writing; (9. Popular Writing; (10) Concept of Scientific Work; (11) Composing Scientific Work. (10) Concept of Scientific Work; (11)

Compiling Scientific Work. (10) Concept of Scientific Work; (11) Compiling Scientific Work.

MPK60008 PANCASILA 2(2-0)

The Pancasila Course is a national compulsory subject that is included in the personality development course group. . This course is required with the following backgrounds: (a) Historicity; as a nation that respects history, the life of the nation and state is never separated from the values that have been instilled by the founding fathers; (b) Cultural; as a nation that has cultural roots and values, then we must have a solid cultural foundation so that our national identity does not become extinct in the hands of the times; (c) Juridical; in the statutes of Universitas Brawijaya it is stated the need to preserve the values of Pancasila; (d) In the Global Era, various world ideologies that enter our lives can influence our views on the life of the nation and state, even threaten the division of the nation,

B. University Content Course Syllabus

UBU60001 Bachelor Thesis 6 credits

Thesis is a scientific work based on the results of work from the implementation of research, technological design work, work internships, and entrepreneurship that discusses a problem or topic that is presented systematically and comprehensively accompanied by a literature study, and contains elements of analysis and synthesis under the guidance of a Advisor .

Prerequisites: have taken at least 110 credits.

UBU60003 ENTREPRENEURSHIP 2(2-0)

This course studies the characteristics of successful entrepreneurs (building dreams and pursuing goals, motivating yourself, solving problems and running a business), intrapersonal skills (communication, leadership and entrepreneurial motivation), developing creativity and innovation in the creation of superior service products, marketing entrepreneurship (personal and corporate), and entrepreneurial management (financial management, evaluation and business development).

UBU60004 ENGLISH 2(2-0)

Ability to speak English for oral and written communication, both active (speaking and writing) and passive (listening and reading). Techniques for communicating technical information to non-technical audiences, writing scientific reports, letters and memos, making formal and informal presentations.

UBU60005 SERVICE TO THE COMMUNITY 4(0-4)

Community Service is a community service activity that is carried out individually (Professional Community Service) or individually/in groups (Mapres Community Service Program, Thematic Community Service Program), aiming to assist the community in solving the problems they face, increasing the level of knowledge and skills, so that it is expected to improve their welfare. Real work lecture activities are divided into 4 activity stages, namely debriefing, implementation of activities at the location, implementation reports, and evaluations.

Prerequisites: have taken at least 80 credits.

C. Syllabus of Faculty Content Courses

TPF61001 BIOLOGY 2(2-0)

This course explains the scope of biology, biological materials, cells, genetics, cell bioenergetics, cell growth and development, classification of organisms, atomic cycles, ecology, biodiversity, plants, animals, and microorganisms and their applications in agricultural technology and biotechnology.

TPF61002 BIOLOGY PRACTICE 1(0-1)

This practicum course learns about the use of a microscope and how to calibrate micrometers, microorganism cell structure, plant tissue, animal tissue, respiration and photosynthesis, biodiversity in aquatic ecosystems, and the interaction of biotic components in an ecosystem.

TPF61003 BASIC CHEMISTRY 2(2-0)

Basic Chemistry is designed to provide an introduction to the basic principles in analytical chemistry in various chemical reactions. Basic principles that cover the introduction and safety of Chemistry laboratory work, basic laws, electrons and nuclei, the periodic table, chemical bonds, intermolecular bonds and solubility, unit conversion in Chemistry, and Stoichiometry. Basic chemical reactions study solutions and colloids, acid-base reactions, buffer solutions, redox reactions, precipitation reactions and also the basis of spectrophotometric analysis.

TPF61004 PRACTICE OF BASIC CHEMISTRY 1(0-1)

In this practicum course, students learn about the basic principles of working in a laboratory. Students learn about the tools in the laboratory and K3 culture. Students are able to make a solution with a certain concentration, alkalimetric acidity principles, buffer solutions, oxidation reduction reactions and determination of the concentration of substances using spectrophotometric methods.

TPF61005 BASIC PHYSICS 2(2-0)

This course provides a basic understanding of the basic principles of physics and its role in everyday life, especially in the field of agricultural technology. This course covers the following materials: dimensions and units; scalar and vector quantities (vector algebra operations); mechanics (statics, kinematics, dynamics); fluid physics (hydrostatic pressure, Archimedes' principle, Bernoulli's law); thermal physics (laws of thermodynamics, sensible heat, latent heat, phase change); wave physics (wave mechanics, wave propagation); and electricity and magnetism.

TPF61006 PRACTICUM OF BASIC PHYSICS 1(0-1)

This course is related to the Basic Physics course and is a practical aspect of experimentation on various selected basic principles of physics. The practical material covers the basic principles of physical measurement, the concepts of statics and the addition of force vectors, the application of Archimedes' law, the introduction of the coefficient of thermal expansion in different materials, and the practice of understanding the electric circuits of Ohm's and Kirchoff's laws.

TPF60007 PERSONAL DEVELOPMENT AND PROFESSIONAL ETHICS 2(2-0)

This course contains the meaning and definition of ethics and morals, code of ethics and professionalism. Implementation of professional code of ethics in an institution (including student ethics, lecturer ethics, education ethics, lecture ethics). Materials on intelligence, personality, communication, and empathy in relation to professional ethics. This course also discusses self-development, status of professional standardization, professional organizations (national and international), prevention of plagiarism, and prevention of corruption.

TPF62008 ORGANIC CHEMISTRY 2(2-0)

This course is a study program course which is a course that is developmental towards an understanding of organic compounds. This course is structured to provide the ability to solve structural and reaction problems and the reactivity of organic compounds. The discussion of organic materials is an important material because it becomes the basis for the development of agricultural technology. This course discusses alkanes, alkenes, alkynes, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, aromatic compounds, organic halogen compounds, stereochemistry, polymers. Reactions in organic molecules (substitution, elimination, esterification, etherification, hydrolysis, amidation, etc.), isometry and stereoisometry, groups of compounds based on functional groups, biomolecular compounds (carbohydrates, proteins, fats) and other natural compounds (alkanes, alkenes,

TPF62009 PRACTICE OF ORGANIC CHEMISTRY 1(0-1)

The practical material that will be carried out includes identification of alcohol functional groups, identification of aldehyde and ketone functional groups, qualitative tests of carbohydrates, qualitative tests of proteins, and saponification reactions in fats. After completing this practicum, students are expected to understand and have skills in identifying functional groups in organic compounds and conducting qualitative tests of organic compounds.

TPF60010 STATISTICS 3(2-1)

Discussion of the scope, uses, types of statistics and phases of descriptive and inferential statistics, as well as the application of statistics in the field of engineering. Description of graphic and numeric data from grouping categorical data and numerical data. Estimated mean, median, mode, standard deviation and coefficient of variance of ungrouped and grouped data. Conditional probability, a probability distribution that includes a discrete probability distribution and a continuous probability distribution. Assessment. Hypothesis testing, level of significance, T-test and Z-test, linear regression, linear regression model, coefficient of determination and multiple regression.

TPF60011 ENGINEERING ECONOMY 3(3-0)

This course contains the interest formula, the concept of cost, annual and present value equivalence, rate of return (RoR), depreciation, taxes, inflation, benefit cost ratio (BCR), break even point (BEP), sensitivity analysis, and technical analysis. other

TPF61012 BIOMATERIAL 2(2-0)

This course contains an introduction to biomaterials science, definitions in the field of biosystems and medicine; classification, structure and basic properties of biomaterials; methods of testing the biological, physical and chemical properties of biomaterials; structure and properties of biometal, bioceramic, biopolymer, bioplastic; application of biomaterials as anti-biofouling, biosensor, drug delivery, bioseparation, biomethane, biohydrogen, bioethanol and biodiesel.

TPF61013 BIOMATERIAL PRACTICE 1(0-1)

This course contains an introduction to biomaterials science, definitions in the field of biosystems and medicine; classification, structure and basic properties of biomaterials; methods of testing the biological, physical and chemical properties of biomaterials; structure and properties of biometal, bioceramic, biopolymer, bioplastic; application of biomaterials as anti-biofouling, biosensor, drug delivery, bioseparation, biomethane, biohydrogen, bioethanol and biodiesel.

TPF61014 SCIENTIFIC METHOD 2(2-0)

In this course, students learn about scientific writing from abstracts, introductions (including identification of problems), formulating research hypotheses, reviewing literature, designing research methods (including determining research variables), results and discussions, and literature. At the end of the lecture, they are also taught writing scientific journal articles and making effective presentation media.

TPF60015 ENTREPRENEURSHIP PRACTICE 1(0-1)

This entrepreneurship practicum course aims to enable students to be able to run an entrepreneurial business through the stages of strengthening entrepreneurial motivation, market surveys, business idea development, business plan preparation, product marketing and business evaluations that have been carried out.

TPF60016 FIELD WORK PRACTICE (PKL) 3(0-3)

The form of field work practice is an activity in industrial partners, institutions, or government or private agencies that aims to correlate theory in the scientific field of student study programs with real practice in the world of work. PKL contains elements of observation/observation and students must be able to analyze and synthesize the results of these observations based on their knowledge under the guidance of a supervisor.

Prerequisite: have taken at least 80 credits

TPF60119 BACHELOR THESIS SEMINAR 1(0-1)

This course is in the form of presentations on the progress of student proposal preparation in turns according to the schedule determined by the supporting lecturer, and is carried

out with a supervisor and/without examiner after obtaining approval from the supervisor to register for a proposal seminar. After taking this MK, students are expected to be able to formulate problems, search for scientific literature and compile them systematically, develop or design scientific activities, scientifically present thesis proposals in written form, be able to present thesis proposals orally, be able to explain the scientific basics underlying the thesis proposal. , and understand you and be able to explain the writings in the proposal.
Prerequisite: have taken at least 110 credits

TPF60020 WRITING THE BACHELOR THESIS 1(0-1)
This course is in the form of student consultations with the thesis supervisor on a regular basis (every week) and attendance at the consultation (at least 80% to be able to take the thesis exam) is recorded in the presence at Siado by the thesis supervisor. After completing this Constitutional Court, students are expected to be able to formulate problems, be able to compose a literature review and present it systematically, be able to develop methods, be able to analyze data, process, and present data, be able to interpret data, be able to compose results and discussions, be able to draw conclusions and provide suggestions from the results obtained, and able to compose a comprehensive thesis.
Prerequisite: have taken at least 110 credits

9.1.2 Syllabus for Bachelor of Food Science and Technology (ITP) PS Courses

TPP61001 BASIC CHEMISTRY 1 2 (2-0)
This course provides an introduction to the basic principles of inorganic chemistry, physical chemistry and analytical chemistry. The topics to be studied are the notion of matter, composition, structure of substances, elements and compounds. Atomic theory: periodic arrangement and general properties, ionization potential, electron affinity, electronegativity. Solution and concentration: definition of solution, mixture of solute, solvent and solution, concentration, equivalent weight, molarity, normality, and molality. Acid-base theory: according to Arrhenius, acid-base ionization constants and calculations. pH of solution: theory and calculation of pH in strong acid solutions, strong bases, weak acids, weak bases, salts, and buffer solutions, oxidation reduction reactions. Stochiometry: stoichiometry in volumetric analysis, gravimetry. Volumetric analysis: standard solutions, acid-alkalimetry, precipitation, permanganometry,

TPP61002 PRACTICUM BASIC CHEMISTRY 1 1 (0-1)
In this practicum course, students learn about the basic principles of working in a laboratory. Students learn about the tools in the laboratory and K3 culture. Students are able to make a solution with a certain concentration, alkalimetric acidity principles, buffer solutions, oxidation reduction reactions and determination of the concentration of substances using spectrophotometric methods.

TPP61003 Calculus 3 (3-0)

This course studies the basic principles of calculus, the basic concepts of mathematical logic including expressions and equations (types of mathematical equations, polynomial equations, factorization), matrices, systems of linear equations and inequalities and absolute values, functions and models, limits and continuity, derivatives functions and applications, integral functions and their applications, introduction to differential equations and their applications.

TPP61004 INTRODUCTION TO FOOD SCIENCE AND TECHNOLOGY 2 (2-0)

This course discusses the role of Food Science and Technology as well as an introduction to the chemical and biochemical aspects of food; food engineering and processing; food microbiology and biotechnology; and food nutrition. The role of food science and technology includes the role of food science and technology in development; role in food security and sovereignty; a role in local food development; and roles in food safety.

TPP62001 BASIC CHEMISTRY 2 3 (3-0)

Basic Chemistry 2 consists of basic knowledge of energy-based chemical transitions and reaction balances. Topics related to thermochemistry, electrochemistry, state of matter and phase diagrams, ideal gas law and its problems, partial pressure and vapor pressure, law of multiple proportions, equilibrium equations, solubility equilibrium, and chemical kinetics. This course also contains principles in chemical analysis such as gravimetry, volumetry, instrumental, radioactive analysis.

TPP6202 GENERAL MICROBIOLOGY 2 (2-0)

This course explains the history of microbiology, applications of microbiology, basic techniques in microbiology (techniques for obtaining microorganisms, techniques for viewing microorganisms, microorganism storage techniques), identification of conventional microbes (morphology and biochemistry), prokaryotic and eukaryotic cells, viruses and bacteria, classification and morphology of molds and yeasts, metabolism of microorganisms, and factors that influence microbial growth.

TPP62003 GENERAL MICROBIOLOGY PRACTICE 2 (0-2)

Apply basic techniques in microbiology (techniques for obtaining microorganisms, techniques for viewing microorganisms, microorganism storage techniques), identification of conventional microbes (morphology and biochemistry), prokaryotic and eukaryotic cells, viruses and bacteria, classification and morphology of molds and yeasts, metabolism of microorganisms, and factors that affect microbial growth.

TPP62004 COMMUNICATION SKILLS 2 (2-0)

Basic knowledge of communication, understanding and characteristics of interpersonal communication, interpersonal communication processes, human perception, verbal and non-verbal messages, effective communication, value aspects, communication norms and ethics, critical thinking skills, case discussion, applying critical thinking skills, audience centered analysis , and its applications.

TPP62005 PROCESSING ENGINEERING 1 3 (2-1)

Engineering principles covering basic engineering concepts (units and dimensions, thermodynamic laws and phenomena/phenomena, ideal gases), mass and energy balance as well as psychrometry and distillation. This course is the basis of the KP 2, KP 3 and PUP courses.

TPP61005 BIOCHEMISTRY 4 (4-0)

This course reviews bioorganic compounds such as carbohydrates, fats, proteins, enzymes, nucleic acids and high energy compounds. The principle of extracting and storing energy from materials and sunlight through anabolic pathways. Metabolism processes (including anabolism and catabolism) of major bioorganic compounds (carbohydrates, fats, proteins, enzymes and nucleic acids) and their energy calculations.

TPP61006 NUTRITIONAL PHYSIOLOGY AND METABOLISM 2 (2-0)

This course includes an understanding of nutrition in food, sources and functions of nutrients for the body, bioavailability, mechanisms of the digestive system, absorption, transport, uptake of nutrients into cells, physiological responses from cooperation between complex organs/organ systems to maintain homeostasis and body functions, the role of central organs in the oxidation and storage of macronutrients and the metabolism of various nutrients in the human body.

TPP61007 FOOD CHEMISTRY 3 (3-0)

This course covers chemical structure, classification, nomenclature, physico-chemical properties, chemical reactions, roles/functions of chemical components in food ingredients and products including water, carbohydrates, lipids, proteins, pigments, vitamins, minerals, flavors, and minor components. (phenolic compounds, saponins, toxicants, antinutrients, and others). Changes in the physico-chemical characteristics of food due to processing in relation to changes in the chemical components of the food. Effect of changes in the physico-chemical properties of food components on spoilage and shelf life of food products. Interactions between components in food products in general.

TPP61008 FOOD PHYSICAL CHEMISTRY 2 (2-0)

Food physical chemistry course discusses particle size, state of matter (gas, liquid, solid), solutions and properties of solutions (electrolytes and non-electrolytes) and colloidal systems. This lecture also discusses adsorption, absorption, surface tension, emulsion and foam systems, osmosis, diffusion, aggregate/precipitate, nucleation, crystallization and glass transition as well as the basic concepts of rheology along with their properties and applications.

TPP61009 PROCESSING ENGINEERING 2 3 (2-1)

Engineering principles covering fluid flow, heat transfer (steady-state and unsteady-state) and mass transfer. This course also studies the effect of thermal processes

(sterilization) on microbes, filtration, membrane technology mass balance and freezing rate.
Prerequisite: TPP62005

TPP61010 FOOD MICROBIOLOGY 1 2 (2-0)
This course explains the history of the development of food microbiology, harmful microbes, types of beneficial microbes, types of microbes in foodstuffs (vegetable, animal), the influence of intrinsic and extrinsic factors on microbial growth in foodstuffs, bacteriophages in food products.

TPP61011 MATERIAL KNOWLEDGE 3 (3-0)
This course studies the components of materials, chemical and physical characteristics of various foodstuffs (cereals, tubers, nuts, spices and seasonings, horticulture, seaweed, eggs, milk, meat and poultry, fish, other foodstuffs).). Relation of material characteristics with food product characteristics and changes during processing, storage and utilization.

TPP62006 FOOD NUTRITION EVALUATION 2 (2-0)
This course covers the factors that affect the nutritional value of food (anti-nutrient compounds, handling, processing, nutrification, etc.), in vivo and in vitro evaluation methodologies for the nutritional value of food as well as an introduction to the use and testing of experimental animals.

TPP62007 FOOD MICROBIOLOGY 2 2 (2-0)
This course describes diseases caused by microbes, microbial control in food processing, sublethal injury microbes, spore-producing microbes and resistance to processing, identification of microbes with modern methods.
Precondition:**TPP6202, TPP61010**

TPP62008 FOOD ANALYSIS 3 (3-0)
The course material includes pre-treatment of samples before analysis (size reduction, screening) and sampling techniques (sampling). Also briefly discussed are the differences between conventional and modern analytical techniques, as well as the understanding of qualitative and quantitative analysis techniques in food analysis. Chemical analysis includes the principles and methods of proximate analysis of protein content, carbohydrate content, fat content, water, vitamins, minerals, pigments, as well as an introduction to the analysis of antioxidant activity, food additives, and toxins. Students are also introduced to rapid analytical techniques such as analysis of hazardous chemicals, preservatives, and dyes using kits. Modern food analysis covers the basic principles and introduction to the application of chromatography, electrophoresis, and ELISA techniques in food analysis, as well as the application of microscopic analysis on food ingredients and products. Physical analysis of food includes various analysis techniques of color, texture and texture profile, particle size and distribution, amylography, viscosity, elasticity, solubility and solubility, as well as other physical properties.

TPP62009 BIOCHEMICAL PRACTICE AND FOOD ANALYSIS 2 (0-2)

The practicum includes qualitative testing of biochemical molecules. Testing changes due to the enzymatic process of carbohydrates, proteins, and fats. Enzyme extraction, activity testing, and enzyme kinetics. Sampling techniques, analysis of levels and characteristics of proteins, carbohydrates, fats, water, vitamins, minerals, anti-nutritional substances, additives, as well as testing the physical properties of food products (color, viscosity, texture elasticity, and others).

TPP62010 ENGINEERING PROCESSING 3 3 (3-0)

This course studies the technical aspects of several unit operations which (1) involve heat (evaporation, pasteurization, sterilization, blanching, freezing and cooling). The material studied is a description of the process, its application, the effect on food products, balance and flow of heat and mass. (2) which does not involve heat (extraction processes with solvents: gas-liquid, vapor-liquid, liquid-liquid, solid-liquid and mechanical-physical separation processes: mixing, centrifugation, size reduction and technology176industry). The aspects studied are the description of the process, its application, the effect on food products, mass transfer, the equilibrium relationship between phases. In addition, it will discuss about food processing tools and machines and their effects in their application to commodities, examples of tools that are generally used in the food industry and machines that may exist in the future.
Precondition:**TPP62005**

TPP62011 FOOD PROCESSING TECHNOLOGY 3 (3-0)

This course covers traditional and modern methods of food preservation, including during distribution and storage. The need for preservation is discussed including the relationship of physical, chemical, and microbiological deterioration factors with water. Processing technology which includes heating, cooling, freezing, drying, salting, acidification, sugar, radiation, chemical preservatives, and modern methods. This course also covers the principles and applications of processing techniques and the influence of processing parameters on product quality. Processing techniques include freeze drying, extraction, extrusion, non-thermal processes and so on.
Prerequisite: TPP62005

TPP62012 FOOD PROCESSING TECHNOLOGY PRACTICE 2 (0-2)

The practicum covers the basics of processing such as measurement (density, rheology, WHC, syneresis), technology (drying, flouring, noodle and baking, cooling and freezing, frying, preservation with sugar, salt and acid, IMF-intermediate moisture foods) and other preservation.

TPP62013 SANITATION AND WASTE TREATMENT 3 (3-0)

Definition of food industry sanitation which includes sanitation of processing room/building, processing equipment, water, workers, raw materials and industrial environment. Pest control and water supply in the food industry. Technology design continues for liquid and solid waste management; sanitary landfills and hazardous waste disposal processes; Recycling technologies include nutrient removal from wastewater, energy production from solid and liquid wastes and product recovery.

TPP62014 QUALITY MANAGEMENT SYSTEM AND HALAL ASSURANCE 2 (2-0)

Concept and definition of quality, history of quality development, quality terminology, scope of operation of quality control, linkage of quality – process and control, quality attributes of food products and product quality standards. In addition, the introduction of quality systems, halal systems, understanding of accreditation and certification, quality audits, writing quality management system documents and making quality manuals, QMS standards ISO 9000:2008, ISO 22000 and ISO 14000 and certification procedures will also be discussed in general as well as discussion. various food regulations used in international trade. This course also studies the halal assurance system in the food industry. Topics discussed include the meaning and purpose of halal certification, policies and regulations as well as related institutions, certification mechanisms and their application, requirements,

TPP62015 ENZYMOLOGY 2 (2-0)

The properties of enzymes as biocatalysts, Enzyme naming and classification systems. The role of enzymes in life processes and their role in food processing. Enzyme structure, enzymatic reaction kinetics and mechanism of action of enzymes.

TPP61012 EXPERIMENTAL DESIGN 2 (2-0)

In this course, you will learn how to design experiments with various types of experimental designs such as RAL, RAK, Factorial, Nested Random and able to perform non-parametric experimental tests (Friedman, Wilson test and different tests: t test, BNT and DMRT) and non-experimental design, observation and data collection, interpretation of experimental analysis results.

TPP61013 FOOD NUTRITION EVALUATION PRACTICUM 1 (0-1)

The subjects of this practicum include testing the nutritional value or bioavailability (bioavailability), nutrients in food, namely carbohydrates and protein, the effect of processing and the presence of anti-nutritional compounds on the nutritional quality of food, as well as methods of evaluating the nutritional value of food in vitro and in vivo.

TPP61014 FOOD MICROBIOLOGY PRACTICUM 2 (0-2)

This practicum is designed to provide practical skills in the laboratory on microbiological analysis of food. Practical materials include general techniques and standard procedures for microbiological analysis, identification and characterization of spoilage and pathogenic microorganisms, the effect of food processing on microorganism resistance, microbial biochemical activity tests, microbial control by chemical treatment, and food preservation through the fermentation process.

TPP61015 SENSORY ANALYSIS 2 (2-0)

This course provides insight into the basic concepts of sensory science as well as basic sensory methodologies at the technical application level, especially for threshold measurement, discriminatory testing, acceptance and preference including data processing and statistical interpretation.

TPP61016 SENSORY ANALYSIS PRACTICUM 1 (0-1)

This practical subject practices basic sensory methods at the technical application level, especially for measuring thresholds, discriminatory tests, acceptance and preferences including data processing and statistical interpretation.

TPP61017 QUALITY CONTROL 2 (2-0)

The scope of quality control operations, quality – process and control linkages, food product quality attributes and product quality standards, process variability, problem solving and quality control tools, statistical reviews, quality control statistics, process evaluation and quality improvement, quality performance measurement and satisfaction consumers; quality economics, computer applications in the field of quality control, review of the relationship between quality management and food safety.

TPP61018 FOOD ADDITIONAL INGREDIENTS AND INGREDIENTS 3 (3-0)

In the discussion of food additives, the review includes: type, chemical structure, function of the product, physical and chemical properties, working mechanism, method of use, limits of use and safety aspects, as well as nutrification of specific food components in food products. This course also contains characteristics and applications of various ingredients (ingredients) that are widely used in the food industry. Students are expected to be able to know the characteristics of food industry materials, their application, related regulations and standards, be able to determine their use in food production, and be able to do problem solving related to the use of materials in food processing. Knowledge of industrial materials studied includes: milk derivatives (skim milk, cream, butter milk, anhydrous milk fat, casein, whey, etc.), starch, modified starch, dextrin, maltodextrin, flour,

TPP61019 PACKAGING AND STORAGE 3 (3-0)

Knowledge of various types of packaging materials (plastic, paper, metal, and glass), their properties (resistance to heat, permeability to gas and water), various packaging methods and their applications. This course also studies the determination of the shelf life of food products using reaction prediction methods and shelf life plots (Arrhenius, linear, and Q10) and others.

TPP62016 PRODUCT DEVELOPMENT 2 (2-0)

Changes in the business environment that require new product development, socio-cultural aspects in society, consumer behavior studies, consumer research, new product development management principles, new product design, technology and engineering in new product development, business aspects in the development of new products which include financial forecasting and market opportunities for new product development, at the end of the lecture several case studies are discussed and the course discussion is closed with a review. Measurement of sensory characteristics. Product testing is in the development and marketing stages. Sensory segmentation sensitivity test.

TPP62017 FOOD REGULATION 2 (2-0)

Food regulation courses are designed to be able to provide an understanding of food law, both nationally and internationally. Lecture materials include BPOM and various regulations on food that apply in Indonesia, BSN and SNI, introduction to CODEX, FDA, USDA and other international food regulators, food labeling rules and claims, food adulteration, regulations on food safety including allergens (food allergens), irradiated food, biotechnology and genetically modified food, nanotechnology, functional food and supplements. This lecture also discusses food regulations used in international trade and international trade procedures (export - import procedures) as well as current issues related to food regulations both nationally and internationally.

TPP62018 FOOD SAFETY AND TOXICOLOGY 3 (3-0)

This course covers the concept of toxicology, classification of toxic substances in food (natural and synthetic): toxins from plants, animals, microbes, toxins from the environment, heavy metals, toxic materials and their toxicity. It also explains the mechanism of toxicity, allergen compounds in food, Genetically Modified Food (GMF), food additives, packaging materials, safety of processed food products, risk assessment and food safety regulation, including biotransformation mechanisms and bioassays in toxicology both in vivo. as well as in vitro.

TPP62019 PROCESSING UNIT PLANNING 4 (3-1)

Explain the theories that underlie the planning process of a processing unit, planning flow diagrams, the need for processing equipment and machinery, utilities, quality management and work safety and economic analysis followed by the practice of making a processing unit plan.
Prerequisites: TPP61009, TPP62010, TPP62011

Food Science and Technology Study Program (Optional)

TPP61020 ANIMAL PRODUCT PROCESSING TECHNOLOGY 3 (3-0)

Characteristics and physiological properties of animal food ingredients. Post-harvest handling techniques for livestock and fish products for consumption needs and processed raw materials for livestock and fish products. The technique of processing livestock and fish products into processed products that have economic value. Techniques for handling and processing waste and industrial processing of livestock and fish products.

TPP61021 NUTRACETIC AND FUNCTIONAL FOOD 2 (2-0)
Understanding of nutraceuticals, supplements and functional foods aimed at health. Discussion on bioactive components of food for the development of supplement products and functional food, especially those based on local resources. Aspects include: the relationship between food, nutrition and health; efficacy of bioactive components in preventing health problems; types of supplements and functional food products; the principles of processing and product analysis; and its development technology including extraction, fortification and food supplementation technology.

TPP61022 CULINARY MANAGEMENT 2 (2-0)
This course covers basic knowledge about the scope and development of catering services including the franchise system. The aspects discussed include aspects of quality, nutrition and economy, including the provision of ingredients, menu planning, processing and preparation for serving, design and layout, organization, personnel, and marketing.

TPP61023 PLANTATION PRODUCTS TECHNOLOGY 2 (2-0)
This course studies the processing of plantation commodities including coffee, tea, cocoa, and palm oil into intermediate products (primary processing), and processing into various products (secondary and tertiary processing) of commodities. The material studied includes the types/varieties of each commodity with its uniqueness, characteristics, primary processing methods, and processing into various food products, health benefits, and applications in other industries. Students are expected to be able to do trouble shooting and current issues related to the processing of commodities and be able to design products for these various commodities.

TPP61024 POLYSCARIDE AND SUGAR TECHNOLOGY 2 (2-0)
This course discusses the characteristics, processing, process equipment, process control, and utilization of polysaccharides and sugars. Polysaccharides discussed include modified starch, cellulose derivatives, pectin, polysaccharides from seaweed, seed gum, exudate gum, microbial gum, polysaccharides from tubers. The technology and utilization of sugar includes cane sugar, brown sugar, sugar resulting from hydrolysis of starch (glucose syrup, fructose syrup, maltose syrup, etc.), sugar alcohol (sorbitol, maltitol, lactitol, mannitol, xylitol, isomalt, isomaltulose, etc.), as well as derivatives. cane sugar (sucralose).

TPP61025 FAT AND OIL TECHNOLOGY 2 (2-0)
This course covers the technology of processing oil source materials into edible fats/oils and their derivative products. The discussion of edible oils/fats processing includes principles, technology/methods, equipment and control of the extraction and purification processes including degumming, refining, washing, bleaching, deodorization, and fractionation. The discussion on processing fat/oil-based products includes technology, process equipment, process control, and product applications: butter, margarine, shortening, frying fats, virgin coconut oils (VCO), cocoa butter substitute/replacer/alternative, fat replacer/mimetic, hydrogenated fats, salad oil, fish oil, creamer powder, MCT (medium chain triglyceride), and others.

TPP61026 Snack Food and Confectionery TECHNOLOGY 2 (2-0)

This course covers snack food technology including chips, various types of biscuits, extruded products, cereals, tortillas, cookies, crackers, wafers, crackers, processed nuts, food bars, and others, as well as confectionery. includes various variants of chocolate (chocolate bars, meises, etc.), various types of candy such as lollipop, soft candy, hard boiled candy, toffee, chewing candy, bubble gum, lozenges, marshmallow, jelly, fudge, ginger candy, and others. The discussion includes raw materials for processing snacks and confectionaries, processing methods, equipment needed, process control, and proper packaging.

TPP61027 Molecular Gastronomy 2 (2-0)

This course studies scientifically and applies molecular gastronomy. The topics taught include gastronomy, sensory sensation and perception, physicochemical principles and techniques in the cooking process, physiochemical transformation of food ingredients during the cooking process, as well as the application of various molecular cooking techniques and advanced culinary arts (advanced cuisine) in relation to optimizing sensation and perception. sensory experience when consuming food and drink.

TPP61028 FOOD TECHNOLOGY AND ENGINEERING INNOVATION 3 (3-0)

This course provides knowledge about the latest innovations in food technology and engineering, which include non-thermal food processing, encapsulation technology, emulsification technology, nanotechnology, microwave applications, ohmic heating, electrochemistry, and provides knowledge about the latest materials related to food engineering processes, biosurfactants and catalysts.

TPP61029 SPICE AND ESSENTIAL OIL TECHNOLOGY 2 (2-0)

This course explains the chemical components contained in spices, their functions and roles for health. The technology for processing spices is also explained regarding the extraction of essential oils as well as the handling and processing of several types of spices with high economic value in Indonesia.

TPP61030 THERMOBACTERIOLOGY 2 (2-0)

The Thermobacteriology course introduces important aspects in thermal treatment of food so that it becomes a product that is safe for consumption and retains nutrition. This course opens with an introduction to the history and development of the application of thermal processes to food products and continues with exposure to important microbiological aspects in thermal processes, including microbial resistance to thermal processes. Next will be given an explanation of the concept of microbial growth rate, destruction and optimization of thermal processes. In the final half of the semester, this course will be continued with an in-depth evaluation of thermal processes.

TPP61031 FERMENTED FOOD 3 (3-0)

Provide basic knowledge about processed products whose processing uses microbes. Processing and development of fermented products, both traditional and modern, including fermented fruits and vegetables, tubers and seeds, and animal products. How to control the process, determine the quality of the final product. Fermentation-based functional foods are also discussed.

TPP62020 POST-HARVEST PHYSIOLOGY AND TECHNOLOGY 2 (2-0)

This course explains the physiological processes of fresh commodities. Includes an explanation of respiration and respiration patterns. Effects of respiration patterns on the shelf life of commodities, transpiration, physico-chemical changes during maturity and product maturity. Effect of temperature, RH, and gas composition on physiological, biochemical and product quality. Specific commodity handling technology, commodity physiological damage, pathology, post-harvest losses and quality standards.

TPP62021 NUTRITION AND PUBLIC HEALTH 2 (2-0)

Discussion on Community Nutrition and Food Security Issues, Nutrition Improvement Program and Food Diversification, Nutrition Epidemiology, Balanced Menu and PPH. Explain the calculation of nutritional needs and adequacy (RDA), as well as nutrition for special groups. Methodology for assessing the nutritional status of the community. Overview of malnutrition, degenerative diseases and public health indicators.

TPP62022 FOOD AND NUTRITION TRENDS 2 (2-0)

This course discusses the latest developments in food technology and health. This course examines actual issues related to: the relationship of nutrition with obesity and metabolic syndrome diseases, nutrigenomics and personalized nutrition, futures in nutrition, nutrition and development, nutrition and aging, sports nutrition, nutrition-immunomodulators and the immune system, and issues related to nutrition. other current issues with the latest nutritional research results. Each material is given an example of a food product concept for a specific purpose.

TPP62023 FOOD AND NUTRITION INTERVENTION 2 (2-0)

This course discusses the principles and concepts of planning, organizing, implementing and evaluating in Food Nutrition Extension and Promotion. This course also examines behavioral and socio-cultural concepts in relation to nutrition and health issues; Extension and Promotion methods and strategies; designing materials, media, and approach techniques (individual, group and mass). Identify problems, develop strategies for food and nutrition interventions.

TPP62024 CONSUMER STUDY 2 (2-0)

Through this course, students are expected to be able to assess the main theories related to understanding and relevant aspects related to changes in consumer behavior with an emphasis on food consumers. Topics covered will also include common methods used in consumer studies.

TPP62025 NATURAL PRESERVATIVE 2 (2-0)
This course studies the history of food preservation, food preservation methods, food preservatives, factors that affect the effectiveness of preservatives, the dangers of synthetic preservatives and the advantages of using natural preservatives, microbial-based natural preservatives, plant-based natural preservatives, animal-based natural preservatives, food products that use preservatives.

TPP62026 FOOD PRODUCT PRODUCT TECHNOLOGY 3 (3-0)
This course discusses the technology for processing food crops including cereals, nuts, and tubers. The scope of the discussion covers the characteristics of materials in relation to the processing process, as well as processing commodities into various processed products including processing technology, process equipment, process control, appropriate packaging.

TPP62027 HORTICULTURAL TECHNOLOGY 3 (3-0)
This course discusses the latest developments in the processing and research of horticultural commodities, characteristics of horticultural commodities (knowledge of the physiological, physical and chemical properties of various horticultural commodities, maturity level of horticultural commodities, main components of horticultural commodities, cell structure, texture and turgor pressure), post-harvest handling/fresh processing of horticultural commodities (physiological properties of quality and shelf life of horticultural commodities, post-harvest handling technology of horticultural commodities), post-harvest handling/fresh processing of horticultural commodities (hot treatment, CAS, MAS), minimally process horticultural commodities, technology horticultural drying, horticultural commodity frying technology, horticultural commodity canning technology,horticultural commodity fermentation technology, use of food additives in horticultural commodity processing, bioactive compound extraction technology in horticultural commodities, horticultural commodity waste processing technology, discussion of case studies in horticultural commodity processing.

TPP62028 FOOD NUTRITION BIOASSAY 2 (2-0)
This course covers the evaluation of foodstuffs related to biological functions. Evaluation techniques include bioavailability, digestibility, absorption and cellular function of nutritional and non-nutritive components and bioactive compounds including dietary fiber, pigments and phytochemicals in foodstuffs. Evaluation of safety, efficacy and biological mechanisms in the body, content of bioactive compounds in foodstuffs and how to test them. Testing in vivo, in vitro or tissue and cellular culture in experimental animals and human cells. Evaluation of functions that will be discussed include the function of digestion, absorption and distribution: vascular, hormonal, immune system, enzyme system.

9.1.3. Syllabus for Undergraduate Biotechnology Courses

TPB61001 MATHEMATICS 3-0

In this course, students learn the basics of sequences, series, matrices, functions and relations and their relevance in industrial biotechnology.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Solve basic and applied math problems.
2. Explain the role of mathematics in industrial biotechnology.

TPB61002 INTRODUCTION TO BIOTECHNOLOGY 3-0

In this course, students study the scope of biotechnology, its role in various industries and in the development of sustainability, as well as its regulation.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Explain the role of biotechnology in various industries and in supporting sustainable development.
2. Explain the principles underlying biotechnology regulation

TPB62001 GENETICS 2-0

In this course, students learn the basics of inheritance and the relationship between biomass taxa (viruses, archaea, bacteria, protists, fungi, animals, and plants).

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Comparing the basis of inheritance across taxa.
2. Classify biomass based on its taxa and create a phylogenetic tree model using software.

TPB6202 INTRODUCTION TO BIOPROCESS TECHNOLOGY 2-0

In this course, students study the scope and industrial applications of bioprocess technology.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Explain the principles of industrial fermentation.
2. Explain the principles of upstream and downstream processing in bioindustry.

TPB62003* BIOPROCESS ENGINEERING BASIC 3-0

In this course, students learn engineering principles in bioprocess operations.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Explain the principles and applications of mass and energy balance, fluid flow and heat and mass transfer in the biotechnology industry.
2. Calculating heat and mass transfer in various bioprocess operations.

TPB61003 BIOCHEMISTRY AND ENZYMOLOGY PRACTICES 0-1

In this course, students practice isolation techniques and biomolecular analysis in the laboratory.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Review the isolation steps and biomolecular analysis.
2. Demonstrate isolation techniques and biomolecular analysis.
3. Interpret data and report results of isolation and analysis of biomolecules.

TPB61004 ANALYSIS ENGINEERING IN BIOTECHNOLOGY 2-0

In this course, students learn the principles of biotechnology analysis.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Explain the principles of analytical techniques in biotechnology.
2. Comparing analytical techniques in biotechnology to achieve specific goals.

TPB61005 ANALYSIS ENGINEERING PRACTICE IN BIOTECHNOLOGY 0-1

In this course, students practice biotechnology analytical techniques in the laboratory.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Reviewing the steps of biotechnology analysis to achieve certain goals.
2. Interpret data and report the results of biotechnology analysis.
3. Demonstrating biotechnological analysis techniques.

TPB61006 Cell and Molecular Biology 3-0

In this course, students study the structure, organization, and function of genetic material, proteins, and cells; processes and regulation of replication, transcription, and translation; and the cell life cycle.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Comparing the life cycles of prokaryotic and eukaryotic cells.
2. Comparing the molecular devices and mechanisms that give rise to the characteristics of prokaryotic and eukaryotic cells.

TPB61007* BIOPROCESS OPERATING UNIT 1 2-0

In this course, students study unit operations of upstream and downstream processes in the biotechnology industry.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Examine the principles of unit operation of upstream and downstream processes in the biotechnology industry.
2. Solve upstream and downstream process unit operations problems in the biotechnology industry.

TPB61008* BIOPROCESS OPERATING UNIT 2 3-0

In this course, students learn the principles of reaction and reactor engineering in the biotechnology industry.

Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Examine the design principles of various bioreactors.
2. Solve homogeneous and heterogeneous reaction problems.

TPB62004 INTRODUCTION TO BIOINFORMATION 2-0
In this course, students explore biological databases and use software to analyze biological data.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Download, interpret and annotate gene and protein sequence data from biological databases using software.
2. Comparing gene and protein sequences using software and presenting the data.

TPB62005 GENETICAL MANIPULATION 3-0
In this course, students learn the principles and applications of genetic engineering on microorganisms.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Explain the principles and applications of genetic engineering to microorganisms.
2. Designing plasmids using software to achieve certain goals.

TPB62006 GENETIC ENGINEERING PRACTICUM 0-1
In this course, students practice genetic engineering techniques on microorganisms in the laboratory.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Studying the steps of genetic engineering on microorganisms.
2. Interpret data and report results of genetic engineering experiments on microorganisms.
3. Demonstrate genetic engineering techniques on microorganisms.

TPB62007 ENZYME TECHNOLOGY 3-0
In this course, students study the discovery, engineering, production, and application of enzymes in various industries and their regulations.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Studying biocatalytic cycles (from discovery of enzymes to their industrial applications)
2. Comparing the application of enzyme technology in various industries.
3. Describe the safety and regulatory aspects of enzyme production.

TPB62008 INDUSTRIAL MICROBIOLOGY AND BIOTECHNOLOGY 2-0
In this course, students study the derivatization and conversion of biomass into bioproducts in the context of sustainability.
Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Explain the biomass cycle and the principle of derivatization and conversion into bioproducts
2. Making industrial trees based on biomass and bioproducts that have the potential to be produced through the biorefinery process.

TPB62009 INDUSTRIAL MICROBIOLOGY AND BIOTECHNOLOGY PRACTICE 0-1

In this course, students practice the conversion of biomass into bioproducts and analyze its quality.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Reviewing the steps of conversion and analysis of biomass into bioproducts.
2. Interpret data regarding the quality of bioproducts and report the results
3. Demonstrating techniques for converting biomass into bioproducts.

TPB62010 PRODUCT DEVELOPMENT AND BIOTECHNOLOGY REGULATION 3-0

In this course, students learn the principles of developing biotechnology products and their regulations.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Developing new ideas for biotechnology products that meet the challenges of human needs
2. Describe the regulatory system related to the production, distribution, and application of biotechnology products.

TPB61009 BIOPROCESS UNIT DESIGN 3-0

In this course, students learn the principles of bioprocess-based production unit design.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Designing a bioprocess-based production unit.
2. Calculating the feasibility of a bioprocess-based production unit design.

TPB61010 EXPERIMENTAL DESIGN 2-0

In this course, students learn the principles of experimental design for a student's final project.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:
1. Compare different types of experiments and their applications.
2. Designing an experiment to answer the hypothesis.

TPB61011 BIOTECHNOLOGY SEMINAR 2-0

In this course, students learn effective communication techniques for their final project.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Create effective tables and figures.
2. Make effective posters.
3. Presenting research ideas effectively.

TPB61012 IMMOBILIZATION TECHNIQUES 2-0

In this course, students learn biological agent immobilization techniques and their industrial applications.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Explain the principles and techniques of immobilization and the factors that influence the performance of immobilization.
2. Comparing biological agent immobilization techniques and their applications in the biotechnology industry.

TPB61013 APPLIED MICROBIOLOGY 3-0

In this course, students study trends in applied microbiology in various fields.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Reviewing the latest trends in applied microbiology.
2. Explain the application of microbiology in various fields.

TPB61014 FOOD BIOTECHNOLOGY 2-0

In this course, students study the application of modern genetics and biochemical processes (enzymatic and metabolic) in food products and their development trends.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Studying traditional foods made using biotechnology.
2. Describe the development of biotechnology applications in food products and their effects on product quality and safety.

TPB61015 NUTRIGENOMICS 2-0

In this course, students learn the concept of nutrigenomics and its application for disease prevention and therapy.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Review current scientific literature to explain claims, opinions or controversies regarding nutrigenomics.
2. Describe the relationship between nutrition, the genome, and human health.

TPB61016 INTRODUCTION TO IMMUNOLOGY 2-0

In this course, students study the components and working mechanisms of the immune system and diseases caused by immune system responses or abnormalities.

Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Comparing the innate and adaptive immune systems and their role in disease etiology.
2. Describe the application of immunology in the healthcare industry.

TPB61017 CELL AND Tissue CULTURE 2-0
In this course, students learn the principles and industrial applications of mammalian cell culture and plant tissue culture.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Explain the principles of mammalian cell culture and plant tissue culture.
2. Describe the industrial applications of mammalian cell culture and plant tissue culture.

TPB62011 ENVIRONMENTAL BIOTECHNOLOGY 3-0
In this course, students learn the application of biotechnology to deal with environmental problems.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Assessing environmental problems and the potential use of biotechnology to address them.
2. Comparing the application of biotechnology to address environmental problems.

TPB62012 BIOSENSOR 2-0
In this course, students learn the principles of developing biosensors and their applications.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Explain the components, working principle, and method of biosensor fabrication.
2. Comparing the performance of biosensors in various fields.

TPB62013 NANOBIOTECHNOLOGY 2-0
In this course, students learn the principles of nanobiotechnology and their applications in various fields.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:
1. Describe the physical and chemical characteristics of nanomaterials, their fabrication methods and devices, and their tests.
2. Comparing the applications of nanobiotechnology in various fields.

TPB62014 PROTEIN BIOTECHNOLOGY 2-0
In this course, students learn about the latest developments in protein biotechnology and its potential applications in various fields.
Course Learning Outcomes (CLO):
After completing this course, students are expected to be able to:

1. Review the current scientific literature on protein biotechnology.
2. Describe the potential applications of protein biotechnology in various fields.

TPB62015 biopharmaceutical 2-0

In this course, students learn the principles of drug development based on biological materials and their production processes.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. Review the current scientific literature on the development of biologic materials-based drugs.
2. Explain the process of drug production based on biological materials.

TPB62016 AROMA TECHNOLOGY 2-0

In this course, students study the application of natural compound compounds for the fragrance and cosmetic industries.

Course Learning Outcomes (CLO):

After completing this course, students are expected to be able to:

1. To examine the development and role of biotechnology in the fragrance and cosmetic industry.
2. Explain the technique of selecting materials, production methods, and quality control of aroma compounds and cosmetics.

9.1.4 Syllabus for Bachelor of Agricultural Engineering (TEP) Courses

TPE61001 INTRODUCTION TO AGRICULTURAL ENGINEERING AND BIOSYSTEMS 2 (2-0)

This course explains the basics of the state of agriculture in Indonesia, agricultural mechanization, the objectives of agricultural mechanization, the scope of agricultural mechanization fields, the application of agricultural mechanization, and barriers to the application of energy sources in agriculture, harvesting, agricultural product processing techniques, rice processing, storage, agricultural building, agricultural mechanization

TPE61002 BASIC MATHEMATIC 2 (2-0)

This course explains the meaning of functions, inverse functions, composition functions, quadratic functions, exponential functions, logarithmic functions, trigonometric functions, rows and series, limits, mathematical logic, Taylor series, Newton Rhapson.

TPE6100 PHYSICS 3(3-0)

This course contains mechanics which includes unit systems, scalar/vector quantities, Newton's law, equilibrium. Liquid which includes the properties of static liquids, flowing liquids, molecular phenomena, surface tension. Thermodynamics which includes heat and temperature, energy transformation, heat transformation. Modern physics which includes quantum theory, nuclear radiation.

TPE62004 Calculus 1 (2-0)

This course covers the basic theorems of calculus, area and volume of rotating objects, transcendent functions: Logarithms, exponentials and trigonometry, integration techniques, Laplace transforms, principles of transformation and inversion, laws of linearity, transformations for derivative and integral functions, solving differential equations and integral. Prerequisite : TPE61002

TPE62005 AGRICULTURAL SCIENCES AND BIOSSYSTEMS 2 (2-0)

This course explains cultivation techniques for producing plants which include: Seeds and plant seeds, including superior seeds. Planting (on planting media in the form of soil and non-soil) includes spacing, crop rotation, and cropping patterns. Comprehensive plant maintenance to support crop production. The role of climate in human, animal and plant life. Definition and scope of climatology in agriculture. Radiation as a source of energy and its benefits for plants and animals. Climatic elements and the mechanism for the variation of climatic elements on the earth's surface (temperature, humidity, wind, clouds, evaporation, and rain). Utilization of climate data in planning activities in the agricultural sector, designing agricultural buildings and irrigation. Management and interpretation of climate data. Recognition and interpretation of climate data. Introduction to climate type classification methods. Understanding of land. The function of the soil for plant growth. Terminology in soil science. Soil formation and classification. Introduction to physics, chemistry/fertility, and soil conversion. Soil maps and land evaluation.

TPE62006 PRACTICUM OF AGRICULTURAL SCIENCES AND BIOSSYSTEMS 2 (0-2)

The practicum discusses the basics of testing soil physical properties. Testing of soil properties includes water content, density, soil density, and soil porosity. Testing is done using a simple test method.

TPE61007 COMPUTER APPLICATION 1 (1-0)

This course contains an introduction to computer hardware and software. Computer programming in Java and Visual Basic. Application of computers for statistical analysis, graphing, tabulation and scientific writing using several package programs, for problems in the field of agricultural engineering.

TPE62008 COMPUTER APPLICATION PRACTICE 1 (0-1)

The practicum is designed to explain the basics of programming and coding languages. Detailed introduction to the function of each coding. And applied directly to the manufacture of simple applications using the functions that have been described.

TPE62009 AGRICULTURAL MATERIALS KNOWLEDGE 2 (2-0)

This course provides knowledge of food commodities of vegetable origin (plant products) and animal origin (products and fisheries). The contents of the material cover the following aspects: source of variety/race, chemical composition and tissue structure, post-harvest/post-mortem physiology. Factors affecting tissue activity and permanent cell changes, chemical and physical damage and their effects on agricultural yields. Treatment of cooling, freezing, controlled atmosphere storage on the quality of agricultural products.

TPE61010 THERMODYNAMICS 3 (2-1)

The topics explained in the thermodynamics course include basic concepts of thermodynamics, forms of energy, systems, processes, and thermodynamic cycles, systems of units, pressure and temperature, properties of pure substances and characteristics of ideal gases, the first law of thermodynamics in closed systems, including heat. , work, specific heat, internal energy, enthalpy and specific heat of ideal gases, First Law of Thermodynamics for open systems (control volume), 2nd Law of Thermodynamics, thermal energy reservoirs, heat engines, cooling engines and pumps heat, (refrigerators and heat pumps), perpetual-motion-machines, Carnot cycle, Carnot principle, Carnot heat engine, refrigeration engine and Carnot heat pump.
<u>Precondition</u>: TPE61002, TPE61003, TPF61006

TPE61011 STATICS AND DYNAMICS 3 (2-1)

This course contains the understanding of vectors, vector operations, analysis of parallel, non parallel and non concurrent coplanar forces, resultant coplanar forces, moments of a coplanar force. Understanding the spatial force system, the operation of the concurrent, parallel, non-concurrent and non-parallel spatial force system, the moment of a spatial force system. Determination of balance conditions, force balance, moment balance, application to concurrent and non-parallel systems, point-by-point balance analysis, determination of the magnitude and type of force that occurs in individual girders, Concurrent, parallel, non-concurrent and non-parallel balance systems. General concept of first moment, centroid for single body and composition, moment of inertia of area and mass, mechanical properties of cross section. Support beams and cables, General concepts of kinematics, trajectory, velocity, acceleration. Motion in straight lines and in curves. Constant acceleration and non-constant acceleration, General Concepts of Kinetics, Newton's Laws I, II and III. Vector equation of motion scalar equation of displacement, work, power, efficiency, kinetic energy of a solid in motion, kinetic energy of a solid in rotating state

TPE61012 FLUID MECHANICS 2 (2-0)

This course explains the knowledge of the basic concepts of fluid mechanics, fluid properties and dimensional analysis of fluid equations. Analysis of dimensions and similitude, fluid statics, fluid dynamics and the basics of flow in an ideal (closed) fluid pipe, both steady and unsteady flow as well as incompressible and compressible, the basics of open channel flow both uniform and non-uniform flow. Analysis of head or energy losses including minor losses in closed and open flows, as well as pump power

requirements and liquid fluid power generation. The theoretical foundations and applications of various fluid flow measurements.
Precondition: TPE61003, TPF61006

TPE61013 FLUID MECHANICS PRACTICUM 1 (0-1)

Explain the basics of fluids. Proof of buoyancy theory. Calculation of the frictional force of water against the pipe that is passed. Understand about bulkheads / constraints for fluid flow to calculate the amount of discharge that can occur.

TPE61014 DRAWING TECHNIQUES 2 (2-0)

This course provides an explanation of the history, objectives, and tools of technical drawing. Normalization of drawing paper size. Normalization of letters and numbers. All kinds of lines. Engineering geometry. Size designation. Projection drawing and sketching system. Cross-sectional images and various kinds of shading. Threads, springs and gears.

TPE61015 ENGINEERING DRAWINGS PRACTICE 1 (0-1)

Practicum learns the basics of technical drawing using autocad applications. An understanding of the function of the tool in the application to form an object. The application and application of the tool function is applied to create an agricultural object that will be displayed at an exhibition of technical drawings.

TPE61016 ENVIRONMENTAL MEASUREMENT 2 (2-0)

This course contains passive and active components, analog electronics, basic semiconductors, diodes, transistors, ICs, op-amps, digital electronics, boolean algebra, logic gates, flip-flops, decoders and encoders, seven segment displays. An overview of modern instrumentation techniques and digital electronic components and subsystems for their integration into digital data acquisition and environmental and process measurements. Emphasis on the use of laboratory equipment. Topics include instrument characteristics, signal conditioning, transducer theory, transducer theory and application, and digital data acquisition.

TPE61017 ENVIRONMENTAL MEASUREMENT PRACTICE 1 (0-1)

Explain the basic components of electronic components. The working principle of each component. As well as the basic concept of converting physical values into digital values by using electronic components or by using formulas. In this practicum also try to use electronic components in their respective functions.

TPE61018 Calculus 2 3 (3-0)

This course provides learning techniques for solving complex derivatives such as derivatives for functions with two or more variables. In addition, the scope of other material is multiple integrals which includes triple integrals in Cartesian, cylindrical and spherical coordinates. The Laplace method is the third subject matter given in this course.

Precondition: TPE61004

TPE62019 APPLIED MATHEMATICS 2 (2-0)

This applied mathematics course provides an explanation to students about the mathematical formulation of the facts in technical and applied theoretical approaches in the field of Agricultural Technology. Evaluation of the accuracy and appropriateness of the theoretical approach with facts in the field. The method of forming several mathematical models that are relevant in the field of Agricultural Technology. Derivatives of functions, Educational Guidelines for the Faculty of Agricultural Technology 2016/2017 41 maximum and minimum functions (absolute, local), concave functions, optimization problems, connected rates, graphing functions, anti-derivatives, definite integrals, basic theorems of calculus, transcendent functions : Logarithms, exponents and trigonometry, integration techniques. Fundamental theorems of calculus, area and volume of rotating bodies, transcendent functions: Logarithms, exponentials and trigonometry, integration techniques and Laplace transforms
Precondition: TPE61004

TPE62020 MATERIAL STRENGTH 2 (2-0)

This course provides knowledge about the strength of materials in relation to loading and the strength of agricultural machinery/equipment elements. Understanding the concept and calculation of stress, moment, torque, deflection, rivet and weld connection.
Precondition: TPE61011

TPE62021 MATERIAL STRENGTH PRACTICUM 1 (0-1)

This practicum is designed to make the practitioner understand the concept of strength testing on a material. By applying several methods for testing. The use of Universal Machine Testing (UTM) is a tool for measuring tensile strength, resistance, and bending. UTM also shows the amount of load that can be accepted by a material, the elastic limit and others. The testing method using the Brazilian Test is also carried out in the practicum.
Precondition: TPE61011

TPE62022 CONTROL SYSTEM 2 (2-0)

This course covers several topics which include introduction to control systems, mathematical models of dynamic systems, basic control actions and industrial automatic controllers, transient response analysis and state error analysis, control system analysis and design with conventional methods, Location and root analysis, Response analysis and frequency, compensation and design techniques, analysis of the pointer function of the non-linear control system, analysis of the control system in spatial position, design of the control system using the spatial position method.
Precondition: TPE61016, TPE61017

TPE62023 CONTROL SYSTEM PRACTICUM 1 (0-1)

This practicum was carried out as an introduction to simple coding on arduino uno, LCD settings, servo motors, and LM35.
Precondition: TPE61016, TPE61017

TPE62024 ENGINEERING MATERIALS KNOWLEDGE 2 (2-0)

This course provides knowledge about engineering materials which includes: general knowledge of engineering materials, atomic structure and bonds between atoms, structure of crystalline solids, mechanical properties of metals, dislocations and strengthening mechanisms, failure, phase transformation in metals, metal alloys, ceramics, polymers, composites, corrosion and degradation of the material.

TPE62025 HEAT MOVE 2 (2-0)

This course provides an understanding of heat transfer as the basis for technical knowledge in the field of agricultural technology, with a discussion of: unit-dimensional, conduction, convection and radiation heat transfer mechanisms. One-dimensional conduction heat analysis, homogeneous body heat analysis of flat walls and hollow cylinders, flat wall composites and concentric cylinders, overall heat transfer rate of flat walls, hollow cylinders, solid cylinders and hollow spheres. Analysis of convection heat transfer (Nusselt Bill), laminar flow in the pipe, Nusselt number of circular tube input areas, turbulent flow in the circular tube empirical relationship of heat transfer flow in the pipe. Determination of natural convection heat transfer coefficient on vertical walls, interferometer on natural convection. Forced convection, a combination of natural convection and forced convection,

Precondition: TPE61010

TPE62026 HEAT MOVING PRACTICUM 1 (0-1)

This practicum aims to observe the transfer of heat energy to a material, to measure the thermal conductivity of the material. The use of a double pipe heat exchanger is carried out in order to make the practitioner better able to understand the basic concepts of heat transfer. The concept of the conductivity coefficient is studied in this practicum.

Precondition: TPE61010

TPE62027 POWER IN AGRICULTURE 1 2 (2-0)

This course explains the classification of resources (movement power) in agriculture, including the history of the development of combustion engines. Application of thermodynamic principles in combustion engines. Design, construction and work systems of functional parts on both diesel and gasoline combustion engines. Evaluation of combustion engine performance.

Precondition: TPE61010

TPE62028 POWER PRACTICE IN AGRICULTURE 1 1 (0-1)

Power Practicum in Agriculture aims as a basic introduction to the component parts, functions, principles and working mechanisms of 2-wheel tractors and 4-wheel tractors. Then also about understanding the internal combustion system in combustion engines and engine lubrication.

Precondition: TPE61010

TPE62029 ERGONOMIC, OCCUPATIONAL HEALTH AND SAFETY 2 (2-0)

K3 elements. The basics of K3 safety. The aims and objectives of SMK3/OHSAS 18001:2007. Introduction and interpretation of SMK3. SMK3 preparation method. Manage the performance of SMK3 in the workplace. Hazard identify & risk assessment. SMK3 implementation and certification. Body work system. The working system of the human mind. Human sensory system; interaction of the human body with the environment. Body rhythm and shift work. The principles of work design based on the human body. Human-machine system. Handling human physical burden. Ergonomics application; physical aspects in ergonomics, biomechanics and applications. Cognitive aspects of ergonomics. Ergonomics checklist. Ergonomics applications in the hospitality sector, agribusiness and industry. Cognitive work analysis. Job analysis approach. Bad design related to cognitive ergonomics. Kansei engineering and its applications. Emotional design. Measurement of mental workload. Canoe Method.

TPE62030 PHYSICAL PROPERTIES OF FOOD 2 (2-0)

This course contains sources, varieties, structures and physiology of vegetable and animal products. Application of momentum, heat transfer and mass in food processing processes; refrigeration, freezing and controlled atmosphere storage. Analysis of selected operating units used in food processing. Extrusion, dehydration, heat treatment.

TPE61031 WORKSHOP 2 (2-0)

This course contains the concept of workshops and workshop management of the postharvest system, welding techniques including autogen (carbide) and arc welding, welding of several types of metal, safety devices and fasteners, fasteners for tool and machine components including rivets, bolts, nuts, pegs, screws, nail. Measurement work, hand work, primary forming process, cutting and drilling, grinding and milling, assembly method and workshop layout.

TPE61032 WORKSHOP PRACTICE 1 (0-1)

Workshop Practicum is designed as an implementation of field knowledge that has been learned in designing a tool or machine, such as how to use welding, hand grinders, seated grinders, etc. In addition to the process of making tools, this practicum is also integrated with the engineering science that has been studied.

TPE61033 BUSINESS MANAGEMENT 2 (2-0)

Definition of Business, Nature of Business, Types of Business Activities The Role of the Food Business in the Economy, Characteristics of the Food Business System, economic factors that affect the performance of the food business.

TPE61034 FOOD PROCESSING ENGINEERING AND AGRICULTURAL PRODUCTS 2 (2-0)

The subject matter of this course covers the process of materials from harvest to semi-finished products and finished products. The process includes threshing, cleaning, drying, stripping, material handling, milling, size reduction. Food processing includes the basics of rheology, heating and cooling of foodstuffs.
Precondition: TPE62025, TPE62026

TPE61035 FOOD PROCESSING AND AGRICULTURAL PRODUCTS ENGINEERING PRACTICE 1 (0-1)

This practicum includes the use of vacuum frying to extend shelf life. Testing the effect of storage by using plastics that have different density values to see the final physical properties of agricultural materials. Testing of drying techniques to increase shelf life. As well as the use of a pasteurization system to inactivate bacteria in milk.
Precondition: TPE62025, TPE62026

TPE61036 NUMERICAL METHOD 2 (2-0)

This course provides a description of the differences between analytical methods and numerical methods, Theory of calculating errors, Roots of equations and non-linear equations, Matrices and linear equations, Interpolation, Numerical Differentials, Numerical Integrals, Solving numerical solutions for differential and integral equations. Solving partial differential equations.
Precondition: TPE61004

TPE61035 MACHINE ELEMENT PLANNING 2 (2-0)

This course explains about simple forces and stresses in machine parts. Clutches, brake bolts, gears, engine bearings, springs, engine tires, planning projects. Plane axles and stakes. Chain, belt and gear transmission planning. Bearing planning.
Precondition: TPE62020

TPE61036 AGRICULTURAL ENERGY AND ELECTRICITY 2 (2-0)

This course provides a description of alternative energy sources, biomass energy, wind energy, water energy, solar energy, energy conversion processes, conversion engines, transformers, circuit systems, combustion theory, diagrams and value audits.

TPE61039 AGRICULTURAL ENERGY AND ELECTRICITY PRACTICE 1 (0-1)

Introduction to the solar panel system, great efficiency is obtained from energy conversion using solar panels. Discusses the concept of energy conversion that often occurs in everyday life. Making biodiesel with used cooking oil is carried out in this practicum.

TPE61038 AGRICULTURAL BUILDING 2 (2-0)

This course explains the definition and scope of agricultural buildings. Environment and development. Measurement application in buildings. Functional design of the building. Structural design of the building.

TPE61039 OPERATING UNIT 2 (2-0)

This course provides knowledge and understanding of the meaning of food processing units, non-food and technical basics in the field of agricultural technology (TP), with a

discussion of: black box diagram philosophy, dimension units, technical approach methods, fundamentals of momentum transfer. , basics of thermodynamics and heat transfer, crystallization and mixing.
Precondition: TPE62025, TPE62026

TPE62040 DESIGN OF AGRICULTURAL EQUIPMENT AND MACHINERY 3 (2-1)

This course explains the meaning of design and types of agricultural machinery and tools, design principles, steps to design agricultural tools and machinery. Design and build a cooling machine along with an explanation of the various cooling loads. The design of the drying machine, the design of the evaporator machine, the workings of the press machine, the hydraulic machine which includes the basic principles, working fluid, piston, cylinder cover, pipeline and hydraulic pump. Machine tools and pneumatic control systems, mechanical machinery and mechanical machinery application and design.
Precondition: TPE61037

TPE62041 OPERATING RESEARCH 2 (2-0)

This course provides an explanation of problem solving to optimize various uses of limited resources using linear programming, using the simplex method, duality and sensitivity and its application in special forms: transportation problems VAM, NMCR, Stepping stone, MODI and case examples. , excel application, transshipment, and queuing theory.

TPE62042 AGRICULTURAL CULTIVATION TOOLS AND MACHINERY 2 (2-0)

This course has subjects covering primary soil processing tools and machines, secondary soil processing tools and machines, planting tools and machines, fertilization tools and machines, weed control tools and machines, pest and disease control tools and machines, seed harvesting tools and machines -grains, corn, cotton, and tubers, working capacity of agricultural tools and machinery, and selection of agricultural tools and machinery.
Prerequisite : TPE62027, TPE62028

TPE62045 PRACTICE OF AGRICULTURAL EQUIPMENT AND MACHINERY 1 (0-1)

The practicum is designed to study the tools and machines used for agricultural cultivation. Includes identification of tillage equipment, weed removal. Besides studying technology in agriculture, such as the operation of seed tables, transplanters, and tractors.
Prerequisite : TPE62027, TPE62028

TPE62044 REGIONAL MEASUREMENT 2 (2-0)

This course contains the definition and scope of regional measurement in the field of agricultural engineering. Area measuring tool. Use of simple measuring tools, scissors, BTM, and Theodolite. Elevation measurement, situation mapping, topography, cutting, profiling and drawing. Map interpretation. Overview of the computer as a data processing tool.

TPE62047 REGIONAL MEASUREMENT PRACTICUM 1 (0-1)

Use of simple measuring tools, scissors, BTM, and Theodolite. Elevation measurement, situation mapping, topography, cutting, profiling and drawing. Map interpretation.

TPE62048 SYSTEM ENGINEERING 2 (2-0)

This course explains the understanding of the scope, concepts, processes of system engineering. Systems approach, systems analysis, systems modeling techniques, descriptive modeling techniques, numerical modeling techniques, decision support systems, management of engineering systems, system life cycles, systems engineering on inventory models, system design, system integration, seismic measurements. Inventory theory for boundless and constrained systems. Optimization technique. Dynamic programming.

TPE61049 POST-HARVEST HANDLING TECHNOLOGY 2 (2-0)

This course explains the basic concepts of packaging, storage, drying and cooling techniques. The basic concepts of theory and practice of storage in agricultural product packaging. Elements that determine storage quality (dry and cold). The properties of atmospheric water vapor on heating/cooling (Psychrometric and Mollier diagrams). Drying and cooling components in energy and mass balance. Effect of cooling on agricultural products (fresh produce, processed products). Cooling damage to fresh produce (fruits).

TPL61041 EXPERIMENTAL DESIGN 2 (2-0)

In this course, you will learn how to design experiments with various types of experimental designs such as RAL, RAK, Factorial, Nested Random and able to perform experimental tests with non-parametric (Friedman, Wilson test and different tests: t test, BNT and DMRT) and non-experimental design, observation and data collection, interpretation of experimental analysis results.

TPE61050 SOIL AND WATER CONSERVATION 2 (2-0)

This course provides an explanation of the notion of soil and water preservation, the principles of water and wind erosion, erosion control methods, erosion control buildings, embankments and reservoirs, flood and sedimentation control.

TPE61051 SOIL AND WATER CONSERVATION PRACTICE 1 (0-1)

Learn the basic concepts of soil and water conservation. Observing the slope of the land in order to apply the appropriate method for the land, as well as taking soil samples to simulate erosion that occurs in the soil. Erosion control structures are described for response actions to avoid erosion or minimize its likelihood.

TPE61052 MACHINE AND SOIL DYNAMICS 2 (2-0)

This course provides an explanation of changes in soil mechanical behavior. Due to agricultural equipment and vehicle wheels in the process of tillage and equipment traffic. Includes the occurrence of stress, strain, deformation, compaction, failure (crushing), soil displacement, soil resistance, and the process of loosening. Effect of soil conditions on the performance of agricultural tools and wheels. This includes the amount of traction, the amount of loading, the level of immersion of the wheels, the amount of slippage, and fuel consumption. Analysis of the use of agricultural tools and machinery related to soil.

TPE61053 MACHINE AND SOIL DYNAMIC PRACTICUM 1 (0-1)

This practicum includes checking the physical properties of the soil using tools. The use of tools and discussions in this practicum can help practitioners understand the treatment that must be done on agricultural land. And also discusses the balance / center point of several tools for soil.

TPE61054 MECHANIZATION OF PLANTATION CULTIVATION 2 (2-0)

The discussion of the Mechanization of Plantation Cultivation course includes a case study on the mechanization of sugarcane cultivation in both paddy fields and dry/dry land. Mechanization of oil palm cultivation starts from land planning, initial planting, maintenance, harvesting and mechanization of the manufacturing process.

TPE61055 IRRIGATION AND DRAINAGE ENGINEERING 2 (2-0)

This course contains general definitions of irrigation and drainage, land leveling for irrigation, water measurement, irrigation water requirements, irrigation water scheduling, irrigation efficiency, open channel water distribution, water distribution for closed canals, irrigation water quality, irrigation systems, understanding drainage for agriculture, drainage and water movement and drainage systems. The response of plants to changes in water in the soil and their correlation to the supply of nutrients. Adsorption of water by roots and its processes in plant physiological systems. Water stress in plants.

TPE61056 IRRIGATION AND DRAINAGE ENGINEERING PRACTICE 1 (0-1)

The practicum is designed to study irrigation and drainage systems. The basic concept of flow discharge is suitable for knowing the amount needed in the agricultural world. Experiment on water infiltration rate. The use and concept of types of drip irrigation and testing of water quality.

TPE61057 FACTORY DESIGN 3 (3-0)

The design of a factory in the field of agro-industry starts from site considerations, processing process selection, determining production capacity, material construction and material selection, multiple scale experiments, flow diagrams, mass and energy balances, utilities, manufacturing hygiene, piping systems, WWTPs, and studies. case of agro-industry unit design.

TPE62058 BIOS SYSTEM ROBOTICS 2 (2-0)

This course provides an explanation of the basics of developing bio-production robots. Robot components; manipulator, end-effector, sensor, traveling device, control device, and actuator. Image acquisition, RGB signal method, algorithm recognition for biological objects. Robots in bioproduction in a controlled environment. Robots for open area bio-production. Robots in the food industry.
Precondition: TPE62022, TPE62023

TPE62059 ROBOTIC BIOS SYSTEM PRACTICUM 1 (0-1)

Precondition: TPE62022, TPE62023

TPE62060 PUMP AND COMPRESSOR 2 (2-0)

This course contains the definition, classification of pumps, basic design, basic pump theory, specific speed, efficiency, performance curve and cavitation. Design of corners and pump housings, testing, construction, installation of pumps in irrigation systems and cost calculations.

TPE60061 DRYING AND COOLING TECHNIQUES 2 (2-0)

This course discusses the general introduction of drying and cooling processes and applications in agriculture. Method of measuring water content, equilibrium moisture content, psychrometric chart. Examples of psychrometric charts on drying, types of drying machines based on product and air flow. Natural and artificial cooling. Know the various types of refrigerants (refrigerators). Refrigerator working principle, refrigerant cycle (coolant). Calculation of heat and working efficiency of the cooling machine. Cooling Engineering Applications for post-harvest and air conditioning. The cooling process and its effect on agricultural products (fresh products, processed products). Cooling damage to fresh produce (fruits). Freezing process. Estimated freezing rate.
Precondition: TPE61034, TPE61035

TPE62062 THE RELATIONSHIP OF SOIL, WATER AND PLANTS 2 (2-0)

This course provides an explanation of soil as a medium for growing plants that need water, the response of plants to changes in water in the soil, including the provision of nutrients, the relationship between soil and plants. Adsorption of water by roots and processes in plant physiological systems, water stress in plants, the relationship between soil and plants influences the physical properties of soil on plant growth.

TPE62063 MODELING AND SIMULATION TECHNIQUES 3 (2-1)

The modeling and simulation engineering course includes a discussion of building a system of equations in the form of mathematical equations that are derived based on the basic laws that apply or occur in a system. The approach of making the model is done with 2 approaches, namely the macroscopic approach and the microscopic approach. The results of a modeling process are generally in the form of differential equations or linear and non-linear equations. The results of the completion of the model are then simulated

in a computer program. Model validation is an important part, namely to compare the simulation results with the results of experiments carried out under the same conditions.
Precondition: TPE61036

TPE62064 POWER IN AGRICULTURE 2 2 (2-0)

This course includes: Classification and function of tractors as a power source or source of motion for agricultural businesses. The power transmission system from the motor to each power outlet on the tractor, namely the hydraulic system, drawbar, and power take off (PTO); Tractor drawbar performance measurement and evaluation; traction mechanics; tractor stability; and coupling.
Precondition: TPE62027, TPE62028

TPE62065 POWER PRACTICE IN AGRICULTURE 2 1 (0-1)

Tractor drawbar performance measurement and evaluation; traction mechanics; tractor stability; and coupling
Precondition: TEP62027, TEP62028

TPE62066 BIOENERGY ENGINEERING 2 (2-0)

The bioenergy course aims to introduce several aspects of bioenergy. The material includes introduction and bioenergy material. The introduction consists of national energy needs and energy supply, energy planning methodology and human needs, information on energy planning needs, energy sources and future energy needs. Bioenergy materials consist of energy from biomass sources, biomass benefits, energy from biomass by direct combustion, pyrolysis, alcohol fermentation, anaerobic digestion, biogas technology, family biogas planning, community and institutional biogas planning, biodiesel technology.

9.1.5 Syllabus of Environmental Engineering (TL) Undergraduate PS Courses

TPL61001 INTRODUCTION TO ENVIRONMENTAL ENGINEERING 3(3–0)

Introduction: Definition and history of Environmental Engineering. Scope of Environmental Engineering. Natural Resources, Environment and Management. Geoenvironmental Sustainability. The Importance of Integrating Environmental Considerations. Clean water supply system. Environmental Costs. Handling and Processing of Liquid, Solid and B3 Waste. Pollution of air, water and soil. Remediation/Recovery of Environmental Damage. Clean Technology. Environmental Management Business. Environmental Regulations.

TPL6202 MATH 1 3(3–0)

In this course, students will learn about functions and inequalities, limits, derivatives, derivative applications and concepts as well as definite integral calculations.

TPL62003 MATH 2 3(3–0)
In this course, students learn about integration techniques (substitution and partial integrals), infinite series (Taylor series and Maclaurin series), plane and space geometry, fold integrals, differential equations and introduction to Laplace transforms.
Precondition: TPL61002

TPL62004 CLIMATOLOGY 2(2–0)
The role of climate in human, animal and plant life. Definition and scope of climatology for the environment. Radiation as a source of energy and its benefits for plants and animals. Climatic elements and the mechanism for the variation of climatic elements on the earth's surface (temperature, humidity, wind, clouds, evaporation, and rain). Utilization of climate data in planning activities in the agricultural sector, designing agricultural buildings and irrigation. Management and interpretation of climate data. Recognition and interpretation of climate data. Introduction to climate type classification methods.
Precondition: TPE61003, TPF61006

TPL62005 PRACTICUM CLIMATOLOGY 1(0–1)
This practicum is to provide experience in measuring, processing and interpreting climate data. Practical material includes measurement of evaporation (evaporation), measurement of rainfall, measurement of air pressure, measurement of soil temperature and humidity, field practicum at the climatology station.
Precondition: TPE61003, TPF61006

TPL62006 FLUID MECHANICS 1 2(2–0)
This course explains the knowledge of the basic concepts of fluid mechanics, fluid properties and dimensional analysis of fluid equations. Analysis of dimensions and similitude, fluid statics, fluid dynamics and the basics of flow in an ideal (closed) fluid pipe, both steady and unsteady flow as well as incompressible and compressible, open channel fundamentals. Analysis of head or energy losses including minor losses in closed and open flows, as well as pump power requirements and liquid fluid power generation. The theoretical foundations and applications of various fluid flow measurements.
Precondition: TPE61003, TPF61006

TPL62007 FLUID MECHANICS PRACTICE 1 1(0-1)
This practicum is intended to provide experience and ability in measuring, processing and interpreting data related to bouyancy material, friction flow through pipes, head loss in pipelines.
Precondition: TPE61003, TPF61006

TPL62008 CHEMICALENVIRONMENT 2(2–0)
Introduction Earth and its contents, Air (Atmosphere), Air Pollution and its sources, Acid rain and global warming, Detection and measurement of air pollution, Water (hydrosphere), Water Pollution and its sources, Detection and measurement of water pollution, Solubility, salt and hardness, Lithosphere (Soil), Soil pollution and its sources,

Detection and measurement of soil pollution, Biogeochemical cycles and chemical reactions in soil, Xenobiotics and environmental sanitation.
Precondition: TPF61003, TPF61004

TPL62009 ENVIRONMENTAL CHEMISTRY PRACTICE 1(0-1)
This practicum is intended to provide experience in testing environmental quality parameters such as DO, BOD, COD, TSS, phosphate, nitrate and heavy metals on soil and water samples.
Precondition: TPF61003, TPF61004

TPL62010 ECOLOGY 2(2-0)
Introduction: understanding, ecosystem concepts, matter, energy, information, laws of thermodynamics, habitats and niches, evolution. Environmental Ecology: understanding, environmental quality, environment as a resource, basic needs for survival, environmental benefits and risks. Environmental Management: Definition, preservation of environmental balance, sustainable environmental carrying capacity, resilience, environmental image. Conservation: Definition, benefits, biodiversity, gene erosion, global dependency. Development Ecology: Definition, benefits and risks of development, sustainable development, simple lifestyle, science and technology capability, adaptive environmental capability, development project management, eco-efficiency. Population Ecology: Definition, Environmental Carrying Capacity, Population Density, Transmigration, Environmental damage, pollution and resource depletion. Energy in development ecology: understanding and use of energy, the role of energy in development, energy problems, diversification of energy sources.
Prerequisite: TPL61001

TPL62011 ENVIRONMENTAL LABORATORY2(2–0)
Sampling Techniques (planning, QA and QC, Water, Air, Biological, Solid, Liquid and Sludge Sampling Techniques), Analysis Techniques (planning, QA and QC, Analytical Measurement, Documentation and Reporting). Instrumentation.
Precondition: TPF61003, TPF61004

TPL62012 ENVIRONMENTAL LABORATORY PRACTICE 1(0-1)
This practicum is intended to provide experience in planning and sampling based on sampling methods for environmental samples (soil, water and air) and analytical measurements.
Precondition: TPF61003, TPF61004

TPL61013 ENGINEERING MATHEMATICS 1 3(3–0)
This applied mathematics course provides an explanation to students about the mathematical formulation of the facts in technical and applied theoretical approaches in the field of Agricultural Technology. Evaluation of the accuracy and appropriateness of the theoretical approach with facts in the field. The method of forming several mathematical models that are relevant in the field of Agricultural Technology. Derivatives of functions, maximum and minimum of functions (absolute, local), concavity of functions, optimization problems, related rates, graphing functions, anti-derivatives, definite integrals, basic theorems of calculus, transcendent functions:

Logarithms, exponentials and trigonometry, integration techniques. Fundamental theorems of calculus, area and volume of rotating bodies, transcendent functions: Logarithms, exponents and trigonometry, integration techniques and Laplace transforms.
Precondition: TPL62003

TPL61014 HYDROLOGY 2(2–0)
Understanding Hydrology and the Hydrological Cycle. Hydrological cycle in system concept. Hydrological Process. Characteristics of water in various forms, places and times on earth: atmospheric water, water bodies of rivers, lakes and seas, water runoff (overland flow), soil water and soil moisture and rain water. Rain data and analysis: rain spread and missing data. Atmospheric water: water vapor, evaporation, evapotranspiration. Subsurface water: unsaturated flow, infiltration, ponding time. Surface water: source of flow, runoff, overflow, Abstraction by infiltration method and SCS method, surface flow rational method. Depth and velocity of flow, travel time, hydrograph units, routing, . Hydrological Measurement.
Precondition: TPL62004

TPL61015 FLUID MECHANICS 2 2(2–0)
Explain open channel hydraulics, basic flow regime equations, open channel cross sections, open channel measuring tools, and open channel criticality, types of fast changing, uniform changing, and slow changing flow, applications in water structures
Precondition: TPL62006, TPL62007

TPL61016 FLUID MECHANICS PRACTICE 2 1(0-1)
Measurement of discharge in the field using several measuring instruments, determining dimensions, determining the type and characteristics of flow
Precondition: TPL62007

TPL61017 SOIL MECHANICS 2(2–0)
This lecture will discuss about soil compressibility, lateral soil pressure, slope stability, compaction theory, in situ tests. Soil compressibility, consolidation settlement, 1-D consolidation laboratory test, pore-pressure plot, normally consolidated and overly consolidated soil, over consolidation rario, 1-D primary consolidation calculation, secondary consolidation settlement, consolidation settlement rate, 1-D consolidation theory Terzaghi. Rankine lateral soil pressure, stationary, active and passive soil conditions. Slope stability, slope safety factor, continuous slope, wedge method, slope stability analysis in the presence of water flow. Compaction theory, properties and structure of compacted soil, standard and modified proctor tests, CBR, compaction specifications, compaction techniques. Soil exploration, drilling,
Prerequisite: TPE61003

TPL61018 ENVIRONMENTAL MICROBIOLOGY 2(2-0)
Introduction to the scope of microbiology, prokaryotic & eukaryotic cells, microbial metabolism, microbial growth (growth curves, microbial growth factors), microbial isolation and identification, microbial classification, microbial preservation, interactions between microbes, microbial biotechnology.

Precondition: TPF61001, TPF61002

TPL61019 ENVIRONMENTAL MICROBIOLOGY PRACTICE 1(0-1)
This practicum provides the ability to take samples of microbes from the environment, isolate, identify morphologically, preserve microbes and calculate the number of microbes.
Precondition: TPF61001, TPF61002

TPL61020 MAPPING 2(2–0)
Definition, scope and application of survey and mapping in environmental engineering and biosystems. Types and functions of survey and mapping measuring instruments. Use of simple measuring tools, scissors, BTM, and Theodolite. Measurement of cutting and determining height differences, measuring profiles and drawings, making situation maps and topography. Map interpretation. Introduction to Modern Cartography: computers as a tool for processing spatial data and spatial technology. Fundamentals of technology and interpretation of aerial photography and imagery.

TPL61021 MAPPING PRACTICE 1(0–1)
This practicum provides the ability to carry out cutting measurements and determining height differences, measuring profiles and drawings, making situation maps and topography. Map interpretation

TPL62022 ENGINEERING MATHEMATICS2 3(3–0)
The course aims to provide the application of the basic principles of describing mathematical formulas of a natural behavior or processes (physical, biological and chemical) in the field of environmental engineering, including: the basics of mathematical modeling including radioactive decay, chemical mixing, population growth , cooling at room temperature, the rate of evaporation of the liquid in a conical container. Mathematical modeling stage: mathematical description in regulatory equations, initial and boundary conditions of a natural behavior or environmental engineering process, model solving (analytic and numerical), model validation (verification and calibration), model evaluation, computer program algorithms, computer programming and model simulation. The basics of numerical methods. Finite difference and finite element numerical solutions to differential and integral equations.
Prerequisite: TPL61013

TPL62023 EXPERIMENTAL DESIGN 2(2–0)
In this course, you will learn how to design experiments with various types of experimental designs such as RAL, RAK, Factorial, Nested Random and able to perform experimental tests with non-parametric (Friedman, Wilson test and different tests: t test, BNT and DMRT) and non-experimental design, observation and data collection, interpretation of experimental analysis results.

TPL62024 STRUCTURAL MECHANICS 2(2–0)
Provide an understanding of the principles of statics which include vectors, analysis of parallel, non parallel and non concurrent coplanar forces, resultant coplanar forces,

moments of a coplanar force. Understanding the force system and the balance of forces and Newton's third law. Definition and types of supports and loads. Force balance in various loading systems. Portal loading system. Moment of inertia, polar moment. Provide knowledge about the strength of the material in relation to the loading and strength of the material, the factor of safety. Definition, concept and calculation of normal stress, direct shear and torsional shear, transverse load and bending moment.
Prerequisites: TPE61003, TPF61006

TPL62025 PRACTICUM OF STRUCTURAL MECHANICS 1(0–1)
This practicum provides experience in determining the balance of forces in various loading systems and determining the strength of materials
Prerequisites: TPE61003, TPF61006

TPL62026 LIQUID WASTE TREATMENT 2(2–0)
Definitions and understandings related to waste treatment, engineering basics, waste management knowledge, types and sources of liquid waste, waste quality standards, physical treatment, biological and chemical treatment. residence time. Handling of various liquid wastes.
Prerequisites: TPL62008, TPL61018

TPL62027 LIQUID WASTE TREATMENT PRACTICE 2(2–0)
This practicum provides the ability to treat liquid waste physically, chemically and biologically
Prerequisites: TPL62008, TPL61018

TPL62028 UNIT OF OPERATION TL 2(2–0)
Chemical and biological concepts. Mass balance, flow model and reactor. Quantity and Quality of clean water and wastewater. Clean water and waste water treatment buildings. Preliminary treatment. Coagulation and flocculation. Sedimentation. Filtration. Ammonia removal. adsorption. Ion exchange. Membrane Process. Activated Sludge. Aeration. Disinfection. Trickling filter and rotary biological contactor (RBC). Pond stabilization and aeration. Aerobic and anaerobic digestion. Handling residual sludge.
Prerequisites: TPL62008, TPL61018

TPL62029 PRACTICUM UNIT OPERATIONS TL 1(0-1)
This practicum provides skills regarding waste treatment units including coagulation and flocculation, sedimentation, filtration, adsorption.
Prerequisites: TPL62009, TPL61019

TPL62030 ENVIRONMENTAL CONSERVATION TECHNIQUES 2(2–0)
Contains the definition of conservation and the need for technological efforts, conservation techniques for surface water, ground water, air, coral reefs, mangroves, and beaches. Conservation technology includes technology that will be applied to rivers, reservoirs, groundwater, soil, forests, estuaries, coral reefs, and mangrove forests. Understanding of environmental processes or behavior needs to be taught so that students know exactly the technology needed. An introduction to an integrated solution is given

to one environment so that the insight into conservation as a whole can be understood. Field reviews are carried out on one of the topics of discussion and reports and presentations are the obligations of students.
Prerequisite: TPL61014

TPL62031 ENVIRONMENTAL CONSERVATION ENGINEERING PRACTICE 1(0–1)
This practicum provides skills to apply conservation techniques in accordance with environmental problems
Precondition: TPL61014

TPL62032 ANALYSISENVIRONMENT 2(2–0)
Hazard analysis, risk analysis, risk effect model, vulnerability, risk management system, emergency response system. The strategic environmental concept (KLHS) includes the basic concepts of KLHS, assessment of programs and strategic plans as well as government policies in the context of KLHS, RTRW KLHS, KLHS of river basin management patterns, KLHS of local government programs and preparation of reports. Environmental management accounting (EMA): EMA framework and concepts, Material and energy flow accounting (MEFA), Environmental cost analysis, Environmental and financial performance, Eco-efficiency analysis. Methodology in the analysis, forecasting and evaluation of environmental impacts.

TPL62033 GEOGRAPHIC INFORMATION SYSTEM 2(2–0)
Understanding Geographic Information Systems in the context of Spatial Technology the urgency of GIS applications in the management of natural resources and the environment. Spatial database as an information system for natural resources and the environment. Fundamentals of digitization and spatial data structures and attributes. Spatial analysis in the management of natural resources and the environment includes: classification, merger, clip, buffer, map calculator, 3-D modeling, and spatial modeling in the management of natural resources and the environment. Various GIS application software: ArcView, Map Info, ArcGIS, and others. Spatial Model and its application in the management of Natural Resources and Environment.

TPL61034 RESEARCH ON ENVIRONMENTAL ENGINEERING OPERATIONS 2(2–0)
This course provides an explanation of problem solving to optimize various uses of limited resources with linear programming, dynamic programming, queuing theory, networking analysis, duality and sensitivity and their application in natural resource management and the environment.

TPL61035 CLEAN WATER SUPPLY ENGINEERING 2(2–0)
Hydrology, review of various quantitative and qualitative characteristics of water sources, protection of water sources, prediction of urban water demand, agriculture and other development sectors as well as conservation concepts. Quantitative and qualitative material of physics, chemistry and biology required in water management. Various interactions between parameters to understand phenomena and see trends that occur in the surface water and groundwater environment. The calculations include the prediction

of the size of the source, demand, dispersion of conservative or non-conservative pollutants. Conventional and modern clean water treatment techniques. The course material includes a number of design calculations and an introduction to various alternative forms of drinking water distribution system construction.
Prerequisites: TPL62008, TPL62009

TPL61036 PRACTICE OF CLEAN WATER SUPPLY ENGINEERING 1(0–1)
This practicum provides the ability to calculate and design clean water treatment units
Prerequisite: TPL62009

TPL61037 DRAINAGE AND SEWAGE 2(2–0)
Terminology, components and urgency in sewerage and drainage, sewerage and rainwater distribution systems: separate, mixed, advantages and disadvantages of each distribution system. Classification of waste water due to both human and natural activities; quantity of dirty water from domestic, commercial, industrial activities, both organic and hydraulic loads; the rational method of the quantity of rainwater, both intensity, return period and application of its distribution; planning of waste water collection and distribution system, energy concept in channel, mixed and separated system, layout pattern system, type and type of conduit as well as technical specifications; Operation and maintenance of sewers and their equipment and institutional management of sewerage systems. Calculation and system design.
Prerequisites: TPL61015, TPL61016

TPL61038 DRAINAGE AND SEWAGE PRACTICE 1(0–1)
This practicum provides the ability to plan wastewater collection and distribution systems with various systems.
Prerequisite: TPL61016

TPL61039 AIR POLLUTION 2(2-0)
The urgency of controlling air pollution; classification of air pollutants; original source; characteristics of air polluting substances; effects and impacts on humans and the environment; ambient air quality standards and emissions; meteorological aspects related to the process of dispersion of pollutants, the theory of dispersion of pollutants and influencing factors; standard methods and procedures for monitoring and sampling air; laboratory analysis; prevention efforts; introduction of coping methods and techniques; gas and particulate air pollutant control equipment.
Prerequisites: TPL62004, TPL62005

TPL61040 PRACTICEAIR POLLUTION 1(0–1)
This practicum provides skills in measuring particulates and pollutant gases
Prerequisite: TPL62005

TPL61041 OCCUPATIONAL HEALTH AND SAFETY (K3) 2(2–0)
K3 elements. The basics of K3 safety. The aims and objectives of SMK3/OHSAS 18001:2007. Introduction and interpretation of SMK3. SMK3 preparation method.

Manage the performance of SMK3 in the workplace. Hazard identify & risk assessment. SMK3 implementation and certification.

TPL61042 ENVIRONMENTAL SYSTEM ANALYSIS 2(2-0)

This course explains the system concept, system life cycle, system requirements, systems approach, systems analysis, and systems modeling techniques, and decision support systems.

TPL62043 ANALYSIS OF ENVIRONMENTAL IMPACT (AMDAL) 3(3-0)

Definition and importance of AMDAL and AMDAL Documents in environmental permits for an activity and/or business. National policies, regulations related to AMDAL, AMDAL process, screening, scoping, public consultation consultation techniques, primary and secondary data collection methods, initial environmental baseline, alternative studies, IMPACT forecasting, Impact evaluation: evaluation of significant impacts; formulation and mitigation of negative impacts; positive impact development, AMDAL Document preparation techniques. Techniques for preparing terms of reference (KA), ANDAL, RPL, RKL and UKL-UPL. AMDAL Assessment Commission (KPA) session.
Prerequisite: Must not be taken less than Semester 5

TPL62044 SOLID AND B3 WASTE HANDLING 2(2–0)

This course includes a discussion of important aspects of solid waste management; solid waste and B3 characteristics; onsite control; integrated solid waste sorting and treatment; solid waste incineration and composting; distribution of B3 waste; B3 waste legislation, B3 waste pollution control, packaging techniques, storage and disposal of B3 waste.

TPL62045 PROJECT MANAGEMENT 2(2–0)

Definition of Project and Project Management, and scope. TOR preparation. Project Auction Announcement. Prequalification, ANNWIJZING. Preparation of project proposals and ustek. Evaluation of proposals and bidders. Announcement of the auction winner. Project life cycle. Project management process. Project initiation. Project planning. Project scheduling. Project control. The human aspect of project management. The scope of the feasibility study. Market aspect analysis; potential market, effective potential market, effective demand, competitor analysis, and industry structure analysis. Technical aspect analysis. Management aspect analysis. Financial and economic analysis; risk analysis, sensitivity, feasibility analysis and industrial economic studies. Project feasibility study proposal. Environmental feasibility and impact, implementation of AMDAL and industrial waste treatment system. legal aspects,

TPL62046 PLAMBING 2(2–0)

This course helps to understand, review the general basics, design, implementation and planning of piping systems (plumbing), and pumps needed in the field of environmental engineering, including: Piping Systems: definition, type, placement, purpose of installing a piping system in a building, the basics of a common piping system. Piping: definition, form and function, instrument components, tools, piping codes, piping system design for drinking water, wastewater, rainwater and fire prevention. Pumps: types, characteristics and uses, head selection and system, aerotors installation and housing

design, flow measurement, valves and control components, pump implementation and planning, pump housing planning, serial and parallel pump installation.
Prerequisite: TPL62006

TPL60047 ENVIRONMENTAL MANAGEMENT (CAPSTONE) 2(0-2)
Sustainable management of water availability in watersheds, management of erosion and sedimentation, sustainable water management, sustainable land management, flood management

TPL60048 DESIGN OF LIQUID WASTE TREATMENT (CAPSTONE) BUILDING 2(0-2)
The design of the domestic liquid waste building which includes primary, secondary and tertiary treatment (filtering unit, sedimentation, flow equalization, pumping station, aerobic treatment process and anaerobic treatment process), to simple sludge management.

TPL61049 TECHNOLOGYCLEAN 2(2–0)
This course provides a basic concept of clean technology which includes clean technology in the field of natural resources and environmental engineering, assessment of clean technology systems and priority sectors in clean production. Clean technology in activities/business/industry.

TPL61050 STANDARDIZATION AND QUALITY MANAGEMENT 2(2–0)
Definition and history of standard use in industry. The reasons for using standards and their uses in engineering system processes. Application of standard accuracy. Selection and development of standards. How to find existing standards and standard locations that can be used. The concept of an integrated quality management approach; Total quality management, using the ISO 9000 quality management system as a reference, eco-management with reference to the ISO 14000 environmental management system and Life Cycle Assessment. Quality evaluation before, during and after processing.

TPL4151 GLOBAL WARMING AND CLIMATE CHANGE 2(2–0)
The definition of global warming and climate change includes the factors that cause global warming, the greenhouse effect, the environmental impact of global warming and climate change, efforts to prevent and improve the environment caused by global warming and climate change, and the risk of disasters caused by climate change.

TPL61052 ENVIRONMENTAL LAW 2(2–0)
This course provides an understanding of Environmental Law with the aim that students are able to understand and explain the protection of environmental management, national and international environmental policy and law issues regarding environmental characteristics, problems and awareness of the environment, the development of environmental law in Indonesia, the substance of the Law. -Law Number 32 of 2009, the

environmental legal aspects in Law Number. 32 of 2009, the role, function and authority of the autonomous government in environmental protection and management, environmental dispute resolution, environmental law enforcement, and environmental ethics.

TPL61053 REMEDIATION 2(2–0)

In this course, students will study the mechanisms of phytoprocesses: evapotranspiration and transpiration, photosynthesis and respiration, phytostabilization, rhizofiltration, rhizodegradation, phytoextraction, phytodegradation, and phytovolatilization. Factors that affect the phytoprocess. Measurement of plant parameters: plant dimensions and parts, wet and dry weight, and growth. Bioaccumulation and biotransformation of substances in plants. Examples of the application of phytotechnology to solve environmental problems: determination of green open spaces, distribution of green open spaces, water resource conservation processes, wastewater treatment processes, and restoration of polluted environments.

TPL61054 ECOTOXICOLOGY 2(2–0)

Environmental toxicology: Definition, dose-response relationship, relative toxicology, reversibility. LC-5 and LD50.

TPL61055 ENVIRONMENTAL SOCIOLOGY 2(2–0)

Population, society and culture (population growth and migration, cultural development, institutions and concepts of identity, function of the form and family system: youth and socialization (internalization, learning, specialization, the role of universities, family and society as educational institutions). Citizen and the State (State law and government, rights and obligations of citizens, legal and political awareness, layers and equality) Society (urban-rural-industrial society concept, influence between urban-rural-industrial communities) Social conflict and integration and unity National Science (science concept; appropriate and modern technology, poverty concept, influence of technology on society.

TPL61056 ENVIRONMENTAL AUDIT 2(2–0)

Introduction to Environmental Auditing: Definition of Audit and Environmental Audit, Nature of Audit, Audit as a component of Environmental Management, Auditing as an Environmental Risk Context, Type of Audit. Environmental Auditing in Indonesia: Legal Basis, Differences between Environmental Audit and AMDAL. Basic Principles of Auditing according to ISO9001, Audit Activities, Auditi and Auditors, Auditor Competence. Type of Audit: Environmental audit procedures, methods and techniques. Benefits of the UI Green Campus audit and audit preparation. Simulation of UB Green Campus Audit Implementation. Audit Report. Audit against criteria or standards: Environmental Management System ISO14000, Life Cycle Assessment ISO14040, Ecolabelling, Proper, Green Industry, OHS Management System. Environmental Audit Practices.

TPL62057 DISASTER MITIGATION AND MANAGEMENT 2(2–0)

Understanding Disaster and Mitigation. Various types and kinds of disasters, basic principles and concepts of disaster mitigation and management. Understanding and determining the risk of various disasters: landslides, floods, earthquakes and tsunamis, volcanic eruptions, droughts and other environmental disasters. Local wisdom as a component of capacity that minimizes the magnitude of disaster risk. Disaster event prognosis. Disaster emergency response and response measures. Recovery / post-disaster recovery.

TPL62058 ENVIRONMENTAL HEALTH 2(2–0)

This course aims to provide students with an introduction to the scope of the field, including: Understanding environmental sanitation and environmental sanitation techniques, introduction to sanitation in drinking water supply, waste water management, solid waste, and environmental sanitation quality management. In this course, students will learn the application of the community participation approach, raising public awareness about sanitation. Simple sanitation system applications: septic tanks, communal septic tanks, cubluks, leach fields, evapotranspiration, composting and biogas. Provision of appropriate sanitation applications according to the willingness and ability of the community in procurement and operation and maintenance. Management organization. Community based sanitation tariff calculation and application. Lectures are equipped with assignments:

TPL62059 TRANSPORT OF POLLUTANTS 2(2–0)

Matrix and tensor. Momentum transport mechanisms which include; a. Viscosity and momentum transport, b. Velocity distribution in laminar flow, c. Equation of change in isothermal system, d. Speed distribution with more than one independent variable, e. Velocity distribution in turbulent flow, f. Interfacial transport in isothermal systems, g. Macroscopic equilibrium in an isothermal system. Energy transport in steady and unstable conditions. Mass transport includes; a) diffusivity and mass transport mechanism, b) concentration distribution in solids and in laminar flow, c) equation of change in multicomponent systems, d) concentration distribution with more than one independent variable, e) macroscopic equilibrium for multicomponent systems, f) 2D and 3D mass transport.

TPL62060 Natural Resources & Environment Bioassessment 2(2-0)

Studying the relationship between the environment and pollution, the response of organisms to changes in environmental quality, living things, as a tool for assessing environmental quality (Bio indicators), criteria for organisms as bioindicators, parameters of air, water and soil pollution, bioindicators of air pollution, bioindicators of water pollution, bioindicators soil pollution.

TPL62061 PLASMA TECHNOLOGY 2(2-0)

Classification of matter and state of matter: solid, liquid, gas, plasma and other phases. Plasma in human life: big bang, fire, lightning, thermonuclear reaction, high voltage, electromagnetic field. Ozone and plasma: stable phase, particles, energy and temperature, shape change. Ozone and plasma technology in environmental conservation: water and air purification, liquid, solid and B3 waste treatment. Plasma technology in energy resistance. Plasma reactor design and safety factor

9.1.6 Syllabus for Bachelor of Bioprocess Technology (TBP) Courses

TPO61001 INTRODUCTION TO BIOPROCESS ENGINEERING (2–0)
This course contains the development of bioprocesses in an interdisciplinary perspective. Basic engineering calculations applied in biological processes, physical processes, fluid flow, heat, mass transfer and unit operations. Principles of bioreactors, bioreactor systems, basic design of bioreactors, multiplication of bioprocess scales, and bioprocess control

TPO6202 ENGINEERING MECHANICS 3(2–1)
This course studies the equilibrium that affects the bioreactor system (concurrent, parallel, non-concurent non parallel), work and energy in the bioreactor, and analysis of the strength of the bioreactor material.

TPO62003 FOOD CHEMISTRY 2(2–0)
This course studies knowledge of chemical structures, physico-chemical properties, chemical reactions, roles/functions of chemical components of food and food products including: water, carbohydrates, proteins, fats, vitamins, minerals, and other components. Changes in the physico-chemical characteristics of food in the form of molecules, granules and processed products due to food processing such as denaturation, rancidity, retrogradation, syneresis, gelatinization, hydrocolloid properties, off-flavor, browning. This course also briefly discusses the interactions between chemical components in food products.

TPO62004 ESSENTIAL MICROBIOLOGY 2(2–0)
This course studies the basics of microbiology, the definition and scope of microbiology, types of microbes, biochemical principles, structure and composition of prokaryotic and eukaryotic cells, microbial nutrition, microbial cultivation, microbial growth, microbial metabolism, microbial control, microbial genetics and microbial applications. in the industry.

TPO62005 PRACTICE OF ESSENTIAL MICROBIOLOGY 1(0–1)
This course provides the basic practice of identification, isolation, microbial cultivation and application in the field of bioprocess engineering

TPO62006 INTRODUCTION TO COMPUTER APPLICATIONS 2(2–0)
This course studies computer science and computing, introduction to computer hardware and software in computing. Computer applications for statistical, mathematical and numerical analysis. The use of computers for graphing, tables and scientific presentations. Application of computing in solving industrial bioprocess problems.

TPO62007 PRACTICUM INTRODUCTION TO COMPUTER APPLICATIONS 1(0–1)
This course provides the basic practice of introducing computer hardware and computing software to solve bioprocess industry problems

TPO61008 TRANSPORT PHENOMENON 1 2(2–0)
This course explains the basic concepts and properties of fluids, fluid statics, fluid kinematics, fluid dynamics, diffusivity and mass transfer mechanisms, concentration distribution in laminar and turbulent flow. Prerequisite : TPE61003

TPO61009 COMPUTER AIDED DESIGN (CAD) 2(2–0)
Students learn about the introduction of CAD, History, Usability, and Software, Introduction to the Graphic interface of CAD programs (Start, Organize, Save, Control Drawing views, units, toolbars), Operation of CAD software to create basic 2D drawing objects with basic tools, inclusion of dimensions, format, properties, viewports, commands and image modifications. Techniques for presenting 2D images and plotting. The introduction of 3D objects includes the definition of functions and benefits; 3D Solid Objects (Box, Sphere, Cylinder, Cone, Wedge, Torus); Get to know 3D modification (3D VIEW, 3D SURFACE, 3D RENDERING; Advanced 3D modification for various types of objects; 3D modification with commands; Layering system; 3D image presentation and plotting techniques.

TPO61010 PRACTICE COMPUTER AIDED DESIGN (CAD) 1(0–1)
This course provides the practice of operating CAD software from basic tools, drawing modifications to presentations

TPO61011 AUTOMATION 1 2(2–0)
This course studies the basics of electronics and instrumentation, data acquisition and data processing, principles of physical, chemical and biological measurements in bioreactors, understanding of analog and digital data, and basic principles of electronic components and instrumentation.

TPO61011 AUTOMATION PRACTICE 1 1(0–1)
This course provides basic practice of electronics and physical, chemical and biological measurements in bioreactors

TPO61013 BASIC BIOCHEMICAL 2(2–0)
This course studies carbohydrates, proteins, fats, glycolysis, gluconeogenesis, phentose phosphate pathway, photosynthetic processes, metabolism, citric acid cycle, fatty acid oxidation, amino acid biosynthesis.

TPO62014 APPLIED MATHEMATICS BIOPROCESS 3(2–1)
This course provides knowledge about the review of Ordinary and Partial Differential Equations. Application of First Order Ordinary Differential Equations to Fluid Problems, Heat Transfer Problems, Kinematics and dynamics, Electrical problems, Microorganism growth and death models, PD applications to reaction rates, First order reaction kinetics, Review of 2nd Order Differential Equations. Application of 2nd Order Ordinary Differential Equations on 2nd order reaction kinetics problems, RCL circuit electrical problems, problems in the form of partial differential equations, 1-dimensional conduction cases in Cartesian coordinates and cylindrical coordinates. Prerequisite : TPE61018

TPO62015 CHEMICAL REACTION ENGINEERING
3(2–1)
This course consists of several topics which include introduction: understanding of kinetics and thermodynamics, chemical reaction kinetics, chemical reaction thermodynamics, catalysts, biocatalysts, bioreactors, enzymatic reaction kinetics.

TPO62016 TRANSPORT PHENOMENON 2 2(2–0)
This course is a continuation of the transport phenomenon 1 which explains more about thermal conductivity and heat transfer mechanisms; thermal conductivity in gases, liquids and solids; Natural convection and forced convection; heat distribution in solids; Heat distribution in laminar and turbulent flow; the theory of viscosity and momentum transfer; velocity distribution in laminar and turbulent flow; equations of continuity, motion and mechanics; theory and properties of liquid polymers. Prerequisite : TPO61008

TPO62017 AUTOMATION 2 2(2–0)
This course studies the basics of control systems, various control algorithms, monitoring and controlling the fermentation process, feedback control, indirect metabolic control, programmed control, application of artificial intelligence to bioprocess control, application of bioreactor control from measurements of physical, chemical and chemical quantities. biology. Prerequisite : TPO61011

TPO62018 AUTOMATION PRACTICE 2 1(0–1)
This course provides the basic practice of control systems from the measurement results of physical, chemical and biological quantities.
Prerequisite : TPO61012

TPO62019 OPERATIONAL MANAGEMENT 2(2–0)
This course discusses the definition and scope of operations management in the bioprocess industry, operations strategy, product design and selection process (manufacturing and service), methods of determining plant location, capacity planning, forecasting, aggregate planning and disaggregation, inventory control (deterministic, probabilistic and uncertainty), MRP II and CRP, scheduling (labor and machine), production on time.

TPO62020 PRACTICE OF OPERATIONAL MANAGEMENT 1(0–1)
This course provides operations management practices in the bioprocess industry

TPO62021 BIOPROCESS OPERATING UNIT 2(2–0)
This course provides knowledge and understanding of the notion of unit operation of bioprocesses with discussion of: black box diagram philosophy, unit dimensions, engineering approach methods, fundamentals of momentum transfer, thermodynamics and heat transfer basics, heat exchangers, evaporation, drying, mixing. and homogenization, solid-liquid separation (crystallization, filtration, adsorption), liquid-

liquid separation (extraction, distillation, membrane filtration). Lay out bioprocess production.

TPO62022 PRACTICUM OF BIOPROCESS OPERATING UNIT 1(0–1)
This course provides operational practice of basic units in the field of bioprocess engineering, especially for upstream processes

TPO61023 ENGINEERING BIOSEPARATION 2(2–0)
This course describes several separation techniques in the bioprocess industry, both in the upstream and downstream processes, the principles of bioseparation and the difference between them and chemical separation, including the separation of solids, liquids, solids, liquids such as sedimentation, centrifugation, distillation, absorption and adsorption, chromatography, ordinary filtration, membrane filtration and crystallization.

TPO61024 ENGINEERING ENGINEERING PRACTICE 1(0–1)
This course provides operational practice of separation units in bioprocesses

TPO61025 ITERATIVE METHOD 2(2–0)
This course provides a description of the differences between analytical methods and iterative methods, interpolation, extrapolation, partial differential equations, differential integral iteration, roots of equations and non-linear equations, examples of application cases for solving iterations on differential and integral equations. Prerequisite : TPE61004.

TPO61026 BASIC FERMENTATION TECHNOLOGY 2(2–0)
This course provides an understanding of the importance of fermentation in industry. Fermentation principle, types of fermentation. Biological materials/agents for the fermentation process, microorganisms in fermentation. Fermentation methods and techniques, substrate handling, starter, medium and inoculation. Sterilization. Fermenter design and control, fermentation kinetics, process control, separation equipment in fermentation. Application of fermentation technology in industry (food, biomass, non-food). Prerequisites : TPO62004, TPO61013

TPO61027 ANALYSIS INSTRUMENTS 3(3–0)
This course provides an introduction to analysis using instruments. Components, working principles, interpretation of the results of several component analysis tools (FTIR, GC, LC, MS, HPLC, NMR, XRD, XRF), microscopy (SEM, TEM), thermal analysis (DSC, DTA, TGA), porosity (BET, surface area analyzer), texture (texture analyzer).

TPO61028 EXPERIMENTAL DESIGN 2(2–0)
This course provides an explanation of the introduction to statistics; Regression and correlation analysis; ANOVA; Experimental design (DOE); Evaluation of research topics and problem boundaries; Selection of factors, levels and responses; Measurement of errors in factors and responses; Factor ranking; basic experiments and mathematical

models; full and partial factorial based experiments; statistic analysis; optimization (RSM, Taguchi).

TPO61029 EXPERIMENTAL DESIGN PRACTICE 1(0–1)
This course provides the practice of research design and statistical analysis in the field of bioprocess engineering

TPO61030 BASIC BUSINESS MANAGEMENT 2(2-0)
This course provides an explanation of the basics of business management, business definitions, the nature and types of business activities, the role of the bioprocess business in bioeconomic development, business characteristics in the bioprocess field and the factors that affect business performance in the bioprocess industry.

TPO61031 BASIC BIOTECHNOLOGY 2(2–0)
This course discusses: genetic material, cloning vectors, restriction enzymes, recombinant DNA technology, introduction to molecular methods for DNA amplification, polymerase chain reaction, DNA synthesis, DNA sequencing, genetic manipulation, mutagenesis, expression optimization, improvement of microbial strains. Genetically engineered products (bioplastics, polymers, biodiesel, and pharmaceuticals), Bioprocesses (Renewable fuels: ethanol, methanol, biogas; Organic acids).

TPO62032 BIOPROCESS REACTOR DESIGN 3(3–0)
This course is one of the top courses that discusses the notion of bioprocess reactor design, microorganisms, bioractor equilibrium, yield, design equations, heat and mass transfer in bioreactors, fluid dynamics in bioreactors, configuration of bioreactors, construction of bioreactors, monitoring and control of bioreactors. , ideal reactor operation, sterilization, bioreactor scaling up, development of new reactors. Prerequisites : TPO62015, TPO62021

TPO62033 BIOPROCESS REACTOR DESIGN PRACTICE 1(0–1)
This course provides bioreactor design practice starting from functional and structural design, combining the skills of mathematics, physics, microbiology, CAD, biochemical reactions, transfer phenomena and thermodynamics, upstream and downstream processes.
Prerequisites : TPO62015, TPO62021

TPO62034 BIOPROCESS INDUSTRY DESIGN 3(3–0)
This course is one of the top courses, where students must be able to elaborate all the courses that have been obtained to design a Bioprocess Industry. The subjects in question are subjects containing soft skills, Economics and Management and Technical which include planning, testing and evaluation. Lecture materials include: Values of Professional Ethics and Law in Industrial Planning (understanding of ISO, Law, Candy etc.), Natural Resources Analysis (raw materials), Market Analysis, Business Feasibility Planning, Planning for Human Resources and Financial Needs, Themes concerning types of non-food food products or commodities for Case Studies, Factory Layout

Planning, Planning and Complete Analysis of Operational Unit Needs, Evaluation Planning, Maintenance Planning,

TPO62035 FERMENTATION TECHNOLOGY APPLICATION 3(3–0)
This course discusses the importance of fermentation in industry. Fermentation principle, types of fermentation. Biological materials/agents for the fermentation process, microorganisms in fermentation. Fermentation methods and techniques, substrate handling, starter, medium and inoculation. Sterilization. Fermenter design and control, fermentation kinetics, process control, separation equipment in fermentation. Application of fermentation technology in industry (food, biomass, non-food). Prerequisite : TPO61026

TPO62036 BIOLOGICAL SYSTEM MODELING AND OPTIMIZATION 3(2–1)
This course provides knowledge and introduction to the application of modeling principles so that students have an understanding of how to make models from translating biological systems into mathematical equations. The application of basic engineering principles through the creation of flowcharts to mathematical equations and then solving these equations and simulating them in a computer program. Prerequisite : TPO62014

TPO62037 BIOENERGY ENGINEERING 2(2–0)
Bioenergy engineering courses provide an understanding of biomass-based energy. Includes introduction and bioenergy material. World and national energy needs, as well as energy availability, energy planning and human needs, energy sources and future energy needs. Energy from biomass sources, benefits of biomass utilization, energy conversion from biomass through direct combustion, pyrolysis, fermentation, anaerobic digestion, esterification and transesterification.

TPO61038 MEMBRANE TECHNOLOGY AND PROCESSES 2(2–0)
This course provides an explanation of the basics of membrane technology, the principles of membrane separation, preparation of membranes made of ceramics, metals and polymers, characterization of membrane materials, membrane processes and systems, membrane applications for food processing (fruit, dairy and derivative products industries).), supply of drinking water and purification of waste and by-products. Membrane applications in the field of bioprocesses. Prerequisite : TPO61023.

TPO61039 PRACTICE OF MEMBRANE TECHNOLOGY AND PROCESSES 1(0–1)
This course provides practical measurement of basic quantities in membrane processes such as flux, rejection, manufacture of polymer membranes and basic characterization of membrane materials.
Prerequisite : TPO61023

TPO61040 COMPUTING FLUID DYNAMICS 3(2–1)
This course explains the basics of CFD, Navier-Stokes equations, mathematical models and boundary conditions, mesh and grid generation, discretization (Finite Element

Methods, Finite Difference Methods and Finite Volume Methods), introduction to CFD software. Prerequisite : TPO61008

TPO61041 INDUSTRIAL WASTE TREATMENT 2(2–0)

This course explains the principles of industrial wastewater treatment, including the basics of waste treatment physically (filtration, sedimentation), chemistry (flocculation, coagulation), biology (activated sludge), the use of advanced technology in waste treatment (MBR, IFASS, etc.).), control and optimization applications in sewage treatment. Liquid waste characterization and treatment standards; Dissolved pollutants, organic and inorganic; Colloids and oil emulsions; BOD, COD and TOC; Organic degradation by aerobic system and activated sludge; Bioreactor and aeration system; Aerobic treatment with biofilm system; Anaerobic degradation; Biodegradation of certain organic compounds; Nitrification, denitrification and phosphorus separation; Integrated waste treatment.

TPO61042 HERBAL TECHNOLOGY 2(2–0)

This course includes an introduction: Introduction, development, and use of natural ingredients (herbs) as medicinal ingredients. Diversity of herbal medicinal ingredients and their active substance content. Identification and characterization of physical, chemical, and biological properties of herbal ingredients. Herbal medicines and their preparations. Capsule formulation for herbal medicinal preparations. Introduction of separation (extraction) and purification (isolation) techniques of active herbal compounds, Mixing preparation technology. Testing the efficacy of herbal ingredients and their toxicology. Drug formulation formulations. Case studies: current issues related to herbal medicines.

TPO61043 ENGINEERING CALIBRATION 3(2–1)

This course provides knowledge and introduction about Measurement and Calibration, Mass Calibration, Temperature Calibration, Volume Calibration, Electrical Calibration, Dimensional Calibration,

TPO61044 CALIBRATION ENGINEERING PRACTICE 1(0–1)

This course provides basic practice of measuring and calibrating various mass, temperature, volume and electrical quantities

TPO62045 ADVANCED PROGRAMMING 2(2–0)

This course explains about the Matlab program and similar programs and their benefits. Introduction Matlab, basic computer programming, variables and constants, operators, formulas and functions, matlab toolboxes. Introduction Matlab work environment, signs and variables, working with workspaces, storing and recalling data, examples of simple math problems. General rules in matlab (variables and operators), introduction to matlab help. Linear algebra review, Arrays and matrices, Polynomials. Computer programming. Matlab programming. Variable string, script M-File. Relations, Logic and program control. Data analysis (std deviation, mean, etc.), interpolation. Making the M-File function. 2D and 3D visualization. Reads and writes data, graphic layouts, and scripts. Standard algebraic, differential and integral operations, search with Solve. Introduction to GUI and Simulink. Numerical simulation. Prerequisite : TPO62005

TPO62023 NON THERMAL PROCESSING TECHNOLOGY 2(2–0)

The Non-thermal Processing Technology course offers material on non-thermal processing techniques for agricultural materials, especially for food. The non-thermal techniques described in this course include: 1. Physical processes such as High Pressure Processing (HHP), 2. Electromagnetic processes such as Pulsed Electric Field (PEF), 2. Irradiation and UV treatment, 3. Ozone treatment, 4. Chlorine dioxide gas phase treatment etc. 5. Combination with thermal or non-thermal technology, 6. commercialization of this technology.

9.1.7 Syllabus for Bachelor of Agroindustrial Technology (TIP) Courses

TPI61001 ORGANIC AND INORGANIC CHEMISTRY 2 (2-0)

This course contains the basics of chemistry based on inorganic and organic compounds. Inorganic chemistry discusses aspects of the structure of chemical compounds, mole concepts, chemical calculations, and reaction analysis of inorganic compounds. Organic chemistry discusses aspects of aliphatic compounds and some functional groups as well as the description of organic compounds in a chemical reaction.

Course Learning Outcomes (CLO):

1. Able to explain the structure of chemical compounds, mole concepts, chemical calculations, and analysis of reactions of inorganic compounds
2. Able to explain aliphatic compounds, functional groups and organic compounds
3. Able to demonstrate and interpret data from laboratory experiments based on inorganic and organic compounds

TPI61002 ORGANIC AND INORGANIC CHEMISTRY PRACTICE 1 (0-1)

The course teaches students to carry out practicum on the introduction of K3 tools and culture, manufacture and dilution of solutions and buffer solutions, volumetric analysis, spectrophotometry, identification of alcohol, aldehyde and ketone functional groups, saponification reactions and protein qualitative tests.

Course Learning Outcomes (CLO):

1. Able to demonstrate and interpret data from laboratory experiments based on inorganic and organic compounds

TPI61003 GENERAL BIOLOGY 2 (2-0)

This course contains material on the introduction of the concept and scope of biological science which includes an introduction to the biological molecules that make up the body of organisms, the cell structure of prokaryotic and eukaryotic organisms, molecular genetics and the process of inheritance of traits, studies on biotechnology as well as studies on the classification of organisms that specifically will discusses organisms from the group of viruses, bacteria, archaea, fungi, plants, and animals from the vertebrate and invertebrate groups. An introduction to basic biology will also be supported by material on the application of biological sciences in the environmental and industrial fields, especially agro-industry.

Course Learning Outcomes (CLO):

1. Able to explain the structure of organisms, the biological processes that occur in the organism's body, as well as the classification of organisms
2. Able to give examples of the use of organisms in the environmental and industrial fields, especially agro-industry

TPI61004 GENERAL BIOLOGY PRACTICUM 1 (0-1)

This course contains the introduction of tools and materials, as well as the practice of the concepts and scope of biology including the cell structure of prokaryotic and eukaryotic organisms, viruses, bacteria, archaea, fungi, plants, and animals from the vertebrate and invertebrate groups associated with applications in agroindustry.

Course Learning Outcomes (CLO):

1. Able to identify tools and materials used in the analysis of organism cells
2. Able to show the cell structure of organisms
3. Able to distinguish the mechanism of growth of bacteria, fungi, plants and animals
4. Able to identify organisms that play an important role in agroindustry

TPI61005 INTRODUCTION TO AGROINDUSTRY 2 (2-0)

This course is a basic course that introduces principles and concepts in Agroindustrial Engineering science including the scope, challenges and prospects in agroindustry, the role and importance of Engineering Management, Process Engineering and Systems Engineering in Agroindustry.

Course Learning Outcomes (CLO):

1. Able to characterize industries that are included in the Agroindustry group
2. Able to describe the role of process engineering in Agroindustry
3. Able to describe the role of industrial management in Agroindustry
4. Able to describe the role of systems engineering in Agroindustry

TPI61006 INTRODUCTION TO ECONOMIC SCIENCE 2 (2-0)

This course is about the concept and scope of the development of economics, structure, behavior and performance as well as policies in economic decision making, both micro and macro.

Course Learning Outcomes (CLO):

1. Able to explain the scope and policies of the development of economics, both micro and macro
2. Able to explain producer behavior (production theory, demand, elasticity, cost theory, behavior structure and market performance)

3. Able to explain consumer behavior (consumption and utility theory, supply, elasticity and equilibrium)

TPI61007 GENERAL MATHEMATICS 2 (2-0)

This course contains definitions, forms and uses of determinants, matrices and vectors, partial fractions, arithmetic sequences and series, geometry, Maclaurin and binomials, function definitions, composition functions, various functions, function graphs, and mathematical logic.

Course Learning Outcomes (CLO):

1. Able to describe solving mathematical problems using determinants, matrices and vectors
2. Able to change mathematical equations using partial fractions
3. Able to demonstrate arithmetic sequences and series
4. Able to categorize the form of a function and not a function
5. Able to conclude problems in mathematical logic

TPI61008 ENGINEERING DRAWINGS 2 (2-0)

This course contains an introduction to the use of drawing tools, techniques for reading images, projecting shapes, and basic rules in making technical drawings for the benefit of the production process.

Course Learning Outcomes (CLO):

1. Able to identify the use of drawing tools
2. Able to explain the principles of technical drawing according to ISO standards
3. Able to design technical drawings
4. Able to draw product designs in the field of agroindustry

TPI61009 ENGINEERING DRAWING PRACTICE 1 (0-1)

This course contains the practice of introducing the use of drawing tools, techniques for reading drawings, projecting shapes, and basic rules in making technical drawings for the benefit of the production process either manually or using Autocad software.

Course Learning Outcomes (CLO):

1. Able to identify the use of drawing tools
2. Able to identify the principles of technical drawing according to ISO standards
3. Able to prepare technical drawing designs
4. Able to show the results of technical drawings

TPI62010 Calculus 2 (2-0)

This course contains limits and continuity of functions, derivatives of functions and their applications, Laplace transforms, integrals and their applications, transcedent functions, conic and polar coordinates, and vector calculus.

Course Learning Outcomes (CLO):

1. Able to calculate function limit values, definite values, line and surface integrals
2. Able to determine the continuity of the function at a point, the nth derivative and the partial derivative of the function, in the form of multiple integrals
3. Able to apply derivative and integral applications
4. Able to identify the characteristics of transcendent functions
5. Capable of converting polar coordinates to conic coordinates and vice versa

TPI62011 INDUSTRIAL MICROBIOLOGY 2 (2-0)

This course contains the basic concepts of Industrial Microbiology, characteristics of industrial microorganisms, growth of industrial microorganisms, fermentation media, influencing factors during fermentation, the basics of the fermentation process, scale up, product purification as well as the opportunities and challenges of Industrial microbiology.

Course Learning Outcomes (CLO):

1. Able to identify various industrial microorganisms.
2. Able to determine the type and amount of raw materials to produce fermented products.
3. Able to explain the basics of the fermentation process

TPI62012 INDUSTRIAL MICROBIOLOGY PRACTICE 1 (0-1)

This course contains demonstrations of the use of analytical tools and materials, as well as basic practices related to the characteristics of industrial microorganisms, the growth of industrial microorganisms in various fermentation media, the calculation of the number of cells and their growth kinetics, the influence of factors and methods in fermentation.

Course Learning Outcomes (CLO):

1. Able to use tools and materials for analysis in industrial microbiology
2. Able to show a variety of industrial microorganisms.
3. Able to do bacterial calculations and growth kinetics
4. Able to show the influence of process factors in fermentation
5. Able to demonstrate fermentation methods on liquid and solid substrates

TPI62013 PROCESS ENGINEERING BASIC 2 (2-0)

This course discusses the basic engineering of physical and chemical processes, as well as the basis for designing, types and diagrams of agro-industrial processes.

Course Learning Outcomes (CLO):

1. Able to calculate mathematically basic physical and chemical processes in agroindustry
2. Able to explain the basis of process design in agroindustry

TPI62014 COMPUTER PROGRAMMING 2 (2-0)

This course contains an introduction to computers and the Python programming language. The material covered includes the work environment, variables, data types and operator types, branching and looping, functions, list structures, and the introduction of objects and classes in Python.

Course Learning Outcomes (CLO):

1. Able to identify variables and data types
2. Able to explain branching and looping
3. Be able to give examples of the use of functions in the program
4. Able to demonstrate the structure of lists, tuples and dictionaries
5. Able to construct simple programs

TPI62015 COMPUTER PROGRAMMING PRACTICE 1 (0-1)

Contains an introduction to computers and the Python programming language. Students will learn the working environment in python, variables, data types and operator types in python. Practice branching and looping, using functions, learning list structures and recognizing objects in python.

Course Learning Outcomes (CLO):

1. Able to identify variables and data types
2. Able to distinguish branching and looping
3. Able to demonstrate the use of functions in the program
4. Able to choose the structure of lists, tuples and dictionaries
5. Able to practice simple programs

TPI62016 WASTE MANAGEMENT AND THE INDUSTRIAL ENVIRONMENT 2 (2-0)

This course contains the scope of industrial waste and environmental management, waste characteristics, waste and environmental laws and regulations, environmental management systems, the basis for improving environmental performance and its tools, as well as environmental impact analysis (KA-AMDAL, RPL, RKL, Environmental Audit) .

Course Learning Outcomes (CLO):

1. Able to explain the concepts and principles of waste management and agro-industry environment
2. Able to apply AMDAL and environmental audit methods for the creation of sustainable agro-industry

TPI62017 HUMAN RESOURCE MANAGEMENT 2 (2-0)

This course contains the basic concepts of human resource management, the 5's job scope of work (job analysis, job description, job specifications, job design, job evaluation), as well as the stages of the staffing process (HR planning, recruitment, selection, orientation and placement, training and development). development, performance appraisal, compensation system and career planning).

Course Learning Outcomes (CLO):

1. Able to apply concepts and processes in human resource management as well as the scope of work in 5's jobs

2. Able to apply procedures in the staffing process in a sustainable creative agro-industry business

TPI62018 AGROINDUSTRIAL MATERIALS KNOWLEDGE 2 (2-0)

This course discusses the characteristics (physical, chemical and physiological properties), the potential and productivity of agro-industry raw materials (agriculture, including plantations, forestry, animal husbandry and fisheries), as well as fresh handling, post-harvest, physico-chemical changes during processing, and prospects. diversification of processed products.

Course Learning Outcomes (CLO):

1. Able to identify the characteristics and productivity of agro-industry raw materials
2. Able to identify diversification of processed products from agro-industry raw materials

TPI62019 AGROINDUSTRIAL MATERIALS KNOWLEDGE PRACTICE 1 (0-1)

The course teaches students to carry out practical work on the introduction of laboratory equipment, fresh handling of horticultural products, fats and oils, total sugar testing, caramelization, gelatinization, and dextrinization of tubers and cereals, fresheners, and food additives.

Course Learning Outcomes (CLO):

1. Able to conduct laboratory experiments related to the handling of fresh materials and the characterization of agro-industry raw materials

TPI61020 INDUSTRIAL MATHEMATICS 2 (2-0)

This course is related to mathematical techniques and their application in solving industrial problems using a mathematical model approach. The material studied includes the concept of interpolation and methods, systems of equations, roots of equations, numerical integrals, numerical differentials, various differential equations and systems of differential equations, analytical and numerical solutions, and their industrial applications.

Course Learning Outcomes (CLO):

1. Able to apply interpolation techniques in finding the value of the approach
2. Able to express the concept of a system of mathematical equations
3. Able to apply integration and numerical differentiation in the field of agro-industry
4. Able to express problems in the field of agro-industry with a Differential Equation approach
5. Able to solve the system of mathematical equations in the field of agroindustry by applying analytical and numerical methods

TPI61021 OPERATING UNIT 2 (2-0)

This course discusses the theory and principles of operating units in agroindustry, as well as calculating the performance and efficiency of each operating unit.

Course Learning Outcomes (CLO):
1. Able to compare the working principle of unit operation
2. Able to analyze mass balance, energy and transport phenomena in agro-industry operating units
3. Able to perform experiments with various unit operations

TPI61022 UNIT OF OPERATION PRACTICUM 1 (0-1)

The course teaches students to carry out practicum on size reduction, mixing, drying, heating and cooling, evaporation and crystallization, adsorption, extraction and distillation.

Course Learning Outcomes (CLO):
1. Able to perform experiments with various unit operations

TPI61023 INDUSTRIAL STATISTICS 1 2 (2-0)

This course contains descriptive statistics, probability, discrete and continuous probability distributions, sampling techniques, parameter estimation, hypothesis testing, and linear and nonlinear regression and correlation analysis.

Course Learning Outcomes (CLO):
1. Able to apply descriptive statistical concepts
2. Able to use the concept of probability and probability distribution
3. Able to determine the appropriate sampling technique and parameter estimation
4. Able to determine the right hypothesis test
5. Able to apply linear and nonlinear regression and correlation methods in agro-industry problems

TPI61024 INDUSTRIAL STATISTICS PRACTICE 1 1 (0-1)

This course contains exercises and demonstrations of the application of descriptive statistics, probability, discrete and continuous probability distributions, sampling techniques, parameter estimation, hypothesis testing, data validity and reliability tests, classical assumption tests, regression analysis and linear and nonlinear correlations in the field of agroindustry.

Course Learning Outcomes (CLO):
1. Able to work on data presentation, measures of central tendency and variability
2. Able to use the concept of probability and probability distribution
3. Able to develop appropriate sampling technique and parameter estimation
4. Able to do hypothesis testing
5. Able to operate linear and nonlinear regression and correlation analysis

TPI61025 PRODUCT DESIGN AND DEVELOPMENT 2 (2-0)

This course contains clear and detailed product development methods which in stages involve marketing, design and manufacturing functions within a company. In addition, concepts and applications in product development are also studied so that students can identify and integrate customer needs (voice of customer) into the design process as a basis for product development and create new products that are suitable for market share.

Course Learning Outcomes (CLO):

1. Able to manage ideas into product concepts based on agroindustry
2. Able to organize the process of developing agro-industry products based on the quality or attributes that customers want
3. Able to design innovative and feasible agro-industrial products.

TPI61026 OPERATING RESEARCH 3 (3-0)

This course discusses the definition of operations research and its basic concepts, building linear programming models and their solutions, integer models, goal programming models, transportation and assignment problems, network models, CPM and PERT project scheduling problems, and dynamic programming methods.

Course Learning Outcomes (CLO):

1. Able to identify the elements of a mathematical model of a problem in a complex agro-industrial system
2. Able to build linear programming mathematical models based on the identification of model elements
3. Able to optimally allocate delivery and assignment problems on the transportation model
4. Able to apply network models to solve optimization problems
5. Able to make project schedule
6. Able to apply dynamic programming methods

TPI61027 WORK DESIGN AND ERGONOMIC 2 (2-0)

This course contains work productivity and work research (work study), method studies and motion studies, work maps, direct work measurement, indirect work measurement, basic concepts of ergonomics, human-machine systems. , work station design and anthropometry, work physiology, workload, work environment and display

Course Learning Outcomes (CLO):

1. Able to explain the basic concepts of ergonomics, human-machine systems, work physiology, work environment, and display
2. Able to analyze with work study methods, study methods, motion studies, and anthropometry in designing a safe and comfortable work system
3. Able to describe work maps in designing system components
4. Able to calculate with direct and indirect work measurement methods

TPI61028 WORK DESIGN AND ERGONOMIC PRACTICUM 1 (0-1)

This course contains the basic practical concepts of work productivity and work research (work study), method studies and motion studies, preparation of work maps, direct work measurements, indirect work measurements, anthropometric measurements, as well as the design of work stations and work systems that are safe and comfortable in accordance with ergonomic principles.

Course Learning Outcomes (CLO):

1. Able to make work maps
2. Able to do direct work measurement and anthropometry
3. Able to manage work stations and work systems that are safe and comfortable in accordance with ergonomic principles

TPI61029 WASTE TECHNOLOGY 2 (2-0)

This course contains waste parameters and waste characterization methods, wastewater treatment technology, solid and gas (covering aspects of pre-treatment, process, and post-treatment), calculation and design of aerobic and anaerobic waste treatment systems, waste utilization, and techno-economic analysis of sewage treatment systems.

Course Learning Outcomes (CLO):

1. Able to explain waste treatment technology according to the type and characteristics of waste
2. Able to calculate needs and design aerobic and anaerobic waste treatment systems

TPI61030 WASTE TECHNOLOGY PRACTICE 1 (0-1)

This course contains practice and demonstration of the use of analytical tools, characterization of liquid and solid waste parameters, biological and chemical applications of liquid and solid waste treatment technology.

Course Learning Outcomes (CLO):

1. Able to use tools for characterization of liquid waste and solid waste
2. Able to practice characterization of liquid waste and solid waste
3. Able to operate the use of separation and adsorption technology on liquid waste
4. Able to operate the use of composting and anaerobic digestion technology on solid waste

TPI61031 QUALITY CONTROL 2 (2-0)

This course covers the basic concepts of total quality management, quality assurance, quality design using several different approaches (quality design process, customer-oriented design, quality function deployment and FMEA in process design, hygienic design concept and Taguchi method), as well as application of statistical principles in quality control issues and quality cost calculations in agroindustry.

Course Learning Outcomes (CLO):

1. Able to understand and apply the principles of total quality management, quality design and statistical principles in agro-industry quality control
2. Able to identify the application of quality assurance in local-based agro-industry
3. Able to analyze statistical data on agro-industry quality control processes

TPI62032 PROCESS UNIT **2 (2-0)**

This course provides an understanding of chemical processes in agroindustry including conversion and transformation of agricultural products, process design, process control and evaluation, scale multiplication, and integration of food and non-food based processes.

Course Learning Outcomes (CLO):

1. Able to explain chemical processes in agroindustry
2. Able to make process blueprints in agroindustry
3. Able to analyze process integration in agroindustry

TPI62033 OPTIMIZATION TECHNIQUES **2 (2-0)**

This course studies the concepts and scope of optimization techniques, optimization models and formulations, optimization without constraints for single- and multi-variables, non-linear programming, geometric programming, and the latest developments in optimization methods.

Course Learning Outcomes (CLO):

1. Able to analyze problems and optimization formulations in agro-industrial systems.
2. Able to solve optimization problems in the field of agro-industry for both single and multi-variable conditions without or with constraints
3. Able to solve optimization problems in agroindustry using Non-Linear method and Geometric method
4. Able to apply global optimization model in agroindustry for continuous and discrete variables

TPI62034 BIOPROCESS ENGINEERING **2 (2-0)**

This course contains the basic concepts of reaction rate, reaction kinetics, enzymatic kinetics, enzyme deactivation, cell culture yield, growth kinetics, substrate kinetics and cell death kinetics.

Course Learning Outcomes (CLO):

1. Able to analyze growth and death kinetics in bioprocess
2. Able to determine optimal conditions in the bioprocess.

TPI62035 BIOPROCESS ENGINEERING PRACTICUM **1 (0-1)**

This course contains basic calculations of reaction rates, reaction kinetics, enzymatic kinetics, enzyme deactivation, cell culture yield, growth kinetics, substrate kinetics and cell death kinetics.

Course Learning Outcomes (CLO):

1. Able to calculate growth and death kinetics in bioprocess
2. Able to calculate optimal conditions in bioprocess

TPI62036 MATERIAL HANDLING AND FACILITY LAYOUT PLANNING **2 (2-0)**

This course material contains studying the concepts of material handling and facility layout planning, product and process design, material flow design, facility requirements planning, analysis of relationships between facilities, material handling equipment, material handling costs, warehousing and supporting facilities, computer-assisted layout. and advanced modeling.

Course Learning Outcomes (CLO):

1. Able to explain basic concepts in facility design and material handling, factors and stages in product and process design
2. Able to analyze material flow, inter-facility relationships, and material handling costs
3. Able to identify facility needs, material handling equipment, warehousing and supporting facilities
4. Able to solve layout planning problems with the help of computers and modeling

TPI62037 MATERIAL HANDLING PRACTICE AND FACILITY LAYOUT PLANNING 1 (0-1)

This course contains the practice of facility layout planning which includes product design, making operation process maps, assembly maps, routing sheets, multiple product process charts, organizational structure and workforce planning, floor area calculations, maps of material handling costs, inflow-outflow maps, priority scales, activity relation diagrams, activity relationship charts, activity relationship diagrams, area allocation diagrams, and a view of the layout of facilities and the flow of materials in the production process.

Course Learning Outcomes (CLO):

1. Able to make product variations
2. Able to compile operation process map, assembly map, routing sheet, multiple product process chart, organizational structure and workforce planning, floor area calculation, material handling cost map, inflow-outflow map, and priority scale, activity relationship diagram and area allocation diagram
3. Able to improve from-to-cost material handling maps, inflow-outflow maps, priority scale
4. Able to build 2-dimensional facility layout drawings and material flow in the production process

TPI62038 PRODUCTION PLANNING AND INVENTORY CONTROL 2 (2-0)

This course contains production management related to problems in manufacturing systems both qualitatively and quantitatively which includes an introduction to production planning and inventory control, location planning, capacity, demand forecasting, aggregate planning, master production schedules, inventory control, material requirements planning, just in time, and manufacturing resource planning.

Course Learning Outcomes (CLO):

1. Able to explain the concept of production planning and inventory control
2. Able to analyze the determination of location, capacity, demand, production, material requirements and manufacturing resources to support a sustainable creative agro-industry system

TPI62039 PRACTICE OF PRODUCTION PLANNING AND INVENTORY CONTROL 1 (0-1)

This course contains the practice of site planning, capacity determination, demand forecasting, aggregate planning, inventory control, and material requirements planning

Course Learning Outcomes (CLO):

1. Students are able to make production plans starting with determining the location, determining production capacity, forecasting demand and making aggregate planning
2. Students are able to handle deterministic and probabilistic inventory control
3. Students are able to make material requirements planning

TPI62040 SYSTEM MODELING AND SIMULATION 3 (3-0)

This course contains the concepts of systems and models, analysis and design of models, simulation of dynamic models and discrete systems, as well as the latest developments of system modeling and simulation.

Course Learning Outcomes (CLO):

1. Able to study a sustainable agro-industry system using a systems approach
2. Able to identify system components
3. Able to illustrate agro-industrial system models
4. Able to analyze data-based agro-industry system problems
5. Able to demonstrate system simulation using computer applications

TPI62041 INFORMATION SYSTEMS AND TECHNOLOGY 2 (2-0)

This course contains the basic concepts of information systems and technology, development of information systems, and databases.

Course Learning Outcomes (CLO):

1. Able to express the concept of computerized information systems
2. Able to determine information system requirements in business processes
3. Able to create information system blueprints
4. Able to identify databases according to organizational needs using DBMS
5. Able to express the development of the use of systems and information technology in the field of agro-industry

TPI62042 INFORMATION SYSTEMS AND TECHNOLOGY PRACTICE 1 (0-1)

This course contains the practice of developing information systems and databases which include process modeling and DFD, ER-Model, SQL (DDl, DML, Query), normalization, interface design, and web-based database systems.

Course Learning Outcomes (CLO):

1. Students are able to build simple information systems
2. Students are able to use database management system (DBMS)

TPI61043 DECISION ANALYSIS **2 (2-0)**

This course studies the basic concepts and types of decision problems, decision-making processes, conditions in decision-making, decision trees, multiple events, concepts and values of information, utility theory, decision analysis models with multiple criteria and their solution models (Analytical Hierarchy Process). , Analytical Network Process, and Fuzzy Decision Making).

Course Learning Outcomes (CLO):

1. Able to choose decision-making methods based on conditions (certain and uncertain conditions, conditions without risk and with risk, conditions without information and with information).
2. Able to apply decision analysis models with multiple criteria (Multi-Criteria Decision Analysis) which includes Analytical Hierarchy Process, Analytical Network Process, and Fuzzy Decision Making on agro-industry decision making problems
3. Able to solve decision-making problems in agroindustry

TPI61044 FACTORY DESIGN **2 (2-0)**

This course is a synthesis of several TIP scientific courses with the aim of providing an understanding of the theory and principles of factory design, identifying and analyzing various aspects that determine the success of establishing an agro-industrial factory, and integrating technical calculations and designs in designing an environmentally sound factory.

Course Learning Outcomes (CLO):

1. Able to analyze capacity requirements, machinery, utilities, mass and energy balances in agro-based factory design
2. Able to make diagrams and maps of agro-based factory planning support processes
3. Able to identify agro-based factories that are environmentally friendly and responsive to the times

TPI61045 INDUSTRIAL PROJECT PLANNING **2 (2-0)**

This course contains concepts and understanding of industrial project planning, the importance of industrial planning studies and studies, studies of new product development within the scope of industrial planning, aspects of marketing analysis and planning, studies of technical and technological aspects (production capacity planning, production technology, demand planning machinery and equipment, layout, location determination, estimation strategy, HR and organizational management aspects, environmental aspects, legal aspects, financial analysis, knowledge of investment and capital budgeting, project feasibility analysis and project scheduling (WBS, OBS, Gantt Chart, and CPM-PERT).

Course Learning Outcomes (CLO):

1. Able to understand industrial project planning concepts and strategies for estimating in a project
2. Able to analyze aspects of industrial management in planning sustainable agro-industrial projects
3. Able to analyze the feasibility of establishing an agro-industrial project planning based on technical, environmental, legal, and financial basis

TPI61046 INDUSTRIAL STATISTICS 2 2 (2-0)

This course contains Normality and Homogeneity Tests, Completely Randomized Design (CRD) and Randomized Block Design (RAK), Factorial Design, Nested Design and Split Plot Design, Multiple Comparison, Orthogonal Comparison, Non-Parametric Statistics, Factor Analysis, Cluster Analysis basis, Multi Dimensional Scaling Analysis, Discriminant Analysis, Conjoint Analysis, and SEM-PLS-GSCA.

Course Learning Outcomes (CLO):

1. Able to solve problems in agro-industry using the right experimental design
2. Able to study the solution of parametric and nonparametric statistical problems
3. Able to analyze problems in agroindustry with multiple and orthogonal comparisons
4. Able to solve problems in agroindustry with appropriate multivariate analysis

TPI61047 AGROINDUSTRIAL PROJECTS 2 (0-2)

This course is a synthesis of TIP science to plan agro-industrial projects/businesses and design processing units. Activities carried out include market potential analysis, product concepts, production process design, raw material management, machine, equipment, and utility planning, facility location and layout, work safety and sanitation, organizational management and legal juridical, waste management and AMDAL, analysis financial feasibility, and project scheduling.

Course Learning Outcomes (CLO):

1. Able to analyze market potential, raw materials, legal juridical, and financial economic feasibility
2. Able to design product concepts to be developed as agro-industry business opportunities
3. Able to design agro-industrial processing units (production processes, machinery and equipment, and utilities)
4. Able to plan raw material management, location and layout of facilities, work safety and sanitation, organizational management, legal juridical, waste management and AMDAL
5. Able to manage industrial project scheduling Able to work in team to design business establishment proposal

TPI61048 SUPPLY CHAIN MANAGEMENT 2 (2-0)

This course contains the basic concepts of supply chain management, supply chain performance, supply chain drivers and metrics, distribution channel and network design, inventory management, procurement management, transportation and distribution management, supply chain performance measurement, information distortion and the bullwhip effect.

Course Learning Outcomes (CLO):

1. Able to explain supply chain concept, scope and strategy achievement in sustainable agroindustry
2. Able to analyze drivers and metrics, information distortion, and bullwhip effect in the supply chain
3. Able to plan distribution channels, networks, transportation, inventory and procurement in the supply chain
4. Able to demonstrate supply chain performance measurement

TPI61049 ANALYSIS AND EVALUATION OF AGROINDUSTRY PRODUCTS 1 (1-0)

This course discusses the principles of analysis and evaluation of agro-industrial products, methods of product analysis (physical, chemical, microbiological and organoleptic), product analysis methods (conventional and non-destructive), and evaluation of the quality of agro-industrial products.

Course Learning Outcomes (CLO):

1. Students are able to evaluate agro-industrial products physically, chemically, microbiologically, and organoleptically
2. Students are able to explain the importance of analysis and evaluation of agroindustry products in developing technoprenuership

TPI61050 AGROINDUSTRY PRODUCT ANALYSIS AND EVALUATION PRACTICE 1 (0-1)

The course teaches students to carry out practicum on the analysis of product analysis methods (physical, chemical, microbiological and organoleptic), product analysis methods (conventional and non-destructive), as well as evaluating the quality of agro-industrial products.

Course Learning Outcomes (CLO):

1. Students are able to evaluate agro-industrial products physically, chemically, microbiologically, and organoleptically

TPI61051 RISK MANAGEMENT 2 (2-0)

This course contains concepts and understanding of the basics of risk management, risk management standards, risk identification and classification, risk assessment, risk management, risk control techniques, insurance and risk transfer, and risk management in various aspects of the company such as: operations, human resources, marketing, supply chain, finance, and environmental damage.

Course Learning Outcomes (CLO):

1. Able to classify various risk events faced by agro-industry business units based on various risk criteria
2. Able to prioritize risk based on the results of risk assessment analysis
3. Able to choose appropriate alternative risk control techniques based on the incidence, impact, and causes of risk
4. Able to apply risk management in various aspects of agroindustry

TPI61052 INDUSTRIAL PSYCHOLOGY 2 (2-0)

This course contains the concept of human behavior in organizations, basic human attributes, perceptions, learning processes and learning theory models, organizational behavior modification, work motivation and motivational theories, group dynamics, communication, conflict management, work stress, strategies productivity

Course Learning Outcomes (CLO):

1. Able to analyze human behavior in work settings
2. Able to diagnose problems related to HR in the organization
3. Able to review the performance of the workforce in the organization

TPI61053 MAINTENANCE SYSTEM 2 (2-0)

This course contains the understanding of the maintenance system, its relationship to the production system, the performance of the agro-industrial production system, the factors that affect the performance of facilities, machines, production equipment, preparation of cost requirements and submission of maintenance budgets, reliability and maintainability, mathematical models of maintenance (preventive and corrective), preparation of preventive and corrective maintenance programs (inspection, repair, replacement, overhaul), measurement of maintenance program performance, and total productive maintenance (TPM).

Course Learning Outcomes (CLO):

1. Able to outline the cost requirements and maintenance budget for the production facility system
2. Able to analyze the problem of facility system reliability arranged in series, parallel, and hybrid.
3. Able to select preventive and corrective maintenance policy programs including inspection, repair, replacement for agro-industrial facilities
4. Able to solve production process facility effectiveness problems using OEE, OTE and OPE

TPI61054 DATA MINING 2 (2-0)

This course contains data, as well as data processing and extracting techniques including classification, association, and clustering to obtain data patterns and important information as a basis for decision making.

Course Learning Outcomes (CLO):

1. Able to analyze data
2. Able to dig data
3. Able to analyze data
4. Able to select data mining algorithms for solving individual and team problems

TPI61055 PROCESS ENGINEERING OF OILS, EMULSIONS AND OLEOCHEMICALS 2 (2-0)

This course discusses the characteristics of oil/emulsion/oleochemistry, extraction techniques and methods, oil purification and processing, emulsions and basic oleochemicals and derivatives, as well as the application of oil products, emulsions and basic oleochemicals (glycerol, methyl ester, fatty acid, fatty alcohol). and its derivatives in agro-industry.

Course Learning Outcomes (CLO):

1. Able to study the characteristics of oil, emulsion and oleochemical materials
2. Able to apply techniques and methods of extraction, purification and processing of oil, emulsion and oleochemical materials
3. Able to analyze secondary data from research on oil, emulsion and oleochemical process engineering

TPI61056 AGROINDUSTRY AUDIT 2 (2-0)

This course discusses institutions in the quality assurance system in Indonesia, audit guidelines and processes, types of agro-industrial audit systems (halal assurance systems, Good Manufacturing Practices/GMP audits, Hazard Analytical Critical Control Point/HACCP audits, product certification, Halal Assurance System/ HAS, Indonesia Sustainable Palm Oil/ISPO), as well as international quality assurance systems (ISO 9001, ISO 22000, British Retail Consortium, Roundtable Sustainable Palm Oil/RSPO)

Course Learning Outcomes (CLO):

1. Students are able to evaluate the quality assurance system and audit process in the agro-industry sector
2. Students are able to examine the latest issues and the latest standards in quality assurance systems

TPI61057 BIOREMEDIATION 2 (2-0)

This course includes a discussion of the basics of bioremediation, types of hazardous pollutants and their level of toxicity in the environment, microorganisms and enzymes that play a role in bioremediation and biotransformation processes in bioremediation, phytoremediation, in situ and ex situ bioremediation as well as the application of bioremediation to agro-industrial waste.

Course Learning Outcomes (CLO):

1. Able to characterize various kinds of harmful agro-industrial contaminants, types of microorganisms and transformations in bioremediation
2. Able to analyze bioremediation process approaches that can be used to solve environmental problems related to agroindustry
3. Able to analyze secondary data from research on the application of bioremediation to the environment and agro-industrial waste

TPI61058 ENZYME AND MICROBIAL TECHNOLOGY 2 (2-0)

This course discusses enzymes (classification, production, immobilization, utilization and safety), microbes (fermentation technology with fungi, yeasts and bacteria), and microbial cell production.

Course Learning Outcomes (CLO):

1. Able to examine important factors in enzymatic and/or microbial bioprocesses
2. Able to analyze bioprocesses involving enzymes and/or microbes

TPI62059 PACKAGING TECHNOLOGY 2 (2-0)

This course explains the basics and technology of packaging, types, classifications and characteristics of packaging materials, deviations from food quality and product safety (packaging resistance), labeling and regulation in packaging, packaging design, analysis and evaluation of packaged products, and their application in agro-industry. .

Course Learning Outcomes (CLO):

1. Able to identify the type, classification, characteristics and durability of packaging materials as the basis for the packaging process
2. Able to apply packaging techniques and designs
3. Able to make packaging blueprints according to principles, techniques as well as labeling and regulations in packaging

TPI62060 INDUSTRIAL MACHINERY AND INSTRUMENTATION 2 (2-0)

This course discusses the basic principles, performance, characteristics, and functional evaluation of machines and equipment and their supporting instrumentation in agro-industry.

Course Learning Outcomes (CLO):

1. Able to explain the basic principles and characteristics of agro-industrial machines and equipment
2. Able to analyze the performance of machine components and agro-industrial equipment
3. Able to identify types and types of machines and equipment in agro-industry

TPI62061 WORK SAFETY AND INDUSTRIAL ENVIRONMENT 2 (2-0)

This course covers concepts and principles in Occupational Health and Safety (K3), OHS management systems, sources of contaminants and prevention efforts, sanitation of production rooms and the environment, and improvement of production room zones.

Course Learning Outcomes (CLO):

1. Able to identify K3 and industrial sanitation in the workplace
2. Able to analyze work safety management system and sanitation implementation in industrial processes and products
3. Able to express ethics and principles of professionalism in K3 and industrial sanitation

TPI62062 SMART AGROINDUSTRY* 1 (1-0)

This course contains the introduction and development of the industrial revolution, smart manufacturing and factories, intelligent agro-industry, the Internet of Things (IoT) and its application to agro-industry.

Course Learning Outcomes (CLO):

1. Able to create IoT blueprints in the agro-industry field
2. Able to express the development of the use of IoT in the field of agro-industry

TPI62063 SPECIAL TOPIC OF AGROINDUSTRY 1 (1-0)

This course contains the latest issues in agro-industry which include the agro-industrial revolution 4.0, the latest developments in the field of smart and sustainable agro-industry, agro-industry opportunities and challenges (such as process engineering, engineering management, systems engineering, bio-industry and the environment).

Course Learning Outcomes (CLO):

1. Able to analyze the latest developments in smart and sustainable agroindustry
2. Able to examine the latest issues in smart and sustainable agroindustry

TPI62064 COST ACCOUNTING **2 (2-0)**

This course contains the basic concepts of accounting, cost behavior, cost calculation and accumulation, raw material costs, labor costs, factory overhead costs, activity accounting (activity based costing and activity based management), job order costing, just in time and backflushing. , cost calculations based on process, quality costs, production losses, by-products, and combined products.

Course Learning Outcomes (CLO):

1. Able to calculate the costs used in the production process including the cost of raw materials, labor, and factory overhead
2. Able to accumulate cost calculations based on activity (activity based costing), based on orders (job order costing), and based on process (process costing)
3. Able to apply cost calculation in sustainable creative agro-industry business

TPI62065 PRODUCTIVITY ANALYSIS **2 (2-0)**

This course is an elective course that studies the concept of productivity, various methods of measuring productivity at various levels, methods of measuring productivity, TPM, OMAX, MFPMM, Balanced Scorecard, Prism Performance Model, Integrated performance measurement system, Green productivity, and evaluation. and productivity improvement planning.

Course Learning Outcomes (CLO):

1. Able to analyze (C4) company level productivity
2. Able to apply (C3) productivity models to calculate productivity
3. Able to plan (C3) productivity improvement proposal

TPI62066 FURTHER OPERATIONS RESEARCH **2 (2-0)**

This course is related to the application of quantitative techniques for problem solving using mathematical models as analytical tools, which include Data Envelopment Analysis, Markov Chains, Queues, Game theory and Montecarlo.

Course Learning Outcomes (CLO):

1. Able to analyze the performance of a unit with the Data Envelopment Analysis method
2. Able to analyze queuing system problems
3. Able to apply Markov chain concept
4. Able to select the optimum strategy with the concept of Game Theory

TPI62067 INTELLIGENT SYSTEM **2 (2-0)**

This course provides an introduction and concept of expert systems, fuzzy logic, artificial neural networks and genetic algorithms. In learning, several examples of solving problems related to the methods used are given.

Course Learning Outcomes (CLO):

1. Able to build expert system
2. Able to apply fuzzy logic concepts
3. Able to make the basic architecture of a simple artificial neural network

4. Able to select the best individuals with the concept of genetic algorithm
5. Able to implement intelligent systems according to the latest issues

TPI62068 PROCESS ENGINEERING OF AROMATIC PRODUCTS AND BIOpharmaceuticals 2 (2-0)

This course discusses the sources and characteristics of raw materials, extraction techniques, functions, analysis and testing techniques, as well as product development techniques for aromatic materials and biopharmaceuticals.

Course Learning Outcomes (CLO):

1. Able to classify sources and characteristics of agro-industrial commodities as aromatic and biopharmaceutical materials
2. Able to identify extraction techniques, analysis, testing and product development of aromatic ingredients and biopharmaceuticals
3. Able to analyze secondary data from research on the constituent components and quality of aromatic and biopharmaceutical products

TPI62069 PROCESS ENGINEERING OF PLANTATION AND FORESTRY PRODUCTS 2 (2-0)

This course discusses process engineering based on plantation commodities (coffee, cocoa, tea, sugar cane, palm) and forestry (wood and non-timber), especially on the main process parameters that affect the quality and quantity of functional components.

Course Learning Outcomes (CLO):

1. Able to determine the critical point of the process that has the most influence on product quality
2. Able to analyze optimal process conditions to produce quality products

TPI62070 NET PRODUCTION 2 (2-0)

This course contains the concept of clean production in sustainable agroindustry, principles in clean production, clean production techniques and implementation, clean production management systems, clean production assessment, design for environment, producer responsibility and case studies of clean production in agroindustry.

Course Learning Outcomes (CLO):

1. Able to explain the concepts and principles of clean production to create a sustainable agro-industry
2. Able to apply clean production techniques, management systems and assessments
3. Able to demonstrate the concept of design for environment and producer responsibility to build a sustainable agro-industry
4. Able to classify problems to build a sustainable agro-industry

TPI62071 BIOENERGY 2 (2-0)

This course contains basic concepts of bioenergy, bioenergy policy, classification and pretreatment of biomass for bioenergy, bioenergy conversion technology (biological, chemical and thermal), biorefinery concepts, bioenergy system analysis, bioeconomic concepts, as well as the concept of developing a business based on bioenergy and biorefinery at scale. small and big.

Course Learning Outcomes (CLO):

1. Able to explain types of bioenergy and national and international bioenergy policies
2. Able to characterize types of raw materials/biomass, pre-treatment processes, and conversion technology for bioenergy production and biorefinery development
3. Able to explain the types and concepts of biorefinery and bioeconomics
4. Able to apply technical, economic and sustainability analysis procedures for business development based on bioenergy and biorefinery

TPI62072 FIELD STUDY **1 (0-1)**

This course contains an introduction to agro-industry, industrial visits, analysis of observations related to aspects of management, agro-industry systems and technology, and presentation of the results of field study visits.

Course Learning Outcomes (CLO):

1. Able to compare between theories about systems, management, and technology and their applications in agroindustry
2. Able to work together in analyzing the results of observations about the application of systems, management, and technology in agroindustry
3. Able to present the results of observations in writing and orally
4. Able to apply professional ethics during industrial visits

9.2. MASTER PROGRAM SYLLABUS (S2)
9.2.1. Faculty Content Course Syllabus for Master Program

TPF81001 THESIS PROPOSAL 2(2-0)
Students plan research for a thesis as outlined in a research proposal. The preparation of research proposals follows scientific principles in a systematic and structured manner. The proposal is a student research guide under the guidance, direction, input, and incentive suggestions of the supervisor. The proposal indicates a research direction that is worthy of obtaining a master's degree in accordance with KKNI level 8. After the proposal is approved by the supervisor, students must present it in front of the examiner who is determined by the head of the study program.

TPF80001 THESIS RESEARCH 4(4-0)
Is a data collection activity in accordance with the research plan that has been prepared in the research proposal. Research carried out in accordance with the IQF level 8 and must be worthy of publication in an international journal indexed by Scopus or Thomson Reuter, or a national journal with a minimum rank of Sinta 2, a national journal that is approved by the Rector of UB but must be with the approval of the Head of the Study Program, or proceedings indexed by Scopus.

TPF80002 THESIS SEMINAR 1(1-0)
Students communicate orally their research results in scientific meeting forums. The results seminar is conducted in semester 4 on a programmed basis with the aim that students must strive to carry out research in a timely manner. If the data obtained is still lacking, students can add material to the seminar as a result of the results of a literature review with topics related to their research. Research seminar activities can be in the form of seminars held internally, attended by supervisors and students who attend seminars. The result seminar can be replaced by student participation as an oral presenter in national or international seminars in semester 3 or 4.

TPF80003 THESIS PUBLICATION 2(2-0)
Students are required to publish scientific articles in indexed international journals according to UB Chancellor's Regulation No. 52 of 2018, or an accredited national journal with a minimum rank of Sinta 2, a national journal approved by the UB Chancellor, or published in a Scopus indexed proceedings. This scientific publication is prepared based on the results of thesis research. In the preparation of scientific publications and the selection of journals, students must consult with their supervisors. Proof of submitting manuscripts to scientific journals and proof that the manuscripts have been sent or are under review are one of the requirements for the thesis examination.

TPF80004 THESIS WRITING 3(3-0)
Students must be able to compile a thesis script properly and deserve to be tested in the final thesis examination from the research results obtained. To be able to take the final thesis examination, students are required to have at least 1 (one) scientific publication from the minimum thesis research results in the review process.

9.2.2. Syllabus of Master's Program in Agricultural Product Technology (THP)

TPP81001 RESEARCH METHODOLOGY AND STATISTICS ON AGRICULTURAL PRODUCTS TECHNOLOGY 3(3-0)

After following this course, students can formulate a proposed concept of research in the scope of Agricultural Product Technology. The topics covered include: ways of conducting scientific research, starting from identification, selection and formulation of problems, literature review, identification of research variables, observation and data collection, interpretation of data analysis results and procedures for writing scientific papers, including: research proposals, research reports (thesis), and scientific publications

TPP81006 ADVANCED FOOD BIOCHEMISTRY 2(2-0)

After following this course, students can explain accurately the metabolic processes of carbohydrates, proteins and lipids which include anabolism and catabolism. Various biochemical changes of carbohydrates, fats, proteins and pigments that occur in foodstuffs. Biochemical changes in poultry and meat. Enzymatic browning. The topics covered include: The concept of metabolism in living cell tissues, both biosynthetic processes and macromolecular catabolism (carbohydrates, proteins, fats), pigments, organic acids, volatile compounds. Various biochemical changes in food ingredients such as the role of pectate enzymes in tomatoes, changes in meat and poultry during processing, changes in pigments in commodities, and changes due to enzymatic browning.

TPP81005 ADVANCED FOOD MICROBIOLOGY 2 (2-0)

This course explains taxonomy and the role of microbes in food processing, identification of advanced microbes (chemical methods, physics, immunology, Elisa, finger printing, bioassays, sequencing (molecular), kinetics of microbial inactivation in non-thermal food processing (HPP, PEF, ultrasound, ohmic heating, radiation, ultra violet, microwaves, oscillating magnetic), extremophile microbes and their use in industry.

TPP81003 NUTRITIONAL VALUE EVALUATION TECHNIQUES 2(2-0)

Evaluation of changes in nutritional and non-nutritive compounds such as dietary fiber, pigments and various bioactive components due to processing and storage. Factors that influence the utilization and its effect on health by using a bioassay evaluation technique. Nutrification and development of interventional foods.

TPP81004 ADVANCED FOOD PROCESSING TECHNOLOGY 3(3-0)

This course will explain the latest food processing and preservation technology and its principles. Materials to be discussed include technologies involving heat such as thermal and aseptic processing, ohmic heating, microwave and radio frequency processing; non-thermal technologies such as the use of high pressure, irradiation, pulsed electric fields, pulsed UV light, magnetic fields, ultrasound and dense phase CO2.

TPP81002 ADVANCED FOOD ANALYSIS 3(3-0)
After taking this course, students can operate laboratory analysis equipment both in industry and in educational and research institutions. The topics covered include: The structure of food components, their properties when subjected to processing, the principles of analytical methods and the working principles of analysis, in addition to the chemical reactions involved. Several types of analytical equipment are commonly used in laboratories.

TPP82001 SEMINAR SELECTED TOPIC FIELD THP 2(2-0)
Students make review papers for selected topics in the field of Agricultural Product Technology that are related to the thesis topic to be worked on. Papers are prepared based on analysis or synthesis with reference to related studies that have been carried out and reported by other researchers in published scientific journals. Also discussed are scientific presentation techniques and review paper writing techniques.

TPP82019 GENETIC ENGINEERING 3(3-0)
Genetic code, genetic elements that control gene expression, cloning strategy, analysis of cloned genes, analysis of gene structure and function, DNA recombination technology and its applications (food biotechnology, aquatic, health, agriculture, bioenergy and bioremediation), trends and current issues related to engineering genetics, ethics and biotechnology (bioethics).

TPP8202 BIOACTIVE NATURAL MATERIALS 2(2-0)
Students are introduced to the source of bioactive components and the understanding of toxicology. The basic principle of extracting bioactive ingredients from natural ingredients. Screening test for bioactive efficacy (bioactive as an antioxidant, IC 50, antibacterial, anti-inflammatory, anticancer). Effects of metabolites in molecular and cellular tissue toxicology. Toxicity test on organ cells (liver, kidney and lung). The concept of measuring bioactive toxicity (LD 50, ED 50, TI, ADI, TDI, NOEAL and LOEAL). Mechanism of Biotransformation of Xenobiotics. In Vitro Toxicity and kinetics assay of bioatif physiology in body/rat. Techniques for determining the positive and negative impacts of bioactives are derived from herbs. The basic principle of acute, sub-chronic and chronic bioactive toxicity testing methods in experimental animals. Dosage determination technique in experimental animals in vivo. In vivo herbal/fauna bioactive testing. Bioactive as Immunomodulator (stimulator and suppressor) in animal and human cells

TPP82020 ENZYMOLOGY 3(3-0)
Enzyme properties; enzyme classification; isolation enzyme isolation; enzyme structure, enzyme kinetics; the specificity of the enzyme and its mechanism; enzyme inhibition and activation; enzyme biosynthesis; enzyme purification and characterization; enzyme immobilization; the role of enzymes in biotechnology; industrial application of enzymes

TPP82004 FOOD COMPONENT CHEMICAL 2(2-0)
This course includes a discussion of the chemical and physical properties of specific food components, their physico-chemical characteristics, their roles and functional properties,

their contribution to the formation of the characteristics of food components and products, including types of protein, types of sugar, types of starch. from various sources of starch, other types of carbohydrates (cellulose, pectin, polysaccharides from seaweed, microbial gum, seed gum, guar gum, etc.), types of lipids, pigments, and vitamins. The material also covers the specific reactions that occur in the food components such as the Maillard reaction mechanism, starch gelatinization in relation to amylographic properties, the formation of emulsion systems and the role of food components in the emulsion system, reactions in lipids, reactions reactions to proteins, reactions to fatty acids, and others. The discussion also includes the formation of functional properties of food components such as foaming, gelation, emulsification, and others.

TPP82005 PHYSIOLOGY OF AGRICULTURAL MATERIALS 2(2-0)
After following this course, students can analyze, synthesize and evaluate physiological processes and the application of technology to agricultural products. The ability of analysis, synthesis and evaluation can be achieved through the ability to design research methods related to physiological processes and the application of post-harvest technology for agricultural products, so that they have a longer shelf life, both for fresh and semi-finished commodities.

TPP82028 PRACTICE OF NUTRITION AND BIOACTIVE COMPOUNDS 3(1-2)
Experiments on evaluating the efficacy of nutritional components and bioactive compounds which include: extraction and isolation of bioactive compounds, identification and testing both qualitatively and quantitatively, then continued with testing the efficacy of bioactive compounds both in vivo using experimental animals and in vitro using cell culture.

TPP82027 DEVELOPMENT OF FUNCTIONAL FOOD AND SUPPLEMENTS 2(2-0)
This course discusses the concepts, health claims, regulations, potentials and prospects of functional foods and supplements. The role of nutrients, dietary fiber, bioactive compounds as antioxidants, anti-infectives and immunomodulators for health and degenerative diseases. Development of functional food and supplements sourced from vegetable, animal and marine products and prospects for functional food and supplements based on traditional food and local food.

TPP82026 NUTRIGENOMICS 2(2-0)
Nutrigenomics is the application of genomics to the study of nutrition and health. Nutrients can function as dietary signals that will bind to the right receptors which can then affect DNA transcription and produce biomarkers (markers) that can be measured. This course involves knowledge of molecular nutrition and genomic techniques used for analysis. The application of nutrigenomics relates to the prevention or intervention of disease by providing or limiting the right nutrient components of food to maintain homeostasis in the body from the biochemical level to the organ system. We also studied the effect of interactions between nutrients and genes on metabolic pathways that regulate disease pathways.

TPP82025 NUTRITION AND IMUNOLOGY 2(2-0)

Discusses the basic principles of immunology, the body's system of protection and defense against disease (infection) and foreign substances caused by interactions with the environment. The role of food (nutrients and bioactive compounds) in increasing the body's immunity (as an immunomodulator) is also discussed. Monoclonal antibody production techniques through eukaryotic cell culture and immunochemical techniques and their application in the food sector.

TPP82024 NUTRITION AND SPECIAL DIET 2(2-0)

This course covers the relationship between eating habits/diet and health and disease incidence. Diet for disease prevention and post-illness recovery. Various types of diets, community dietetics for malnutrition, diets for degenerative diseases (obesity, diabetes mellitus, hypertension, heart and hypercholesterolemia, gout, digestive disorders, cancer, osteoporosis and osteoarthritis). Food combining, vegetarian diet, detox diet and so on

TPP82023 ADVANCED NUTRITIONAL PHYSIOLOGY AND METABOLISM 2(2-0)

This course contains the utilization of nutrients (especially macronutrients: carbohydrates, fats and proteins) by the body. The flow of the utilization of nutrients through the process of intake, digestion, absorption, transport and uptake and metabolism in cells to produce energy or maintenance functions by involving cooperation between organs and hormones (neuroendocrine). Regulation (regulation) of energy metabolism is also explained more deeply at the molecular level as well as in various physiological conditions (fed and starved) and changes in macronutrient composition. While the regulation of protein metabolism is indicated by protein turnover in the body related to protein function for maintenance and protein deposition.

TPP82022 EPIDEMIOLOGY AND NUTRITIONAL STATUS 2(2-0)

This course discusses life cycle nutrition, nutritional epidemiology design, assessment of nutritional status, consumption and diet patterns, and the relationship between nutrition and disease.

TPP82006 ADVANCED FOOD PROCESSING ENGINEERING 2(2-0)

After following this course, students will be able to re-explain the theoretical concepts regarding the basic functions of engineering and be able to apply them in food processing. The topics covered include: mass and energy balance, thermal processes, steady and unsteady heating concepts, rheology, cooling, freezing and Supercritical CO2 Extraction in food processing. The application of basic engineering can be done in terms of: determining production capacity based on mass balance, energy efficiency engineering, determining the adequacy of pasteurization and sterilization, fluid transportation, and estimating the freezing rate of food products.

TPP82007 FOOD SAFETY MANAGEMENT 2(2-0)
Discusses the development of food safety management systems, including food safety in terms of health and food safety in religious (halal) aspects, through food safety risk management and evaluation of food safety systems

TPP82008 INTEGRATED QUALITY CONTROL 2(2-0)
This course discusses tools in quality control (including statistical quality control/SQC, Six Sigma, FMEA, Taguchi Technique, etc.), their application in the food industry based on the philosophy of continuous improvement. Also discussed are ways to redefine processes through techniques such as Concurrent engineering, QFD and business process reengineering. Furthermore, process analysis which includes quality costs as well as process evaluation and improvement are also discussed in this course.

TPP82009 PRODUCT DEVELOPMENT AND INNOVATION MANAGEMENT 2(2-0)
This course discusses the management of ideas, the management of intellectual property rights in relation to product development in the food industry. Product development strategies are also discussed based on company conditions, product life cycles, consumer behavior, marketing mix, engineering and production management aspects, as well as decision-making techniques in the food industry. To support the product development process, the measurement of consumer attitudes and behavior as well as the diffusion of innovation in the food industry is also discussed.

TPP82010 ESTIMATION OF STORAGE LIFE AND STABILITY FOOD PRODUCTS 2(2-0)
This course describes methods and mechanisms for estimating product shelf life using complex assessments (integrated factors). This course consists of the process of evaluating shelf life, accelerated storage techniques, the effect of humidity, temperature, microbiology, sensory and its use in predicting shelf life, packaging effects on estimating shelf life and accelerated stability testing of food products.

TPP82011 INTEGRATED SENSORY SCIENCE AND CONSUMER STUDY 2(2-0)
This course describes the physical-chemical properties and chemical processes that are important for changes in sensory and textural properties during food processing and/or storage along with the principles and multivariate statistical methods used to relate the physico-chemical properties of foods to sensory perception and consumer preferences.

TPP82012 WASTE MANAGEMENT 2(2-0)
This course explains the waste management system based on the law regarding waste management itself. This course also consists of insights from agencies that regulate waste management such as BLH and EPA, AMDAL, UKL-UPL, RKL-RPL, waste management efficiency, as well as the latest technology for waste treatment. This course will focus more on case studies on the management of Agroindustrial waste.

TPP82018 CELL AND MOLECULAR BIOLOGY 2(2-0)
This course discusses cells, cell cycle, cell membrane structure, membrane transport, endocytosis-exocytosis, biological molecules: nucleic acids and proteins, protein processing, DNA organization, genetic code, signal transduction, genome replication, rearangement and exchange of genetic information, homologous recombination, site specific, and transposition, application of molecular biology in plants/animals, application of molecular biology in prokaryotes.

TPP82017 ENVIRONMENTAL BIOTECHNOLOGY 2(2-0)
This course explains the scope of environmental biotechnology, international conventions related to the environment, the influence of environmental quality on food security, microbial ecology (microbial interaction), biogeochemical cycle, biofouling, bioremediation technology, phytoremediation, clean production, microorganisms from extreme environments. , microbes that degrade organic pollutants, microbial responses to detergent pollutants, decrease phosphate compounds in the aquatic environment

TPP82016 INDUSTRIAL BIOTECHNOLOGY MICROBIOLOGY 2(2-0)
Lecture on Microbiology and Industrial Biotechnology contains the use of microorganisms or enzymes for the production of goods and services in industry. This course discusses the notion of industrial microbiology/biotechnology, bioeconomics, challenges and prospects. Cell factor, fermentation biochemistry, metabolites (primary and secondary). Biosynthesis and production processes of food, feed, energy, bulk and chemical compounds, biopolymers. This lecture also discusses the latest research related to product development in MBI. Management and economic aspects of MBI are also discussed at the end of the course.

TPP82015 FOOD SAFETY MICROBIOLOGY 2(2-0)
This course discusses the microbiological aspects of food safety. The topics covered include: types of foodborne pathogenic microorganisms and their toxins, characteristics of the disease caused, disease diagnosis methods, types of food carriers of pathogenic microorganisms, frequency of occurrence of food poisoning, pathogenesis mechanism, target population, analytical methods for detection and identification of foodborne pathogenic microorganisms and their toxins. , and examples of food poisoning extraordinary events

TPP82014 ADVANCED FERMENTED FOOD 2(2-0)
The Advanced Fermented Food Lecture explains the process and technique of producing fermented food and its health benefits. The health benefits of fermented foods from various countries were discussed such as the specific benefits of fermented milk, soy products, kefir, yogurt, and cheese, natto and miso, other fermented vegetables such as kimchi and sauerkraut. This lecture also explains the bioactivity and bioavailability of microorganisms and discusses the latest technology in fermented food production to increase its functional value. The final section also discusses the current and future selected topics of fermented food products.

TPP82013 ADVANCED BIOPROCESS TECHNOLOGY 2(2-0)

Students know the scope of Bioprocess Technology and the important role of Bioprocess Technology in industry. Know and understand strain improvement techniques (mutations, recombinant DNA technology), metabolic engineering, fermentation systems, bioreactors, optimization strategies in fermentation, modeling and simulation in bioprocesses, cascade control systems, mammalian cell cultures.

TPP82003 ADVANCED ENZYME TECHNOLOGY 2(2-0)
This course discusses the characteristics of enzymes, enzyme classification, enzyme structure, enzyme isolation, enzyme kinetics, specificity and mechanism of enzyme activity, enzyme biosynthesis, enzyme activation and inhibition, enzyme immobilization, enzyme purification and characterization, the role of enzymes in biotechnology, enzyme applications in the field of industry.

TPP82021 FOOD BIOTECHNOLOGY 3(3-0)
This course discusses genetic engineering techniques (Recombinant DNA Technology, Cloning Techniques) Application of food biotechnology to produce new food products including food ingredients, dairy products, meat products, flavors, oils & fats, sweeteners, vegetable products. Detection methods of recombinants in food products, the impact of food biotechnology on the nutritional quality of foodstuffs, the impact of food biotechnology on the environment, the safety of genetically modified food products. Consumer perceptions of genetically modified food (GM), the industry perspective as a producer of GM foods, bioethics.

9.2.3. Syllabus for Masters in Agricultural Engineering (TEP) Courses

TPE81001 RESEARCH METHODOLOGY 3(3-0)
This course provides an understanding of the philosophy of science and learns ways to conduct scientific research, ranging from identification, selection and formulation of problems, literature review, identification of research variables, observation and data collection, interpretation of data analysis results and procedures for writing scientific papers, including : research proposals, research reports (thesis) and scientific publications.

TPE81002 AGRICULTURAL ENGINEERING MANAGEMENT AND BIOSSYSTEM 3(3-0)
This course has the subjectwhich includes the definition, scope and scope of macro and micro agricultural and biosystem techniques. Bioprocess and bioproduct technology. Properties of composite biomaterials, ceramics, metals, and polymers. Biorefinery includes bioenergy.

TPE81005 ADVANCED MODELING AND OPTIMIZATION TECHNIQUES 3(3-0)
This course explains about dynamic system modeling with ordinary differential equations. Introduction to the positional variable method of systems analysis. Analysis of mechanical, electrical and fluid power systems. Solving differential equations analytically and numerically. Finite different & Finite element. Introduction to classical

control theory. Feedback and stability applied in the S domain. Frequency response as an experimental and analytical apparatus. Use MATLAB for modeling. Group and individual projects are required for graduation credit.

TPE81006 DESIGN ENGINEERING 3(3-0)

This course explains the aims and objectives of designing an experiment. Experimental design principles. Resources for tools in experiments and techniques for dealing with them. Treatment plan. Problems in administering the test response. Model analysis for some standard designs. Convariance analysis. The assumptions that underlie a model of analysis of variance and its conformity tests. Modeling diversity through probability rules and distribution functions. Estimation of hypothesis test parameters. Data collection methods, surveys and problems. testing the average value, testing proportions, testing variance, goodness of fit, independence and homogeneity. Linear regression; simple regression model, use, correlation, coefficient of determination, and hypothesis testing in linear regression. Non parametric statistics ; series test, sign test, rank-sum test, Kruskal-Wallis test, Spearman Correlation Relationship test, and Kolmogorof Smirnov test. Non-parametric Hypothesis Testing. Analysis of variance for comparison of mean values (ANOVA). Contingency table analysis and factorial design. Engineering problem solving. Computer applications and programming structures, odds and statistics. Efforts to apply statistical expertise in biosystem problems.

TPE81004 TECHNOECONOMICS 3(3-0)

Concept analysis model and application of technoeconomics for planning, feasibility assessment and implementation in the field of agricultural engineering and agro-industry. The definition of technoeconomics includes technology and management of raw material procurement, determination of process technology and capacity, operational management and economic and financial feasibility analysis.

TPE82019 AGRO BIOSSYSTEM ENGINE DESIGN 3(3-0)

This course studies the operating characteristics and design aspects related to process equipment and food and fiber production. Evaluation of mechanization equipment for the production and process of agro-bio-systems. Quantitative and qualitative performance tests, analyze results and develop final design specifications. The relationship between process characteristics and material characteristics. Process parameter setting on material.Big task: Project design individual agro-bio-system machine. Prerequisite : TPE 6105

TPE82007 PHYSICAL PROPERTIES OF AGRICULTURAL MATERIALS AND PRODUCTS 2(2-0)

This course contains sources, varieties, structures and physiology of plant and animal products. Application of momentum, heat transfer and mass in the food processing process; refrigeration, freezing and controlled atmosphere storage. Analysis of selected operating units used in food processing. Extrusion, dehydration, heat treatment.

TPE82008 MECHATRONICS AGRICULTURAL EQUIPMENT AND MACHINERY 4(4-0)

This course consists of several subjects which include the principles of modeling, interfaces, laplace and transfer functions. Introduction to the use of electronics in the field of agroindustry. Introduction to number systems and logic circuits. Introduction to components and how sensors and actuators work. Principles of signal processing and conditioning. Convert digital data to analog and vice versa. Commonly used digital control design methods. Introduction to non-linear effects and their compensation in mechatronic systems. Introduction to the components and workings of PLC (programmable logic controller). Process control with PLC.

TPE82009 ENERGY CONVERSION ENGINEERING 2(2-0)

This course provides an understanding of energy and energy sources. Types and classification of energy. Laws and equations in energy conversion. Energy profile; sources, reserves and energy needs of the world and Indonesia. Basic concept of energy conversion system. Resources and classification of energy conversion machines. Fuel in energy conversion. Renewable energy. Energy is not renewable. Classification of combustion engines. Calculation of internal combustion engine performance. Steam power plant. Fluid machines. Classification of refrigeration engines. The thermodynamic cycle of the refrigeration engine. Energy conservation techniques in vehicles, industry and buildings.

TPE82010 INSTRUMENTATION AND TESTING 2(2-0)

This course provides an overview of modern instrumentation techniques and digital electronic components and subsystems to integrate them into digital data acquisition and control systems for biosystems. Emphasis on the use of laboratory equipment. Topics include instrument characteristics, signal conditioning, transducer theory, transducer theory and application, PLC and digital data acquisition and control.

TPE82011 ADVANCED ENVIRONMENTAL CONSERVATION ENGINEERING 2(2-0)

This course explains the definition of conservation and the need for technological efforts, techniques for conserving surface water, groundwater, air, coral reefs, mangroves, and beaches. Application of conservation in rivers, reservoirs, groundwater, soil, forests, estuaries, coral reefs, and mangrove forests. Environmental processes or behavior. Integrated conservation insights.

TPE82021 BIOPRODUCT PROCESS TECHNOLOGY 3(3-0)

This course provides an understanding of advanced bioprocessing techniques by emphasizing the modeling and processing aspects of eukaryotic systems and combining them with biological products. Modules cover heat treatment, fluid extraction under supercritical conditions, and advanced biological material thermodynamics, chromatography, and spectroscopy.

TPE82020 ALTERNATIVE RENEWABLE ENERGY 3(3-0)

This course explains the search for renewable energy sources, which involves an in-depth study of solar, wind and alternative biological energy. It also involves principles, technologies and performance evaluation for components of these technologies and an introduction to hydropower, geothermal and other energies: energy conservation; co-generation; electricity production using wasted heat. Financing, economics and other issues related to alternative energy sources.

TPE82001 HYDROLOGY ENGINEERING 3(3-0)
This course contains the hydrological cycle, infiltration, interception, evaporation, surface water flow, routing, frequency analysis, groundwater flow including aquifers and well pumping tests. Hydrological measurements, including measurements of rainfall, measurements of open and closed channel discharge, measurements of infiltration/percolation and evaporation.

TPE8202 SPATIAL TECHNOLOGY 3(3-0)
This course contains the concepts of databases and geographic information systems; Spatial Analysis and Modeling; Digital Elevation Model (DEM), Model; Simulation and Integration with Spatial Information Systems; GPS and data acquisition; Hydrological modeling for watershed management of water resources; GIS and Natural Resources Management.

TPE82003 NATURAL RESOURCE MANAGEMENT ENGINEERING 3(3-0)
This course explains about erosion, water damage, Agroindustrial waste; assessment of land and watershed criticality, and environmental pollution; water and soil conservation techniques, and Agroindustrial waste treatment; UKL-UPL, AMDAL, KLHS and environmental policies.

TPE82013 WASTE MANAGEMENT AND TREATMENT 2(2-0)
This course explains about pollution due to agricultural production processes. Mechanism of formation, deployment, and handling techniques. The hierarchy of pollution reduction and waste management. Techniques for handling waste water and sludge from agricultural production processes and processing agricultural products. Techniques for dealing with air pollution from the agroindustrial. Management and techniques for handling solid agricultural waste. Utilization of agricultural waste and processing technology. Issues and concepts related to the design of recycling and treatment systems for domestic and small-scale commercial waste. Huge task: The project designs an individual sewage treatment unit.

TPE82012 WATER SUPPLY AND ADVANCED IRRIGATION 2(2-0)
This course contains an inventory and identification of potential water resources, both rainwater, surface water, ground water and air and soil moisture; Planning and design Irrigation and drainage of agricultural land, including methods of determining water requirements for crops, irrigation efficiency, and water balance; management of water resources in watersheds and rural areas, including the application of optimization methods in water management.

TPE82015 AGRICULTURAL MECHANIZATION PROJECT MANAGEMENT 3(3-0)

Discusses the aspects of agricultural mechanization project management which includes the context and process of the mechanization project, integration management, scheduling, cost management, quality management, risk management and procurement management, project manpower management and communication.

TPE82004 DECISION MAKING TECHNIQUES 3(3-0)
This course discusses managers and decision making; managerial decision making and information systems; decision support framework; decision support concept; company information system decision support system; knowledge management system; expert system

TPE82016 SUSTAINABLE AGRICULTURAL ENGINEERING 2(2-0)
This course discusses integrated agricultural engineering with the concept of Low External Input for Sustainable Agriculture (LEISA), organic fertilizers versus synthetic fertilizers, organic compounds that are useful for HEIA (Hight External Input Agricultural) Organic agriculture, Integration of fisheries-animal husbandry and agricultural cultivation, Indicators sustainable agriculture, the benefits of sustainable agriculture, cultivation technology to support sustainable agriculture such as organic hydroponic technology in urban farming (urban farming), waste utilization technology for agricultural cultivation with bioremediation and phytoremediation to support environmentally friendly sustainable agriculture

TPE82005 AGRICULTURAL MECHANIZATION SYSTEM ANALYSIS 3(3-0)
Lectures cover concepts in agricultural mechanization systems. Identify and evaluate problems and barriers to agricultural mechanization. agricultural mechanization needs. improvements or suggestions for improvement.

TPE82015 MANAGEMENT OF AGRICULTURAL POWER AND MACHINERY 3(3-0)
Topics include machine performance, machine cost, cost of ownership, operating cost, labor cost, cost on time, total machine cost. Factors Affecting the demand for Machinery, Number of Plants/ha, Labor Supply, Risk Management, date of planting and Harvesting, Field capacity, Applying Suitable size and manpower, estimating the number of days Required

TPE82017 AGRICULTURAL ENGINEERING INFORMATION SYSTEM 3(3-0)
In this course, you will learn about data, information concepts and agricultural engineering information systems, design and development of information systems in agricultural engineering.

TPE82018 AGRICULTURAL PRODUCT MARKETING MANAGEMENT 3(3-0)
Discusses sales planning, market segmentation, pricing, product design and product packaging, distribution channels, and sales promotion.

TPE82014 ADVANCED DRAINAGE 2(2-0)
This course consists of several subjects covering terminology, components and urgency in sewerage and drainage, sewerage and rainwater distribution systems: separate, mixed,

advantages and disadvantages of each distribution system. Classification of waste water due to both human and natural activities; quantity of dirty water from domestic, commercial, industrial activities, both organic and hydraulic loads; the rational method of the quantity of rainwater, both intensity, return period and application of its distribution; planning of waste water collection and distribution system, energy concept in channel, mixed and separated system, layout pattern system, type and type of conduit as well as technical specifications; Operation and maintenance of sewers and their equipment and institutional management of sewerage systems.

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9.2.4. Course Syllabus for Masters in Agroindustrial Technology (TIP)

TPI81001 AGROINDUSTRIAL MATERIALS SCIENCE 2(2-0)
This course discusses agricultural compounds (primary & secondary metabolites), classification of Agricultural Product Materials (BHP) based on (commodity types and benefits), BHP composition, production, productivity and quality of BHP from various aspects of composition and nutrition. In addition, it also discusses the BHP industrial tree and the interpretation of the potential for the development of processed products.

TPI81002 RESEARCH METHODOLOGY AND WRITING TECHNIQUES 2(2-0)
This course covers the philosophy of research, stages of research covering the background and formulation of the problem, objectives, and scope, various techniques and approaches for determining research methods, analysis and interpretation of results. Developing research and science and technology, theory development, EYD-Indonesia science, concept of objectives, hypothetical schemes and research benefits, thesis preparation strategies, problems used for thesis research, postgraduate research, scientific methods, along with examples of good research and Correct.

TPI81003 ANALYSIS MODELING SYSTEM 2(2-0)
Lectures cover introductory material, system problem strategy, simulation model, definition, characteristics, principles, model clarification system, inventory modeling, inventory model with auxiliary, buffered inventory, heating reactor modeling, non-linear modeling with equation solution, introduction to dynamics systems, system dynamics, modeling presentation

TPI81004 AGROINDUSTRIAL PRODUCTION SYSTEM 2(2-0) This course discusses the concept and scope of production systems, forecasting (forecasting), line balance, Operations Scheduling/Manufacturing Execution Systems, operating technology in Agroindustrial systems.

TPI82001 TECHNO ECONOMIC AGROINDUSTRY 2(2-0)
Lectures cover material understanding and aspects of technoeconomics, applied technoeconomic analysis, technology, change and innovation, agro-industry technoeconomic analysis, technology and economic growth, implementation of technoeconomics, study of technoeconomic analysis. Students are able to develop

knowledge of the concept of analysis models and technoeconomic applications for planning, assessing feasibility and implementing agro-industry. The definition of technoeconomics includes technology and management of raw material procurement, determination of process technology and capacity, operational management and analysis of economic and financial feasibility.

TPI8202 BIOTRANSFORMATION ENGINEERING 2(2-0)
Lectures cover introductory materials, basics of molecular biology, basic gene transformation, DNA manipulative enzymes, biotransformation, oxidoreductase, hydrolase, enzyme technology, biocatalist design, biotransformation in the food industry, vanillin biotransformation, understanding, scope and development of industrial biotransformation/biocatalysis. . Preparation of microbes for the biotransformation process (isolation, selection and preservation). Methods of cultivation and harvesting of microbial cells. Classification of biotransformation reactions and their products; improving the performance of the biotransformation process (enhancing microbial enzyme biocatalysis: activity, selectivity, stability; process improvement: substrate–yield conversion, product concentration, process productivity); Introduction of plant cell biotransformation products; selection of bioreactors for biotransformation.

TPI82003 SUPPLY CHAIN STRATEGY AND MANAGEMENT AGRO INDUSTRY 2(2-0)
This course discusses the concept of sustainable supply chains, decision support models, multiple criteria decision making, sustainable indicators, performance measurement models, risk assessment models and sustainable strategies in the Agroindustry system.

TPI81005 AGROINDUSTRY QUALITY SYSTEMS AND MANAGEMENT 2(2-0)
This course discusses the concept of quality, and quality attributes, quality systems at global and national levels, application of Total Quality Management (TQM), Hazard Analysis Critical Control Point (HACCP), introduction to Halal Assurance System (HAS), ISO 9000 Series, ISO 22000 , ISO 14000, Kaizen, Six Sigma, plus the latest topics, such as Certification of Geographical Indications, and quality standards of agro-industrial products in international trade and Indonesia.

TPI81006 AGROINDUSTRY INNOVATION AND STANDARDIZATION 2(2-0)
This course discusses the relationship between innovation research and standards, types of agro-industry supporting innovations, central and regional innovation institutions, global and national standardization regulations, standardization in the agro-industry, several forms of product standards, quality systems, and services related to agro-industry, as well as international trade standardization. .

TPI81007 HUMAN RESOURCES DEVELOPMENT 2(2-0)
This course describes planning models and ways to create HR planning programs such as planning for recruitment and selection, planning for human resources development, planning for compensation and benefits. In addition, this course also describes models of HR development and training, career development, learning organization, knowledge management, to be applied in organizations and business.

TPI81008 DECISION SUPPORT SYSTEM 2(2-0)
This course aims to provide students with knowledge about decision support systems for managers and information systems capable of supporting agro-industry operations. The disciplines of this course are a combination of several different disciplines: mathematical models, database systems, expert systems, operations research, management science, graphic engineering, and object-oriented system development techniques.

TPI81009 AGROINDUSTRIAL BIOTECHNOLOGY 2(2-0)
This course covers the history and kinds of biotechnology products, primary metabolites, enzymes, process and strain comparison, kinetic engineering, fermentation technology, modern biotechnology (recombinant DNA), protein synthesis, gene cloning, gene expression, bioinformatics, functional gene analysis, recombinant protein production.

TPI81010 PROCESS ENGINEERING AND METABOLITE PRODUCTS SECONDARY 2(0-2)
Lectures cover the definition of primary and secondary metabolism in plants (biopharmaceuticals) and microbes, secondary metabolic pathways, classification of secondary metabolite products, commercial products and under development. Characteristics of various secondary metabolites (isoprene-terpenes, phenolics, alkaloids, complex glycosides, plant amines, sapogenins, etc.). Secondary metabolite product extraction technology, production tools and machinery and their respective advantages and development. About the concept of secondary metabolite product development.

TPI81011 WASTE MANAGEMENT AND TECHNOLOGY AGRO INDUSTRY 2(0-2)
This course covers the scope of waste management and the industrial environment, issues of waste and environmental issues as well as engineering and processing technology for liquid, solid and gas waste, covering aspects of pre-treatment, process, post-treatment, value-added products from waste, systems environmental management, techno-economic analysis and life cycle analysis mainly on agro-industry.

TPI82004 BIOENERGY AND BIOREFINERY 2(0-2)
This course contains the concept of bioenergy (production of bioethanol and biogas) and biorefinery related to the potential utilization of agricultural waste containing lignocellulosic or non-lignocellulosic (such as algae, green biorefinery) as well as potential products of physical, chemical, biological degradation in producing bioethanol or other materials. chemical value of the function and role of the development of bioenergy and biorefinery products.

TPI82005 BIOREMEDIATION 2(0-2)
Lecture materials include types and methods of bioremediation, microbial bioremediation, phytoremediation, soil bioremediation, air bioremediation, water bioremediation, bioremediation molecular techniques, biodegradation of organic matter,

metal biotransformation, in-situ and ex-situ bioremediation, and bioremediation applications.

TPI82006 PALMA PROCESS ENGINEERING 2(0-2)
This course includes: classification of palms, primary and secondary metabolites of palms, primary and secondary product processing technology, quality standards of palm products, production tools and machinery, palm production systems.

TPI82007 FATTY AND OLEOCHEMICAL PROCESS ENGINEERING 2(0-2)
This course discusses the structure, composition and physico-chemical properties of fats, products made from fats, extraction and purification techniques of fats. This course also discusses the principle of changing the character of fat molecules during processing, the principle of the derivatization reaction of fat molecules to produce oleochemical products (base and derivatives), techniques for chemical transformation of fats that are oriented towards the development of their derivative products as well as the application of fats in emulsion technology for various industrial purposes. .

TPI82008 TECHNOLOGY ENGINEERING AND PROCESS DESIGN 2(0-2)
This course covers the role of process design in the agricultural processing industry, processing system structure and criteria, process engineering for agro-industry, design stages, heuristic methods for process synthesis, optimization techniques for process design, scale-up of processes and equipment; analysis of economic feasibility and profitability. Process and plant design tasks in the agroindustrial. Lectures cover engineering principles, chemical engineering and kinematics, reactor principles, pilot plant experiments, process design, pulse electric field (PEF), extraction using PEF, lethal value, death curve & effective process, nanotechnology in agroindustry, ISL curve, microwave processing & identification, extuder.

TPI82009 ADVANCED OPTIMIZATION TECHNIQUES 2(0-2)
This course discusses quantitative optimization techniques that can be used for agro-industrial operation solutions. The introduction of the theory of errors in numerical calculations. Optimal conditions for problems without constraints and problems with constraints

TPI82010 ADVANCED RISK MANAGEMENT 2(0-2)
This course discusses the scope of risk management, types and aspects of risk, methods and analysis of risk aggregation. In addition, it also provides insight into risk-product development, Monte Carlo simulation, certainty equivalent, as well as case studies related to risk management in the agro-industry sector.

TPI82011 HALAL INDUSTRY 2(0-2)
This course discusses the basic concepts of the halal industry, the principle of halal haram (halalan thoyyiban), market opportunities for halal products including food, pharmaceutical, health, and cosmetic products, analysis techniques for determining product halal status (haram material detection techniques), Halal Assurance System (HAS).) various products, Halal Control Point (HCP), traceability in the halal industry supply chain. This course explains the latest halal regulations on a global and national

scale, the development of various halal products and related services, and the linkage of HAS in food integrity.

TPI81012 INTEGRATED PRACTICE 2(0-2)

This course is a work simulation in agro-industry, which includes the process of procuring raw materials, production, quality control, shelf life analysis, marketing of a food product, and the economic feasibility of agro-industry products on a pilot plan scale.

9.3. DOCTORAL PROGRAM SYLLABUS (S3)

9.3.1. Doctoral Program Faculty Courses

TPF92001 QUALIFICATION EXAM 1(1-0)

Students prepare a pre-proposal containing the study material that will be used as research material. Qualification exams are carried out to assess students' readiness in theory, concepts or techniques to conduct research on their dissertation. In this exam, students must be able to demonstrate the feasibility of conducting independent research to obtain a doctorate in food science.

Course Learning Outcomes (CLO):

1. Students are able to review literature and are relevant to the dissertation topic.
2. Students master scientific concepts related to the topic of their dissertation research.
3. Students are able to formulate research problems to be carried out.

TPF9202 PROPOSAL WRITING AND PROPOSAL EXAM 2(2-0)

Students must prepare a research proposal under the supervision of the promoter and co-promoter. The proposal is a research guideline for compiling a dissertation. Proposal writing can be started by students. The promoter and co-promoter provide direction and advice according to their competence so that the content of the research is worthy of a doctorate in food science. This process requires intensive discussion with the promoter and co-promoter. Proposals must demonstrate the student's ability to conduct research independently and have good research qualities for a doctorate degree. After the proposal is approved by the promoter and co-promoter, students must present it in front of the promoter, co-promoter, and examiner appointed by the head of the study program.

Course Learning Outcomes (CLO):

1. Students are able to review literature in depth and are relevant to the dissertation topic.
2. Students are able to identify, formulate and solve problems.
3. Students are able to plan and develop research methods for their dissertation research.
4. Students master state of art knowledge of research topics

his dissertation.

TPF91001 RESEARCH AND RESEARCH PROGRESS SEMINAR 1 6(6-0)

Research and research progress seminars have a weight of 18 credits which are divided into 3 stages of 6 credits each. This stage can be in accordance with the research stages in the dissertation proposal or not because the research stages are not in three stages. Students are required to arrange the material for this research progress seminar so that it can be divided into three stages. The division of these three stages is carried out so that the promoter can monitor the progress of research and the progress of writing scientific papers in journals on a regular basis. If the data obtained is still lacking, students can add material for the progress seminar from the results of a literature review with topics related to their research. Research progress seminar activities can be in the form of seminars held internally with the presence of promoters and co-promoters or students attending seminars, national or international scientific conferences or meetings. At the research results seminar, students must have submitted a draft publication based on the research data that has been obtained. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors.

Course Learning Outcomes (CLO):

1. Students are able to do research independently
2. Students are able to analyze and synthesize data on the progress of research results
3. Students are able to communicate the progress of research results in writing and orally.

TPF92003 RESEARCH AND RESEARCH PROGRESS SEMINARS 2 6(6-0)

Research and research progress seminars have a weight of 18 credits which are divided into 3 stages of 6 credits each. This stage can be in accordance with the research stages in the dissertation proposal or not because the research stages are not in three stages. Students are required to arrange the material for this research progress seminar so that it can be divided into three stages. The division of these three stages is carried out so that the promoter can monitor the progress of research and the progress of writing scientific papers in journals on a regular basis. If the data obtained is still lacking, students can add material for the progress seminar from the results of a literature review with topics related to their research. Research progress seminar activities can be in the form of seminars held internally with the presence of promoters and co-promoters or students attending seminars, national or international scientific conferences or meetings. At the research results seminar, students must have submitted a draft publication based on the research data that has been obtained. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors.

Course Learning Outcomes (CLO):

1. Students are able to do research independently
2. Students are able to analyze and synthesize data on the progress of research results
3. Students are able to communicate the progress of research results in writing and orally.

TPF91002 RESEARCH AND RESEARCH PROGRESS SEMINARS 3 6(6-0)

Research and research progress seminars have a weight of 18 credits which are divided into 3 stages of 6 credits each. This stage can be in accordance with the research stages in the dissertation proposal or not because the research stages are not in three stages. Students are required to arrange the material for this research progress seminar so that it can be divided into three stages. The division of these three stages is carried out so that the promoter can monitor the progress of research and the progress of writing scientific papers in journals on a regular basis. If the data obtained is still lacking, students can add material for the progress seminar from the results of a literature review with topics related to their research. Research progress seminar activities can be in the form of seminars held internally with the presence of promoters and co-promoters or students attending seminars, national or international scientific conferences or meetings. At the research results seminar, students must have submitted a draft publication based on the research data that has been obtained. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors. If the research is still in progress, the publication draft does not have to be 100% complete for publication, the data that has been obtained and has been consulted with the promoter is discussed in the draft international scientific publication. Student participation in national or international seminars or scientific meetings must be approved by the promoter and co-promoter. Assessments for national and international scientific seminars are carried out by a team of supervisors.

Course Learning Outcomes (CLO):

1. Students are able to do research independently
2. Students are able to analyze and synthesize data on the progress of research results
3. Students are able to communicate the progress of research results in writing and orally.

TPF91003 INTERNATIONAL PUBLICATION I 2(2-0)

Students are required to publish scientific articles in reputable international journals. The intended international journal must be agreed with the promoter and co-promoter. According to UB Chancellor's regulation no. 52 of 2018 that every Doctoral Program student is required to take and complete a final project in the form of a dissertation and scientific publication. Scientific publications in the form of: a) 2 (two) scientific articles in international Scientific Journals indexed by Scopus or Web of Science Core Collection (Thomson Reuter), having an impact factor of at least 0.1, or Microsoft Academic Search; or b). 1 (one) scientific article in a scientific journal as referred to in number 1 and 1 (one) article in the Proceedings. The final assignment in the form of Scientific Publication as referred to is prepared based on the results of the Dissertation research.

Course Learning Outcomes (CLO):

1. Students are able to communicate concepts and research results clearly and effectively in reputable journals.
2. Students understand the procedure for submitting scientific manuscripts to reputable journals.

TPF92004 INTERNATIONAL PUBLICATION II 2(2-0)

Students are required to publish scientific articles in reputable international journals. The intended international journal must be agreed with the promoter and co-promoter. According to UB Chancellor's regulation no. 52 of 2018 that every Doctoral Program student is required to take and complete a final project in the form of a dissertation and scientific publication. Scientific publications in the form of: a) 2 (two) scientific articles in international Scientific Journals indexed by Scopus or Web of Science Core Collection (Thomson Reuter), having an impact factor of at least 0.1, or Microsoft Academic Search; or b). 1 (one) scientific article in a scientific journal as referred to in number 1 and 1 (one) article in the Proceedings. The final assignment in the form of Scientific Publication as referred to is prepared based on the results of the Dissertation research.

Course Learning Outcomes (CLO):

1. Students are able to communicate concepts and research results clearly and effectively in reputable journals.
2. Students understand the procedure for submitting scientific manuscripts to reputable journals

TPF92005 DISSERTATION WRITING AND DISSERTATION EXAM 5(5-0)

Students must be able to compile a dissertation manuscript properly and deserve to be tested in the final dissertation exam from the research results obtained. To be able to take the final dissertation exam, students are required to have at least 2 (two) scientific publications from the results of the dissertation research that have been published or accepted for publication.

Course Learning Outcomes (CLO):

1. Students are able to identify relevant theories and concepts and relate them to methodologies and evidence, apply appropriate techniques and draw conclusions systematically.
2. Students are able to compile research reports that have up-to-date topics in their fields
3. Students are able to interpret and apply information in the literature to explain the results of their research.
4. Students demonstrate the ability to make a real contribution to (new) knowledge through the results of their research.
5. Students are able to communicate concepts and research results clearly and effectively in scientific writing and orally.

9.3.2. Syllabus for Doctoral Program in Agroindustrial Technology (TIP)

TPI91001 PHILOSOPHY OF SCIENCE 2(2-0)

Meaning of Philosophy, Philosophy of Science, Concept of Science, Function of Philosophy, Role of Philosophy in the Development of Science, Ontology, Epistemology, Axiology, Scientific Thinking Tools, Language, Mathematics, Statistics, Strategies for finding findings for Dissertations based on Philosophy of Science.

TPI91002 DEVELOPMENT OF AGROINDUSTRY 2(2-0)

Definition and scope of agro-industry, upstream and downstream industries, perspective on agro-industry, agro-industry as a pioneer supported by the agricultural sector, agro-industry as a driver of export of agricultural products, agro-industry as import substitution, Utilization of Potential Demand for Farmers' Families , Utilization of Potential Demand for Farming Families, Vehicle for Adjusting the Supply of Agriculture Sector, Development of Agro-industry as a Vehicle for Diversification and Transformation of Economic Structure, agro-industry driving rural industrialization, agro-industry which is anti-development, Conditions for industry to act as driver of rural industrialization, Risks and feasibility studies for agro-industry investment .

TPI91003 AGROINDUSTRIAL INNOVATION SYSTEM 2(2-0)

The structure of this course consists of material on the relationship between research, innovation, and standards,central and regional innovation institutions, various types of agro-industry support innovations, level of technological readiness (TKT), and technology dissemination, followed by the standardization stage, regulations and standardization systems on a global and national scale, innovation products, the stage of managing Intellectual Property Rights (IPR) to inventors.

TPI91004 INTEGRATED QUALITY SYSTEM 2(2-0)

Factors affecting the quality of agro-industry products, the integrated relationship of internal and external factors forming product quality, quality system institutions on a global and national scale, the stage of formulation and determination of the Indonesian National Standard (SNI), and the latest research developments related to quality systems.

TPI91005 BIOTECHNOLOGY DROWN AGROINDUSTRY 2(2-0)

This course includes a discussion of the relationship between a publication and the applied level, scaling up, biorefinery, bioremediation, biotransformation and bioconversion and how it can be used in a dissertation.

TPI91006 AGROINDUSTRY POLICY STRATEGY 2(2-0)

Agroindustry policy and program strategies, on farm and off farm development, investment needs, investment policy support, domestic consumer price protection policies for imported agro-industry goods, price control policies to reduce price fluctuations , policies on cheap and soft credit schemes for farmers, policies on supervision and quarantine for trade traffic between countries, policies on developing facilities and infrastructure to support trade operations, policy on incentive guarantees for potential investors

TPI91007 TECHNOLOGY PRODUCTS DOWNSTREAM 2(2-0)

Understanding the development of agro-industry biotechnology through IRL and TKR, how to increase IRL and TKR into downstream products. scale-up of biotechnology products, white biotechnology, biotransformation, bioremediation, and bioconversion in forming sustainable agroindustrial biotechnology products.

TPI91008 AGRICULTURAL EQUIPMENT AND MACHINERY ENGINEERING 3(3-0)

Agricultural processing tools and machines and their effects on commodities, examples of tools generally used in the agricultural product industry, machines that may exist in the future, the use of machine tools for sorting, threshing , distribution and transportation.

TPI91009 INDUSTRIAL WASTE TREATMENT 3(3-0)

Introduction to industrial waste treatment processes, physical units of sewage treatment (filtering, aeration, gas administration, physical precipitation). Biological process unit (aerobic treatment; microbial growth in aerobic treatment; activated sludge process and its modifications; aerobic attached growth process; tricking filters and rotating biological contactors process; anaerobic processes; fluidized bed and sludge blanket systems process; nitrification process; denitrification process), Chemical processes (Coagulation-Flocculation; Disinfection; Precipitation; Adsorption and Ion Exchange).

TPI91010 INSTRUMENTATION CONTROL AND BIOSSYSTEM 3(3-0)

This course contains the static and dynamic characteristics of measurement systems, sensors and transducers, signal processing, mathematical modeling of control systems, transfer functions, response analysis, PID control, control system analysis and design, ON-OFF control systems, PLC control, Fuzzy control. , intelligent control-1, intelligent-2.

TPI91011 RENEWABLE ENERGY FOR INDUSTRY 3(3-0)

Search for renewable energy sources, which involves in-depth study of solar, wind and alternative biological energy. Principles of technology and performance evaluation for components of these technologies, water technology, geo-thermal and other energy, energy conservation, co-generation, electricity production using wasted heat, financing related to alternative energy sources issues.

9.3.3. Syllabus of Food Science Doctoral Program (IP) Courses

TPP91001 PHILOSOPHY AND RESEARCH METHODS OF FOOD SCIENCE 2(2-0)

This Constitutional Court explains the ancient theories of ethical philosophy. What is called the term science and scientific knowledge. Recent cases will be used as material for discussion with students, these cases include food technology, biotechnology, nutrition and health. This course also contains the latest Research Methods that are often used in food science research using the latest experimental designs, for example in the field of process or product optimization (eg RSM) along with their simulations and the software used (eg: Design Expert, Minitab).

Course Learning Outcomes (CLO):

1. Students understand the theory of philosophy of science and ethics

2. Students understand the role of scientists and their responsibilities towards environmental change, especially in the food sector (food technology, biotechnology, nutrition and health).
3. Students are able to make appropriate and up-to-date research designs for research in the food sector.
5. Students are able to prepare research proposals.
6. Students understand the stages in publishing scientific articles in reputable journals.

TPP91002 ADVANCED FOOD SCIENCE 2(2-0)

With global changes such as climate, population, availability of water and energy, food science and its application are required to play a role in overcoming these problems. This course discusses the latest topics in the field of food science including food chemistry, food biochemistry, food engineering and processing, food microbiology, food biotechnology, and food nutrition (metabolism and disease pathways, lifestyle and diet). Isolation techniques of bioactive compounds and methods of identification of bioactive compounds in food. Development of functional food and health. Aspects of the role of microbes in food processing. Food safety aspects. The latest and actual researches in the food sector are also discussed.

Course Learning Outcomes (CLO):

1. Students are able to understand the development of food science in the fields of food chemistry, food biochemistry, food processing, food engineering, food microbiology, food biotechnology, and food nutrition.
2. Students are able to explain the latest developments in a topic in the field of food science.
3. Students are able to explain the role of progress in each field of food science in life.

TPP91003 BIOACTIVE COMPONENTS AND ITS UTILIZATION 2(2-0)

This course studies bioactive components derived from natural materials of fauna and flora. The function of bioactive components as pharmaceutical or herbal medicines to treat various types of human diseases. Students study secondary bioactives derived from various sources of fauna and flora, structure and function of secondary bioactives, both commercial and non-commercial. Students also studied several examples of pathway metabolites from existing secondary bioactives. Students study Indonesia's local potential as a new bioactive component that has not been tested as a pharmaceutical drug or herbal medicine. Students learn the principles of extraction specifically to isolate, fractionate and identify bioactive components. Students conduct trials on the efficacy of pharmaceutical/herbal drugs from secondary bioactives by In Vitro, In Vivo and Ex Vivo. This course is specifically designed to provide students with sufficient supplies to design their doctoral research topics. Some of the topics discussed specifically include: bioactive components as antimicrobial, antioxidant, anti-inflammatory, antitumor, anticancer, antidiabetic and anticholesterol. General discussion of the function of pharmaceutical drugs from plants (especially peptides and plant proteins) as antibodies and vaccines. Students are expected to be able to design experimental stages to find new pharmaceutical/herbal drugs and test the benefits/efficacy of extracts or extract isolates in the laboratory. Students are also expected to be able to develop new pharmaceutical drug products from plants/animals through an inter, multi and transdisciplinary approach. The knowledge gained by students through this course is a provision to explain phenomena that occur in natural materials that can be developed into pharmaceutical/herbal drugs or functional food products. Through this course, students are expected to be able to analyze, evaluate and create new pharmaceutical/herbal drugs or new functional food products that can or will be commercialized.

Course Learning Outcomes (CLO):

1. Able to analyze, evaluate secondary bioactive components from plant and animal materials including levels, structures, biosynthetic pathways and secondary bioactive functions from plant and animal materials.
2. Able to choose natural material extraction techniques according to the characteristics of secondary bioactive materials and products, able to select and evaluate methods of fractionation, isolation and elucidation of secondary bioactive structures.
3. Able to analyze, evaluate and make secondary bioactive products through organism culture techniques
4. Able to analyze, evaluate and make secondary bioactive products through cell tissue culture techniques or plant cell organs.
5. Able to analyze, evaluate and make secondary bioactive products through marine animal culture techniques.
6. Able to analyze, evaluate the differences in several principles of secondary bioactive efficacy test methods.
7. Able to understand cell models for testing bioactive compounds
8. Able to understand molecular simulation docking method

TPP91004 FOOD COMPONENT INTERACTION 2(2-0)

This course is a course that studies the basic principles of molecular interactions; basic principles of interaction of water with other food components, interaction of protein with other food components, interaction of carbohydrates with other food components, interaction of lipids with other food components, interaction of micro components (vitamins, minerals, pigments, polyphenols, etc.) with other food components; the impact of these interactions on the properties and characteristics of food products and nutritional quality. Students are expected to be able to explain phenomena that occur in food systems based on interactions between food components that occur based on the principle of molecular interactions. The knowledge gained by students through this course is a provision to explain phenomena that occur in food ingredients or products.

Course Learning Outcomes (CLO):

1. Able to explain the chemical phenomena that underlie the formation of the characteristics of materials and food products and the changes that occur during processing and storage
2. Able to determine how to control chemical changes that occur during processing and storage
3. Able to analyze chemical reactions and interactions between food components that result in changes in the characteristics of food products during processing and storage

TPP91005 FOOD COMPONENT DERIVATIZATION 2(2-0)

This course studies the synthesis of new food products based on physical, chemical and enzymatic components of food. Includes physical, chemical and enzymatic derivatization of starch, cellulose, other carbohydrates, physical, chemical and enzymatic lipid derivatization, physical, chemical and enzymatic derivatization of proteins, physical, chemical and enzymatic vitamin derivatization, physical, chemical and chemical bioactive derivatization , and enzymatic, physical, chemical, and enzymatic flavor derivatization, and physical, chemical, and enzymatic synthesis of food additives.

Course Learning Outcomes (CLO):

1. Able to determine the purpose of derivatization of food components in relation to the application of these components in processing and forming food characteristics
2. Able to determine the appropriate method for derivatization of food components including derivatization of starch, other carbohydrates, lipids, proteins, vitamins, bioactive compounds, flavors, and food additives.
3. Able to evaluate the application of food component derivatives in food processing and the formation of functional properties on health.

TPP91006 FOOD PROCESSING TECHNOLOGY INNOVATION 2(2-0)

This course discusses the latest processing technology innovations that have been created/have been applied in the food industry to be able to produce food products with good physical-chemical and sensory qualities, which are safe, and provide good for human health. The lecture is also focused on studying non-thermal food processing technology that allows food producers to modify the processing process by minimizing the damage caused to food quality to a minimum. This technological innovation is also intended to answer consumer demands which are growing day by day.

Course Learning Outcomes (CLO):

1. Able to collect and use information about current consumer demands for food product quality

2. Able to understand the principles / use of the latest food processing technology in the current food (Industry) field
3. Able to analyze the shortcomings of previous processing technology and modify it with the application of the use of the latest food technology related to consumer demands

TPP91007 FOOD SENSORY SCIENCE 2(2-0)

This course explains the basics of processing sensory information from physical stimulants (products, services, environment), through sensory perception systems (peripheral and central nervous systems) in influencing the work of the brain in an integrated manner (appreciation, mood, and consumer behavior). The mechanism of the oral process in relation to perception and sensory expression is focused on examining the relationship between food ingredients, the production process of food products, and the food product itself with consumers. Neurological sensory studies as well as understanding the physical, mechanical and chemical processes of the oral process were studied in depth to understand the perception mechanism in relation to food components, multimodality and complexity of sensory stimuli.

Course Learning Outcomes (CLO):

1. Able to collect and use information about current consumer demands for food product quality
2. Able to understand the principles / use of the latest food processing technology in the current food (Industry) field
3. Able to analyze the shortcomings of previous processing technology and modify it with the application of the use of the latest food technology related to consumer demands

TPP91008 CAPITA SELEKTA FOOD PROCESSING TECHNOLOGY 2(2-0)

This course covers specific topics related to innovations in food processing which include thermal processing (drying, pasteurization, sterilization, extrusion) and non-thermal (enzymatic processing, use of pressure, irradiation, etc.) The discussion includes basic concepts in the processing process, discussion of in-depth information about the effect of the process on changes in the characteristics of raw materials and predictions of product specifications that can be produced. This course also discusses modifications in specific processing conditions and the latest developments in food processing. Foodstuffs include local ingredients including tubers, nuts, cereals and others

Course Learning Outcomes (CLO):
1. Students are able to analyze the effect of food components on the conditions of the processing that will be applied
2. Students are able to analyze changes in the characteristics of food raw materials as the effect of applied processing

3. Students are able to innovate processes based on a deep understanding of basic concepts in food processing
4. Students are able to create specific processes to solve problems in food processing

TPP91009 BIOACTIVE COMPOUND PRODUCTION TECHNOLOGY 2(2-0)

This course discusses the latest trends in food science and technology; including the study of the development of new products and their potential to be developed/applied to the food industry as well as matters related to human nutrition. The areas of discussion include: novel raw materials and ingredients, including bioactive components; the latest developments in food processing and packaging technologies (new developments in food processing and packaging technologies); the use of biotechnology and nanoscience in food research (advanced biotechnological and nanoscience developments and applications in food research); the steps that must be met before new materials/products can be introduced to the market (analysis of biological and non-biological risks, including the possibility of allergies and intolerances);

Course Learning Outcomes (CLO):

1. Students understand the definition of bioactive compounds and their development prospects as well as modern consumer preferences for these products
2. Able to distinguish various bioactive compounds and their sources
3. Able to explain physico-chemical properties and their role for human health

TPP91010 ADVANCED FOOD MICROBIOLOGY 2(2-0)

This course studies the relationship between pathogenic microbes and food, the environment and the host, minimal processing processes that can prevent the growth of pathogenic microbes, the prevalence of pathogens and their virulence.

Course Learning Outcomes (CLO):

1. ExplainBacterial and fungal food-related diseases.
2. Describenew minimal processing methods used in the food industry;
3. Explaindefensive strategies used by bacteria;
4. Able to categorize methods for microbial detection and identification for food quality and safety assessment;
5. Able to control microbiological quality and food product safety;
6. Explainthe ecology and physiology of microbes in the food and digestive tract;
7. Have a comprehensive understanding of the virulence and pathogenesis of pathogenic microbes in food and their interactions with the environment and host

TPP91011 FOOD VIROLOGY 2(2-0)

This course contains the structure, types and characteristics and functions of viruses, virus life cycles, viral gene regulation, viral replication, viral infections, virus isolation and detection techniques, viral foodborne illness, bacteriophages, phage applications in the food sector, phage applications for genetic engineering. , viral expression system, phage display technology.

Course Learning Outcomes (CLO):

1. Students are able to understand the structure, role, types and characteristics of viruses
2. Students are able to understand gene regulation related to the viral life cycle
3. Students are able to understand how to isolate and identify types of viruses in food products
4. Students are able to understand virus detection techniques in food products
5. Students are able to explore bacterial viruses (bacteriophages) according to their characteristics
6. Students are able to know the type of virus that causes foodborne illness
7. Students are able to understand the benefits of bacteriophages in the food and non-food fields

TPP91012 FOOD BIOTECHNOLOGY 2 (2-0)

This course contains the basic principles of molecular biotechnology, the influence of biotechnology on food production, processing and quality, applications of biotechnology to microbes, plant tissue culture techniques, genetic engineering of plants and animals, functional food ingredients and their health benefits, biosensors for product monitoring. biology, probiotics, enzyme biotechnology, food fermentation biotechnology both modern and traditional, food safety issues of various recombinant products, regulations and patents related to GMO organisms and recombinant products.

Course Learning Outcomes (CLO):

1. Understand the basic principles of molecular biotechnology
2. Understand the influence of biotechnology on food production, processing and quality
3. Integrating basic concepts of molecular biology and biochemical pathways for food technology applications
4. Discuss technology to produce transgenic microorganisms, plants and animals
5. Provides insight into biosensors for monitoring biological products
6. Analyzing the pathogenicity and control of pathogenic bacteria and molds that cause disease in foodstuffs
7. Explore modern and traditional food fermentation biotechnology, including bioprocessing of food waste
8. Knowledge of information on regulatory and patent issues related to organic organisms and recombinant products.

TPP91013 MICROBIAL TOXICOLOGY 2(2-0)

This course studies toxins produced by microbes, classification of toxins (exotoxins and endotoxins), types of bacterial toxins (neurotoxins, enterotoxins, cytotoxins), fungi (mycotoxins) and algae, both from genetic and ecological aspects. Resistance to processing, its mechanism of action in the body and control in food.

Course Learning Outcomes (CLO):

1. Explaintypes of microbes (bacteria, fungi and parasites) producing toxins and their habitats
2. Explainclassification of toxins produced by microbes and their mechanism of action in the body
3. Explain the host defense mechanism against toxins produced by microbes
4. Explain the resistance of microbial toxins to processing and how to prevent them

TPP91014 MOLECULAR NUTRITION
2(2-0)

This course discusses how the molecular mechanism of nutrients and non-nutrients can have a biological effect; knowledge of the mechanisms at the molecular level, biochemical processes and their effects up to the cellular level which is the center for regulating health or disease functions; specific transcription factors for specific food components that play a role. The method used to see the interaction of food components with genes in vitro and in vivo. The discussion is more focused on diseases such as obesity, diabetes and cancer. General genomic analysis techniques such as transcriptomics, proteomics and metabolomics used in molecular nutrition research are also taught.

Course Learning Outcomes (CLO):

1. Able to explain the molecular interactions between nutritional or non-nutritive substances and genes and their mechanisms in influencing health and disease.
2. Able to explain the concept of molecular nutrition research.
3. Able to explain the application of genomic technology such as transcriptomics, proteomics and metabolomics in molecular nutrition research.
4. Able to explain the results of the latest research on molecular nutrition
5. Able to make research plans on molecular nutrition.

TPP91015 BIOSSAY ENGINEERING
2(2-0)

This course discusses bioassay techniques in testing the bioavailability and bioactivity of nutritional compounds (macro or micro nutrients) and bioactive compounds. The in vitro methods taught include the gastrointestinal model and the use of the Caco-2 cell model to measure the uptake and transport of a food component. The use of cell lines, primary cells from organs, microsomal or S9 fractions from organs, transgenic microbes and others. In vivo methods include the use of normal or transgenic experimental animals, feeding techniques or compounds being tested, feed composition. Validation technique to compare in vitro and in vivo tests or from experimental animals to humans and interpretation of in vitro test results their relevance to in vivo conditions

Course Learning Outcomes (CLO):

1. Able to apply testing techniques in vitro and in vivo to measure the bioavailability and bioactivity of food components.
2. Able to use appropriate methods to test the bioavailability and biological activity of food components.
3. Able to interpret in vitro test results data for in vivo conditions.

TPP 91016 PHYSIOLOGY OF FOOD NUTRITION 2(2-0)

This course studies the physiological and metabolic responses in the human body and their regulation of macronutrient and micronutrient intakes. This course contains the following materials, the framework of human physiology and homeostasis; important concepts about the chemical-biochemical properties of macronutrients and micronutrients; digestive system (macro and micronutrients); nutrient absorption mechanism; circulatory system, metabolic profile and biomarkers; endocrine system (and hormonal regulation); regulation of nutrient uptake into body cells; central organ in energy metabolism; metabolism of carbohydrates, proteins and fats and their interactions; vitamin metabolism; mineral metabolism; case study integration of understanding of the physiology of food nutrition and selected topics by students which is expected to lead students to the topic of their dissertation

Course Learning Outcomes (CLO):

1. Knowing the framework of human physiology and homeostasis as well as important concepts related to the physiology of food nutrition
2. Knowing the mechanism of digestion and absorption of nutrients and the factors that influence it (food factors and physiological factors of the body)
3. Knowing the circulatory system and its relationship to metabolic profiles and biomarkers in the blood related to nutrient consumption and how to determine them
4. Know the work of the endocrine system in the regulation of nutrient uptake and metabolism
5. Knowing the mechanism and regulation of nutrient uptake in body cells and the factors that influence it
6. Knowing the working relationship between central organs that play a role in energy, protein and micronutrient metabolism
7. Mastering the basics of carbohydrate, protein and fat macronutrient metabolism in muscle cells, liver and/or adipose tissue

8. Able to predict metabolic settings based on changes in macronutrient composition and bioavailability and predict their physiological output
9. Able to critically analyze food consumption behavior in real life settings and their consequences on individual physiological responses and provide examples of recommendations for improvement
10. Able to formulate problems and provide real solutions to unhealthy consumption behavior in the form of research ideas with the aim of engineering the bioavailability of macronutrients or micronutrients in food ingredients/products so as to produce the desired physiological response

X. STUDENTS

Student affairs is one of the sub-sections in the organizational structure of the Faculty of Agricultural Technology, Universitas Brawijaya (FTP UB) under the supervision of the Vice Dean for Student Affairs. The main task of the student affairs field is to facilitate students in the field of services, including scholarship services, graduation, and non-academic learning facilitators (soft skills) through the development of various student organizations. In this case, student organizations are formed as a forum for FTP UB students to form students who excel in achievements at the provincial, regional, national and international levels, confident to be able to compete at national and international levels, honest, integrity, responsible, innovative. , and have an entrepreneurial spirit according to UB's vision and mission to become a world class entrepreneur university.

10.1. Student Sovereignty Institution (LKM) at the Faculty of Agricultural Technology

Student organizations in FTP UB are official student organizations and function as a forum for the development of student activities in FTP UB, whose existence is officially recognized and ratified by the leadership of FTP UB. LKM is a special activity unit in FTP UB which accommodates and channels the potential and creativity of students in the fields of reasoning and science, interests and talents, welfare, entrepreneurship, and social care which includes thinking, feeling, and sports. Based on the Regulation of the Dean of FTP UB No. 4 of 2020 concerning Guidelines for Student Development of the Faculty of Agricultural Technology, Universitas Brawijaya, it can be explained that various kinds of LKM in FTP UB are as follows:

1. **Student Representative Council**hereinafter abbreviated as DPM. DPM is a high legislative institution in student life in FTP UB. DPM functions to voice the aspirations of all students and the academic community in FTP UB (advocacy).
2. **student Consultative Assembly**hereinafter abbreviated as MPM is a student institution in FTP UB which has legislative and supervisory authority in student activities. MPM is the highest student institution at the FTP UB level where this institution is a forum for the aspirations of FTP students. This institution will supervise and accommodate all the activities of the LKM institution. This institution consists of 3 students who are elected by acclamation by representatives of each LKM.
3. **Student Executive Board**hereinafter abbreviated as BEM is a student organization of FTP UB which has executive authority in student activities. BEM is an association consisting of FTP UB students who have the aim of accommodating and channeling/realizing aspirations for FTP UB students. BEM also has the function of helping to develop and educate student resources, both about science in the fields of agricultural technology, socio-economics, and politics in Indonesia and the world. Active in advocating scholarship acceptance, criticizing national and global issues, organizational development, and leadership.

4. ***Agritech Research Study Club*** which hereinafter abbreviated as ARSC is an LKM that oversees reasoning activities by developing competence in the fields of research and scientific work and innovation of FTP UB students.
5. ***Agritech Sport*** hereinafter abbreviated as AS is LKM which oversees the activities of developing sports competence for FTP UB students.
6. ***English for Specific Purpose*** hereinafter abbreviated as ESP, is an LKM which oversees the English competency development activities of FTP UB students.
7. **ART** is an LKM that oversees talent interest activities through the development of artistic competence of FTP UB students which includes sound arts, music arts, theatrical arts, painting, event organizers, photography arts, and others.
8. **TECHNO** is an LKM that oversees the journalistic competence development activities of FTP UB students.
9. **Agricultural Technology Islamic Study Forum** hereinafter abbreviated as FORKITA is an LKM that oversees the Islamic spiritual competence of FTP UB students.
10. **Christian Student Fellowship** hereinafter referred to as EFRATA is an LKM that oversees the Christian spiritual competence of FTP UB students.
11. **Catholic Student Family** which hereinafter abbreviated as KMK is an LKM which oversees the Catholic spiritual competence of FTP UB students.
12. ***Agritech Business Center*** hereinafter abbreviated as ABC is LKM which oversees the entrepreneurial competence of FTP UB students.
13. Departmental Student Association, hereinafter abbreviated as HMD, is a student organization at the departmental level at FTP UB to accommodate and channel the potential and creativity of students in the professional and scientific fields according to their fields of knowledge. The Agricultural Product Technology Student Association, hereinafter abbreviated as Himalogista, is the HMD which oversees the professional competence of students from the Department of Food Science and Biotechnology, FTP UB.
14. **Agroindustrial Technology Student Association** hereinafter abbreviated as Himatitan is HMD which oversees the professional competence of students of the Department of Agroindustrial Technology, FTP UB.
15. **Agricultural Engineering Student Association** hereinafter abbreviated as Himateta is HMD which oversees the professional competence of students of the Department of Agricultural Engineering and Biosystems FTP UB.

10.2. Introduction to Campus Life for New Students (PK2-MABA)

Based on the regulation of UB Rector No. 44 of 2018 concerning Guidelines for the Implementation of the Introduction to Campus Life, PK2-MABA's vision is to become a means of awareness and adjustment of students as members of the scientific community and the nation's next generation of quality, to become the glue of unity and togetherness, and to develop a critical and analytical culture of students. The mission of PK2-MABA is to form students who have high integrity who prioritizes intellectuality and upholds moral and religious values as well as develops student mindsets that are critical, innovative, dynamic, and sensitive to social dynamics. The general purpose of

PK2-MABA activities is to introduce new students to campus life so that it is easier for students to adapt to various activities in higher education, both academic and non-academic.

Based on the regulation of UB Rector No. 44 of 2018 concerning guidelines for implementing the Introduction to Campus Life, New Students who do not follow/do not pass PK2-MABA are subject to sanctions in the form of:

a. Cannot be a member and administrator of student organizations in FTP and UB;
b. Unable to obtain scholarship facilities; and
c. Unable to take the undergraduate final exam (thesis exam).

10.3. Outstanding Student (MAWAPRES)

Selection of Outstanding Students (MAWAPRES) is conducted every year with accurate filing selection by the jury and the winner is expected to pass the selection of outstanding students at Universitas Brawijaya and National level. MAWAPRES selection is carried out at the departmental level, then the final determination is carried out at the Faculty level. The faculty then gives the name of MAWAPRES which will be submitted to the university level.

Students can participate in the selection of MAWAPRES for a maximum of 6 semesters. Implementation procedures include: a) Registration and filling out forms; b) File collection; c) File verification by the student affairs subdivision; d) Recap of registration file; e) Selection of Outstanding Students; f) Sending files to universities.

10.4. Student Code of Conduct

The Code of Ethics is prepared with the aim of providing guidelines for all FTP UB students to behave well, with integrity, reputation, and noble character in carrying out activities within FTP UB and in society in general. The implementation of the Code of Ethics is a joint commitment of FTP UB students to realize the vision, mission, and goals of FTP UB, and to support FTP UB as one of the units with Integrity Zone (ZI); the formation of students who are pious, knowledgeable, have integrity, are reputable, have noble character, and are virtuous; create an orderly, orderly, orderly, and reputable academic and non-academic education process in a conducive academic and non-academic/student climate; as well as to form the character of students who are disciplined, ethical, with integrity, reputation, and obedient to legal norms,

The benefits of the Code of Ethics are:

1. Creating a conducive academic learning and student learning climate that facilitates the achievement of the vision, mission, and goals of FTP UB;
2. The creation of FTP UB as an Integrity Zone (ZI);
3. Increasing the satisfaction of students, lecturers, and education staff as well as FTP UB stakeholders, including the families of FTP UB students;
4. Availability of quality human resources, discipline, integrity, reputation, and noble character.

Good standards of behavior reflect high morals, integrity, reputation, and adherence to ethical norms that live in society and religion, which include:

1. Be devoted to God Almighty according to religion and beliefs;
2. Appreciate science, technology, literature, and the arts;

3. Uphold the national culture;
4. Maintain the authority, reputation, integrity, and good name of FTP UB;
5. Actively participate in maintaining facilities and infrastructure, environmental cleanliness, comfort, order, and security in FTP UB;
6. Maintain personal integrity and reputation as a citizen of FTP UB;
7. Obey the rules and regulations that apply in FTP UB;
8. Be polite, neat, clean, and smell good (don't wear sandals, T-shirts, tight and open clothes);
9. Behave friendly, maintain good manners towards others, keep good words, do not commit sexual harassment, and maintain association with the opposite sex (relationships between men and women) in accordance with religious and societal norms;
10. Do not smoke in any place except in the space provided;
11. Respect others regardless of ethnicity, religion, race, and social status;
12. Obedient to legal norms, religious norms, and other norms that live in the community;
13. Respecting the opinions of others and prioritizing deliberation;
14. Responsible for all actions both in real life and in activities using social media;
15. Avoid actions that are not useful and/or contrary to legal norms, religious norms, and other norms that live in the community;
16. Not bullying and intimidating others, either directly or indirectly through print media or online social media;
17. Do not cheat and cheat in academic or non-academic matters;
18. Prioritizing common interests over personal or group interests;
19. Putting forward thinking based on intellectual and scientific logic without any coercion of personal or group will;
20. Maintain the integrity and reputation of FTP UB.
21. Not spreading ideas that are prohibited by legal norms, religious norms, and societal norms to others, such as communist ideology, atheism (not believing in God Almighty), LGBT (lesbian, gay, bisexual, and transgender), radicalism, and others ;
22. Not spreading false news/fake news (hoax) that can harm others;
23. Do not incite others to do unscrupulous acts;
24. Always try to take care of yourself and take care of others, for example by using standard medical devices (masks or face shields) and keeping a distance from other people if your body condition is not very healthy.

Standards of student behavior in lecture halls and laboratories are:

1. Be present on time, or before the lecturer/teacher enters the lecture room or laboratory;
2. Dress neatly, politely, cleanly, and smell good in the sense of not deviating from the principles of propriety;
3. Respect other students by not doing actions that can disrupt lectures, for example using gadgets or other electronic devices during lectures, sitting positions that interfere with other students, and other activities that disturb the concentration and tranquility of other students;

4. Do not smoke in lecture rooms, laboratories, or other rooms except in the space provided;
5. Courteous in expressing opinions or refuting opinions, as well as prioritizing intellectual and scientific logical thinking in expressing opinions;
6. Do not use inappropriate words or hurt other people's feelings;
7. Honest, not signing the attendance of other students who he knows are not present in lectures, and not cheating in doing assignments and exams;
8. Maintain an inventory of lecture halls or laboratories;
9. Do not take actions that can cause danger while in the laboratory without the guidance of a lecturer or laboratory officer;
10. Not joking/joking during lectures/practice in the lecture hall or in the laboratory;
11. Do not pollute the room and laboratory inventory at FTP UB such as littering, crossing tables, chairs, and room walls;
12. Comply with the regulations stated in every laboratory in FTP UB;
13. Using standard medical devices (masks or face shields) and keeping a distance from other people in the room or laboratory if the body condition is not very healthy;
14. Returning laboratory equipment to its place in a clean and undamaged condition;
15. Maintain the integrity of lecture room services and laboratory services.

Student ethics in working on assignments, research reports on theses, theses, and dissertations are as follows:

1. Submit assignments/reports on time;
2. Honest in the sense of not plagiarizing or using other student's assignments/reports;
3. Not trying to influence the lecturer so that the person concerned does not submit assignments/reports with the promise of rewards in any form and name;
4. Comply with scientific ethics in writing a thesis/thesis/dissertation, for example complying with the provisions and procedures for writing, following guidance properly, not plagiarizing the work of others (plagiarism);
5. Do not promise or provide a sum of money or other facilities to lecturers or other parties with the aim of influencing the process of guidance on assignments/reports, theses/thesis/dissertation;
6. Do all assignments, research reports, theses, theses and dissertations independently and do not ask other people to do them or pay for consultant services to do them;
7. Maintain integrity in preparing assignments, research reports, theses, theses and dissertations.

The ethics of students in taking the exam are as follows:

1. Comply with the exam rules set by FTP UB;
2. Honest and in good faith, do not look at books or other sources that are not justified, except for exams that expressly confirm this;
3. Do not disturb the concentration of other students who are taking the exam;
4. Do not cross out FTP UB's inventory such as tables, chairs, walls with bad intentions for the purpose of making it easier to answer exam questions;

5. Do not promise or provide a sum of money or other facilities to lecturers or other parties with the aim of influencing the process and test results;
6. Believing in one's own abilities, in the sense of not using the influence of others for the purpose of influencing the examination process and results;
7. Do not cheat in the implementation of the exam;
8. Maintain integrity when taking exams.

The ethics between students and lecturers and education staff (tendik) are as follows:

1. Respect all lecturers and staff regardless of ethnicity, religion, race, and not based on feelings of liking or disliking;
2. Behave and communicate politely to all lecturers and staff in interactions both inside and outside the FTP UB environment;
3. Protecting the good name of lecturers and staff and their families;
4. Not disseminating information that is not good and not necessarily true about a lecturer and staff to other parties, except for violations of law and ethics that are required under the provisions of laws and regulations in FTP UB;
5. Polite in expressing opinions or expressing disagreements about scientific opinions accompanied by rational and scientific arguments;
6. Be honest with lecturers and staff in all aspects;
7. Not promising or providing a sum of money or other facilities to the lecturer with the aim of influencing the lecturer's assessment;
8. Believing in one's own abilities, in the sense of not using the influence of others for the purpose of influencing the lecturer's assessment;
9. Not issuing threats either directly or by using other people against lecturers and staff;
10. Cooperating with lecturers and staff in achieving learning objectives, including preparing before interacting with lecturers in the lecture room;
11. Maintain good manners when submitting objections to the attitude of lecturers and staff towards the leadership accompanied by sufficient evidence;
12. Avoiding the attitude of hating the lecturer or other disrespectful attitude due to the value given by the lecturer;
13. Obey the orders and instructions of the lecturer as long as the orders and instructions do not conflict with legal norms and other norms that live in the community;
14. Dare to be responsible for all actions related to interactions with lecturers and staff;
15. Not bullying lecturers and staff either directly or through print media or online social media;
16. Not playing against each other or inciting lecturers and staff to one another.

Ethics in relationships between fellow students:

1. Respect all students regardless of ethnicity, religion, race, and social status, and not based on likes or dislikes;
2. Behave and communicate in a friendly and polite manner to all students in interactions both inside and outside the FTP UB environment;

3. Cooperate with other students well in studying without imposing personal ego;
4. Have strong solidarity and help each other for a good cause and do not conflict with legal norms, religious norms, or other norms that live in society;
5. Treat your fellow students fairly;
6. Avoid words that can hurt the feelings of other students;
7. Do not make threats or acts of violence against fellow students both inside and outside the FTP UB environment;
8. Advise each other for good purposes;
9. Likes to help other students who are less fortunate in their studies or economically disadvantaged;
10. Together to maintain the integrity, reputation, good name of FTP UB, and not to take any disgraceful actions that damage the good image of FTP UB;
11. Respecting differences of opinion or views with other students, as well as prioritizing discussions based on scientific intellectual logic to avoid forcing opinions on other students;
12. Do not disturb the peace of other students who are following the learning process;
13. Not inviting or influencing other students to take disgraceful actions that are contrary to legal norms, religious norms, and other norms that live in the community;
14. Maintain associations between students of the opposite sex (relationships between men and women) according to prevailing religious and societal norms, and do not take actions that are not commendable in relation to the association of men and women;
15. Not spreading ideas that are prohibited by legal norms, religious norms, or societal norms to other students such as communist ideology, LGBT (lesbian, gay, bisexual, and transgender), atheists (don't believe in God Almighty), radicalism, and others.
16. Do not bully and intimidate other students either directly or indirectly through print media and online social media;
17. Do not take advantage of other students for personal or group interests;
18. Not spreading false news (hoax) about other students on various social media;
19. Maintain the integrity and reputation of FTP UB's individual students.

Ethics in the relationship between students and society:

1. Perform actions that elevate the integrity, reputation, and good name of FTP UB in the community;
2. Likes to help the community according to their knowledge;
3. Avoid actions that violate the norms that live in the community, both legal norms, religious norms, norms of decency, and norms of propriety;
4. Inviting the public to do good and not to invite bad deeds;
5. Comply with legal norms, religious norms, and societal norms that apply in the neighborhood;
6. Provide examples of good behavior and integrity in the community.

Code of Conduct Sanctions

Every member of the academic community has an obligation to report any violations of the Code of Ethics. The leadership of FTP UB is obliged to protect the identity of the reporter and every member of the academic community is obliged to prevent the occurrence of violations of the Code of Ethics by anyone in FTP UB. Every violation of the Code of Ethics will get a sanction from the leadership of FTP UB. The Dean may consider imposing more severe sanctions for violations of the Code of Ethics after obtaining input from parties who are aware of the occurrence of violations of the Code of Ethics.

Sanctions for violators of the Code of Ethics can be in the form of reprimand, stern warning, cancellation of course scores for one semester, cancellation of PKL/KKN, cancellation of final project, suspension for a certain period of time, and expulsion from UB. Every violator of the Code of Ethics is given the right to self-defense, no later than one week after the notification of the violation is submitted to the person concerned and the violator of the Code of Ethics receives a written notification from the FTP UB leadership.

10.5. Scholarships, Funds, and Student Rewards

10.5.1. Scholarship

Scholarships are grants in the form of financial assistance given to individuals that aim to be used for the continuation of the education taken, and the conclusion is that scholarships are the provision of financial assistance to a student, as a form of remuneration for achievements or because of financial needs with the aim of achieving sustainability. his education.

Implementation procedures include:

a) Selection of prospective FTP student scholarship recipients uses 3 stages
   - The academic path is chosen with the highest GPA in each department and class
   - The Student Affairs Subdivision cooperates with the FTP BEM to select underprivileged students

b) File collection and selection by student staff

c) The student affairs subdivision has written a letter that has not yet received a scholarship

d) Register students and write letters to be sent to the directorate

In the event that some of the requirements for applying for a scholarship require a certificate of not having received a scholarship, the student can arrange for a letter of making a statement that he has not received a scholarship through the student affairs department. Implementation procedures include: 1)Students submit a statement letter in the Student Affairs subdivision; 2) Fill out the application form; 3) Data verification; 4) Making a letter that has not received a scholarship and signed by the Vice Dean for Student Affairs; 5) Students who receive a letter have not yet received a scholarship.

10.5.2. Non-Academic Student Delegation Fund Assistance

To realize FTP UB as an outstanding and reputable faculty, it is necessary to encourage students' interest to be active in various activities at national and international levels. For this reason, students need to understand the procedure for applying for non-academic student delegation funds. Student delegation funding assistance for various non-academic activities is intended for FTP UB students with the condition that the head of the delegation must be an FTP UB student.

Implementation procedures include: 1)Make a duplicate delegation proposal; 2) Proposals are submitted to the student affairs subdivision to be verified as eligible or not; 3) Initial confirmation sheet; 4) Signature of the Vice Dean for Student Affairs; 5) Disbursement of delegation funds by students 1 week prior to the activity implementation; 6) Preparation of accountability reports and approval sheets signed by the Deputy Dean for Student Affairs.

10.5.3. Procedures for Passing Selection for Regional, National, International Competitions

In order to improve the achievements and reputation of FTP UB, students are encouraged to actively participate in various competitions at regional, national and international levels. In order to achieve championships at the regional, national and international levels, consultation, monitoring, and evaluation media are provided.

Implementation procedures include: 1)Students report in participating in competitions; 2) Student Affairs coordinate with the Deputy Dean for Student Affairs regarding student reports; 3) Student Affairs directs students to consult with the Vice Dean for Student Affairs; 4) The Vice Dean for Student Affairs instructs the preparation of an assignment letter for mentoring and mentoring; 5) Students process assignments and coordinate with supervisors and competing students for time line arrangements; 6) Guidance is carried out for supervising lecturers with the target of students who have passed the competition selection; 7) Administrative facilitation for students who will be competent.

10.5.4. Submission of Cover Letter for Fund Aid to the Rectorate

In order to have sufficient funds to support organizational activities, delegations or competitions at regional, national, and international levels so that they can help improve the quality of UB, students need to understand the procedure for submitting a cover letter for funding assistance to UB's rectorate. Universitas Brawijaya is one of the campuses whose concern is to support and facilitate students who contribute positively such as activities, competitions or student exchanges. Active students as the spearhead of all kinds of activities on campus are the benchmark for achieving the target indicators for each faculty or university without having to neglect their lectures.

Implementation procedures include: 1)Students/delegates/student institutions make submission proposals; 2) Proposal consultation in the Student Affairs subsection; 3) It is declared eligible, the ratification sheet is initialed by the Head of Subdivision for Student Affairs and signed by the Deputy Dean for Student Affairs; 4) Students make a cover letter for application for financial assistance to the university/sponsor; 5) The signing of the letter by the deputy dean for student affairs.

10.5.5. Submission of Outstanding Student Rewards

To encourage FTP UB students to have high soft skills achievements, FTP UB provides award facilities for FTP UB students who have won competitions at regional, national, and international levels. It is expected to provide motivation for all active students to compete to improve their achievements while still in college. For this reason, students need to understand the procedure for submitting awards for outstanding students.

Implementation procedures include:1)Students register for student affairs by bringing the requirements (photocopy of KTM, biodata, certificate of achievement support); 2) Students fill out a list of achievements; 3) Students verify files and recap; 4) Submission of proposals shall be accompanied by an acknowledgment sheet signed by the Deputy Dean for Student Affairs, and provide disposition of the disbursement of funds to the head of the student affairs subdivision; 5) Received by the treasurer of the LKM or the head of the activity implementer.

10.6. Graduation

Universities and faculties as a forum for holding graduations every month with a graduation system in collaboration with faculties in terms of determining quotas, as for the completeness facilities, graduates/faculty graduates who facilitate. So that alumni data is available and the administration of graduation participants is orderly so that prospective graduates can carry out their graduation smoothly.

Implementation procedures include: 1)Graduation registration; 2) Filing in student affairs; 3) Fill in the alumni biodata; 4) Recap of biodata of prospective graduates and graduates; 5) Graduation announcement; 6) Toga taking; 7) Taking graduation photos.