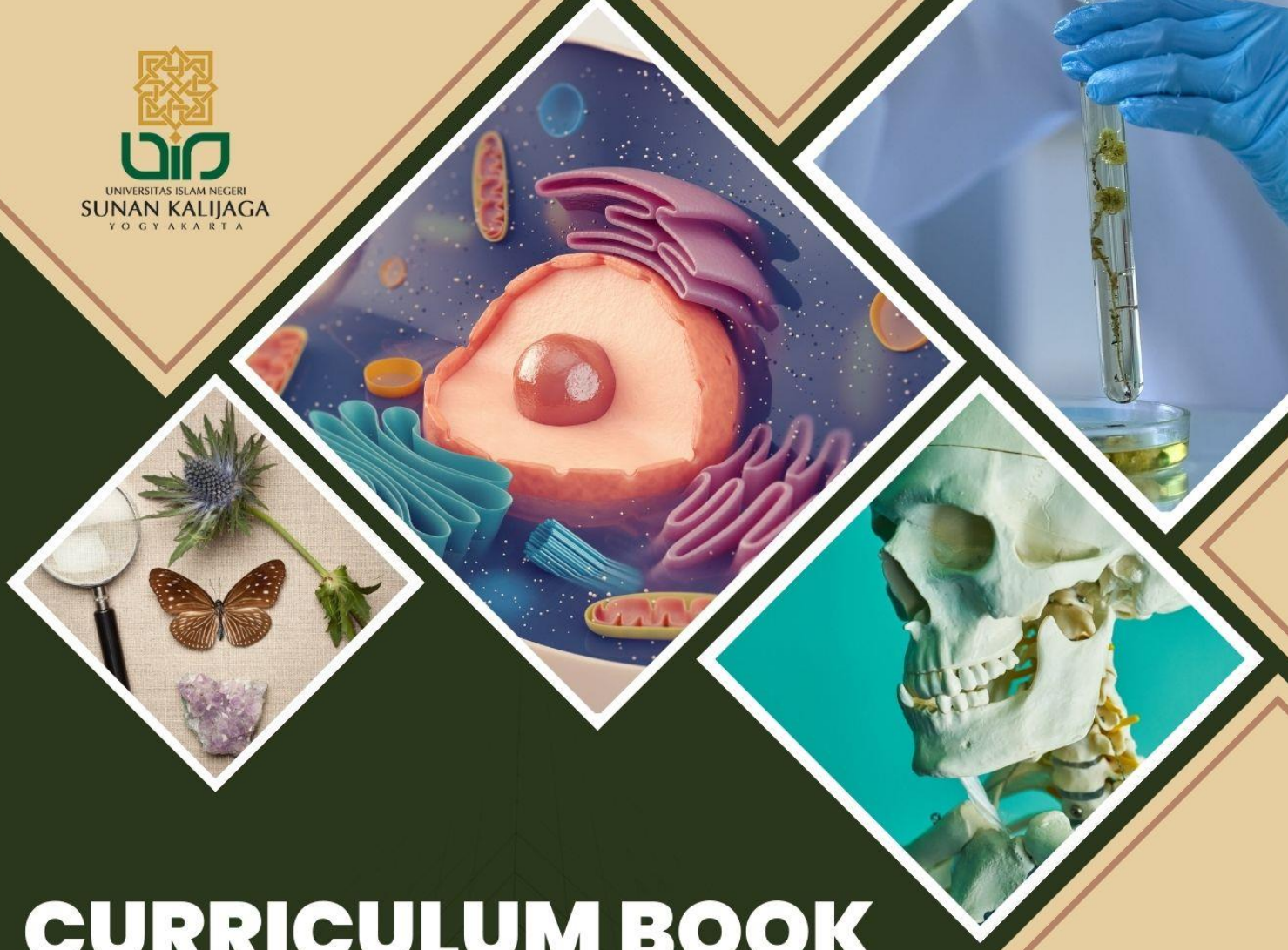
UNIVERSITAS ISLAM NEGERI
SUNAN KALIJAGA
YOGYAKARTA



CURRICULUM BOOK

BACHELOR OF BIOLOGY

FACULTY OF SCIENCE AND TECHNOLOGY

UIN SUNAN KALIJAGA YOGYAKARTA

PREFACE

Assalamu'alaikum Wr. Wb.

AlhamdulilLaah Robbil 'aalamiin, praise and gratitude are due to Allah SWT, the Creator of all knowledge and knowledge for the compilation of the 2020 Curriculum for the Biology Study Programme. This curriculum is designed based on the results of an evaluation of the effectiveness of the 2016 curriculum implementation as well as a response to various developments that exist to improve academic quality in the Biology Study Programme.

Curriculum development is a necessity as a dynamic anticipation of the development and demands of the times. John Dewey, an education expert, argued that education is life, so education should be able to provide guidance to humans in their lives. Thus, when the demands for quality improvement are inevitable, it is necessary to design an appropriate curriculum.

The development of the Biology Study Programme curriculum cannot be separated from the role of various parties. Therefore, thanks are extended to the Head of the Faculty of Science and Technology and its staff, lecturers in the Biology Study Programme, resource persons from academics and practitioners, and all those who have helped the 2020 curriculum development process. May Allah SWT give the best reward.

Finally, nothing is perfect except the Most Perfect. All constructive suggestions for curriculum development in the Biology Study Programme are always expected.

Wassalamu'alaikum Wr. Wb.

Yogyakarta, 25 August 2020

Head of the Biology Study Programme

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THE STRUCTURE AND THE IMPLEMENTATION OF CURRICULUM OF BIOLOGY STUDY PROGRAM

A. Program Study Profile

The bachelor's program in Biology is one of the study programs offered at the Faculty of Science and Technology at UIN Sunan Kalijaga Yogyakarta based on the Approval Letter of the Minister of National Education No. 05/MPN/HK/2004 dated January 23, 2004, addressed to the Minister of Religious Affairs. Presidential Decree No. 50 of 2004 article 2, paragraph 2 stated that UIN Sunan Kalijaga Yogyakarta is technically academic in general science fostered by the Minister of National Education cq. Director General of Higher Education, and technically functionally facilitated by the Minister of Religious Affairs under the Director General of Islamic Education. Thus, administratively, the Biology Study Program is under the guidance of the Ministry of Religious Affairs. However, academically, the Biology Study Program is under the guidance of the Ministry of National Education.

The Biology Study Program is committed to implementing the tri dharma of higher education, including aspects of education and teaching, research, and community service, as an implementation of an interpretation of the essential Islamic teachings. This commitment is born from the spirit to achieve the vision of "Excellence and forefront in integrating Islamic and scientific values in Biology for civilization". This vision is manifested in efforts to integrate and interconnect Islamic values with the fields of Biology and engineering, as a form of contribution in answering the challenges of advancing civilization, especially the challenges of civilization faced by Muslims today.

The orientation of the Biology Study Program curriculum development is to equip students with the basics of science in the fields of biology and engineering, as well as Islamic religious knowledge, socio-culture, information technology and language. This is based on the vision, mission, goals and objectives of the Biology Study Program. Therefore, the resulting graduates are graduates who are superior and prominent, that is, besides having scientific skills, they also have moral and ethical skills based on Islamic teachings.

B. Vision, Mission, Study Program Objectives

The Biology Study Program has a vision, mission, and goals which are derivative forms of the vision, mission and goals of organizations at a higher level, namely UIN Sunan Kalijaga and the Faculty of Science and Technology.

Vision of the Biology Study Program
Excellence and leading in the development and integration of biology for biodiversity and conservation based on local wisdom with Islamic insights and values at the global level by 2039.

Mission of the Biology Study Program
Organizing education and teaching, research and scientific publications, as well as community service in the field of biology for biodiversity and conservation based on local wisdom which is integrated with Islamic and Indonesian insights and values to educate life and support the nation's competitive advantage, and contribute to the progress of human civilization.

Objectives of the Biology Study Program
1. *Graduates can become professionals in the field of biological research and testing.*
2. Graduates can take and complete further education.
3. Graduates can participate in providing creative and innovative alternative solutions based on biology as their contribution to problems in society and the environment.

C. Graduate Profile

The profile of study program graduates is formulated with professional roles and a series of competencies (learning outcomes) that graduates must have to carry out these roles in a professional, accountable, and manner, have the knowledge, skills, independence, and attitudes to find, develop, and apply the science, technology, and art that are beneficial to humanity (PP No. 19 Year 2005 article 26 paragraph 4). Based on the studies conducted, the study program determines the profile of graduates. The Biology Study Program consists of 3 graduate profiles. As shown in the following table:

Table 1 Programme Educational Objectives (PEO)

PEO 1	Graduates who can apply biological principles and master laboratory skills and fields professionally can also design and conduct research based on scientific methodology.
PEO 2	Graduates who can design programs based on mastery and skill in biology for biodiversity and conservation by internalizing Islamic values.
PEO 3	Graduates who can think critically, creatively, and innovatively also have empathy, communication, and cooperation skills.
PEO 4	Graduates who are able to conduct inspections to verify the halalness of processing and products based on the principles of Islamic law and the halal assurance system.
PEO 5	Graduates who demonstrate resilience, independence and entrepreneurial spirit.

D. Program Learning Outcomes

Table 2. Learning Outcomes

No	LO of Biology Study Program Based on KKNI	Dimension
1	2	3
1.	Contribute to improving the quality of life and the environment based on Islamic values and Pancasila	Attitudes and Values
2.	Have an attitude of independence, struggle as a lifelong learner and have an entrepreneurial spirit	
3.	Integrates relevant biological principles and concepts in natural resource and environmental management	Knowledge
4.	Able to practice standard laboratory and field methods for analysis in the field of biology	
5.	Able to design relevant research frameworks and procedures in biodiversity and conservation with Islamic values	
6.	Able to explain the concept of halal and haram products based on Islamic law	
7.	Able to present ideas logically and systematically according to the rules of scientific ethics	General Skills
8.	Able to evaluate and process data validly and able to collaborate in groups	
9.	Able to present and communicate solutions in managing biological and environmental resources based on biological science	Special Skills
10.	Able to identify materials and components in the halal product process	

E. Curriculum Maps

1. Compulsory Courses for the Biology Study Program

The composition of the Biology Study Program's compulsory scientific courses along with the credit loads as basic courses according to the relevant study material of 88 credits which includes:

a. National Insight Study Materials = 6 credits
b. Social and Religious Study Materials = 14 credits
c. Basic Mathematics and Science Study Material = 7 credits
d. Biology Core Study Materials = 61 credits

Table 3. Compulsory Courses for the Biology Study Program

No	Subject	Credit Course	SMT	Prerequisite	Type of prerequisite	Related LO
1	Pancasila	2	1	-	-	1,2
2	Citizenship	2	2	-	-	2
3	Indonesian	2	1	-	-	2, 9
4	Introduction yo Islam Studies	2	1	-	-	1, 6, 9
5	'Ulum Al Qur'an	2	1	-	-	1, 6, 9
6	'Ulum Al Hadith	2	1	-	-	1, 6, 9
7	Islam and Natural Science	2	3	-	-	1, 6, 9
8	Islam and Social Humanities	2	3	-	-	1, 6, 9
9	Islamic Civilization	2	4	-	-	1, 3, 6
10	Assistance for Prophetic Biology	1	3	-	-	1, 3, 6
11	Mathematics for Biology	3	1	-	-	4, 5
12	Basic Science for Biology	4	1	-	-	4, 5, 8
13	Biological Concepts	3	1	-	-	4, 6
14	Biostatistics	3	2	Mathematics for Biology	Taken	4, 5, 10
15	Biochemistry	3	2	Basic Science for Biology	Taken	5, 8
16	Animal Structure and Development	3	2	Biological Concepts	Taken	4, 6, 8, 7
17	Structure and Development of Plants	3	2	Biological Concepts	Taken	4, 6, 7
18	Microbiology	4	2	Biological Concepts	Taken	4, 6, 7, 8
19	Animal Physiology	3	3	Animal Structure and Development	Taken	4, 5, 6, 8, 9,11
20	Plant Physiology	3	3	Structure and Development of Plants	Taken	4, 5, 6, 8, 11
21	Biosystematics	3	3	Biological Concepts	Taken	4, 5, 6, 11
22	Genetics	4	2	Biological Concepts	Taken	4, 5, 6,8, 9, 11
23	Ecology	4	4	Biosystematics	Taken	4, 6, 9, 10, 11
24	Evolution	2	4	Biological Concepts, Animal Structure and Development, Structure and Development of Plants	Taken	4, 6
25	Cell and Molecular Biology	4	3	Biological Concepts	Taken	4, 6, 9, 11

No	Subject	Credit Course	SMT	Prerequisite	Type of prerequisite	Related LO
26	Biotechnology	2	4	Biological Concepts	Taken	4, 5, 6, 8, 9, 11
27	Conservation Biology	3	4	Biological Concepts, Ecology	Taken	4, 6, 9, 11
28	Bioethics	2	4	Biological Concepts	Taken	1, 3, 9
29	Bioproducts and Entrepreneurship	3	4	Biological Concepts	Taken	2, 3, 6
30	Methods and Writing Scientific Papers	4	4	Biological Concepts	Taken	2, 6
31	Field Practice *	3	6	Biological Concepts	Taken	1, 2, 6
32	KKN*	4	7	Biological Concepts, Methods and Writing Scientific Papers	Passed (min score C)	1, 2, 6, 11
33	Final Project	4	8	Methods and Writing Scientific Papers	Passed (min score C)	1, 2, 6, 11

*Compulsory courses for students who have not taken merdeka belajar

2. Specific Biology Study Program Elective Subjects Graduate profile

Biology graduate profile takes 148 credits which include:

a. Compulsory courses in Biology Study Program = 88 credits (Table 12)

b. Elective courses (Biology interest/merdeka belajar) = 60 credits (Table 13

Table 13. Mapping of elective / specialization courses for Programme Educational Objectives

No.	Study Materials	Topics	Courses	SMT	Credit	Programme Educational Objectives (PEO)				
						1	2	3	4	5
1	2	3	4	5	6	7	8	9	10	11
1.	Specific Biodiversity	Studies on specific organisms (animals or plants or microorganisms) which include: 1. Structure 2. Development 3. Physiology 4. Systematics	**Zoology:**							
			Animal Comparative Anatomy	5	3	√	√	√	√	√
			Reproductive Biology	6	3	√	√	√	√	√
			Behavioural Biology	6	3	√	√	√	√	√
			Entomology	6	3	√	√	√	√	√
			Herpetology	6	3	√	√	√	√	√
			Ichthyology	6	3	√	√	√	√	√
			Immunobiology	7	3	√	√	√	√	√
			Mammalogy	7	3	√	√	√	√	√
			Ornithology	5	3	√	√	√	√	√
			Invertebrate Systematics	5	3	√	√	√	√	√
			Vertebrate Systematics	5	3	√	√	√	√	√
			Teratology	7	2	√	√	√	√	√
			Botany							
			Comparative Anatomy of Plants	5	3	√	√	√	√	√
			Bryology	6	3	√	√	√	√	√
			Plant Ecophysiology	6	3	√	√	√	√	√
			Plant Morphogenesis	6	3	√	√	√	√	√
			Orchidology	6	3	√	√	√	√	√
			Plant Systematics	5	3	√	√	√	√	√
			Microbiology:							
			Bacteriology	5	3	√	√	√	√	√
			Enzymology	5	3	√	√	√	√	√
			Physiology	6	3	√	√	√	√	√
			Microbial Physiology	5	3	√	√	√	√	√
			Mycology	5	3	√	√	√	√	√
			Microbial Systematics	6	3	√	√	√	√	√
			Virology	7	2	√	√	√	√	√
2.			Environmental Quality Standards	6	3	√	√	√	-	√

No.	Study Materials	Topics	Courses	SMT	Credit	Programme Educational Objectives (PEO)				
						1	2	3	4	5
1	2	3	4	5	6	7	8	9	10	11
	Applied Biodiversity		Biogeography	7	3	√	√	√	-	√
			Environmental Fiqh	6	3	√	√	-	-	√
			Animal Biotechnology	7	3	√	√	√	-	√
			Plant Biotechnology	6	3	√	√	√	-	√
			Tropical botany	7	3	√	√	√	-	√
			Aquatic Ecology	5	3	√	√	√	-	√
			Animal Ecology	5	3	√	√	√	-	√
			Microbial Ecology	5	3	√	√	√	-	√
			Terrestrial Ecology	7	3	√	√	√	-	√
			Ethnobiology	6	3	√	√	√	-	√
			Population Genetics	6	3	√	√	√	-	√
			Nutrition and Health	7	3	√	√	√	-	√
			Industrial Microbiology	6	3	√	√	√	-	√
			Food Microbiology	6	3	√	√	√	-	√
			Plant Nutrition	6	3	√	√	√	-	√
			Natural Material Products	7	3	√	√	√	-	√
3.	Biological technical skills	1. Laboratory management 2. Biological testing techniques at various levels from molecular to ecosystem	AMDAL	5	3	√	√	√	-	√
			Biomolecular Analysis	6	3	√	√	-	-	√
			Biological Assistance	5	3	√	√	-	-	√
			Bioinformatics	5	3	√	√	√	-	√
			Biomonitoring	5	3	√	√	√	-	√
			Bioremediation	6	3	√	√	√	-	√
			Ecotoxicology	6	3	√	√	√	-	√
			Plant Tissue Culture	5	3	√	√	-	-	√
			Conservation Management	6	3	√	√	√	-	√
			Analytical Microbiology	6	3	√	√	√	-	√
			Microtechnics	5	3	√	√	-	-	√
			Biology Project	5	3	√	√	√	-	√
			Computational Biology	6	3	√	√	√	-	√
			Plant Breeding	6	3	√	√	-	-	√

No.	Study Materials	Topics	Courses	SMT	Credit	Programme Educational Objectives (PEO)				
						1	2	3	4	5
1	2	3	4	5	6	7	8	9	10	11
		3. Modeling of biological studies	Molecular Biology Engineering	7	3	√	√	-	-	√
			Urban Farming	7	3	√	√	√	√	√
			Economic botany	5	3	√	√	-	-	√
			Editing dan Layouting	5	3	√	√	√	√	√
			Literature Review	6	3	√	√	√	√	√
			Presentation Skill	5	3	√	√	√	√	√
			Journal Article Writing Techniques	5	3	√	√	√	√	√
			Aquaculture	5	3	√	√	-	-	√
			Biology and Environmental Instrumentation	6	3	√	√	√	-	√
			Capita selecta 1	5,6,7	2	√	√	√	√	√
			Capita selecta 2	5,6,7	3	√	√	√	√	√
			Capita selecta 3	5,6,7	4	√	√	√	√	√
4.	Biology-Education	Pedagogic and Didactic	Studying and Learning	6	3	√	√	√	√	√
			Curriculum and Learning Design	5	3	√	√	√	√	√
			Learning Resources and Media	5	3	√	√	√	√	√
			Learning Assessment	5	3	√	√	√	√	√
			Student Development	5	3	√	√	√	√	√
			Education Management	5	3	√	√	√	√	√
5.	Biology – halal	1. Legal principles regarding halal products. 2. Science, technology, and regulation of halal products	Fiqh of Halal Products	5	4	√	√	-	√	√
			Material Critical Points	5	4	√	√	-	√	√
			Halal Slaughter Animals	5	2	√	√	-	√	√
			Halal Audit	6	4	√	√	-	√	√
			Halal Testing Laboratory	6	4	√	√	-	√	√
			Halal Assurance System	6	3	√	√	-	√	√

No.	Study Materials	Topics	Courses	SMT	Credit	Programme Educational Objectives (PEO)				
						1	2	3	4	5
1	2	3	4	5	6	7	8	9	10	11
6.	Bio-entrepreneurship	Personal and team managerial skills	Financial Intelligence	7	2	√	-	-	-	√
			Innovation Management	7	3	√	-	-	-	√
			Project Management	7	3	√	-	-	-	√

The curriculum map is a course journey from semester 1 to the end that shows the relationship of knowledge. Curriculum mapping is a planning tool that can be used at any stage in the curriculum development cycle. This map is in the form of a graphic description or a synopsis of curriculum components that can be used to map study program courses and lead to efforts to achieve learning outcomes. The 2020 Curriculum Map for the Biology Study Program is presented in Figure 1.

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Pancasila	Citizenship	Islam & Natural Sciences	Islamic Civilization			KKN	FINAL PROJECT
Indonesian	'Ulum Al-Hadith	Islam & Social Humanities	Cell and Molecular Biology				
Introduction to Islamic Studies	Biochemistry	Genetics	Evolution				
'Ulum al Qur'an	Biostatistics	Biosystematics	Conservation Biology				
Mathematics for Biology	Animal Structure & Development	Animal Physiology	Bioproducts & Entrepreneurship				
Basic Science for Biology	Structure & Development of Plants	Plant Physiology	Bioethics				
Biological Concepts	Microbiology	Ecology	Biotechnology				
		Assistance for Prophetic Biology	Methods & Writing Scientific Papers				
20 Credits	20 Credits	22 Credits	22 Credits	20 Credits	20 Credits	20 Credits	4 Credits

Notes:

Nationality Courses	Social & Religious Courses	Basic Science Courses	Basic Biology Courses	Intermediate Biology Courses	Integrated Biology Courses	Elective / Specialization courses

F. Lecturers

No	Lecturers' Name	NIDN (National Lecturer's Registration Number)	Educational Background	Field of Expertise
1	Prof. Dr. Maizer Said Nahdi, M.Si.	2027045501	Doctoral degree Biology UGM	Environmental Biology
2	Dr. Arifah Khusnuryani, M.Si.	2015057501	Doctoral degree Biology UGM	Microbiology
3	Dr. Isma Kurniatanty, M.Si.	2026107901	Doctoral degree SITH ITB	Animal Biotechnology
4	Siti Aisah, M.Si.	2011067401	Master Biology UGM	Ecology
5	Dr. Ika Nugraheni, AM., M.Si.	7028002	Doctoral degree Biology UGM	Botany
6	Lela Susilawati, PhD	0027017909	Doctoral degree TUAT Japan	Microbiology
7	Jumailatus Solihah, M.Biotech.	2024067601	Master Biotechnology UGM	Molecular Biology
8	Anti Damayanti H., M.Mol.Bio.	2022058101	Master University of Queensland	Molecular Biology
9	Erny Qurotul Ainy, M.Si.	2017127901	Master Biology SITH ITB	Microbiology
10	Najda Rifqiyati, M.Si.	2023057901	Mater Biology IPB	Zoology
11	Dr. Eka Sulistyowati, M.IWM		Doctoral degree Environmental Science UGM	Ecology and Environmentak Science
12	Ardyan Pramudya K., M.Si.	2003128401	Master Biology SITH ITB	Ecology
13	Anisa Nazera Fauzia, M. Biotech.	2002019102	Master Biotechnology UGM	Plant Molecular Biology
14	Shilfiana Rahayu, M.Sc.		Master Biology UGM	Botany
15	Dias Idha Pramesti, M.Si		Master, Biology Univeristas Brawijaya	Botany
16	Dian Aruni Kumalawati, M.Sc.	2009058504	Master Biology UGM	Molecular Biology
17	Agessty Ika Nurlita, M.Si.	-	Master Biology IPB	Microbiology
18	Satiti Ratnasari, M.Sc.	-	Master Agriculture UGM	Botany

G. Course Syllabus

1. Compulsory Courses Syllabus

Biological Concepts (3 Credits)

This course is a basic biology course that provides students with learning experiences related to the basic principles in biological systems from the cellular level to the organism level, biodiversity diversity, and the principles of conservation.

Reference:

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.

Genetics (4 Credits)

This course is a basic biology course that provides students with learning experiences related to genetics and organisms, genetic material, hereditary patterns, as well as genetic diversity.

References:

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Genetics: The Code of Life, 2011, Burton Guttman, Anthony Griffiths, David Suzuki, The Rosen Publishing Group, Inc.

Structure and Development of Plants (3 Credits)

This course is a basic biology course that provides students with learning experiences related to morphology, anatomy and histology of high and low plants which include roots, stems, leaves, flowers, and fruit for identification and classification purposes. This course is also related to the phases of development in plants, both the plant life cycle in the embryogenesis, morphogenesis, and organogenesis phases.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. An Introduction to Plant Structure and Development, 2010, Charles B.Beck. Cambridge.

Animal Structure and Development (3 Credits)

This course is a basic biology course that provides students with learning experiences related to the morphology, anatomy, and histology of vertebrate and invertebrate animals for identification and classification purposes. This course is also related to the developmental phases in animals, both the plant life cycle in the embryogenesis, morphogenesis, and differentiation phases.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Animal Structure and Function, 2012, Cecie Starr, Ralph Taggart, Christine Evers , Brooks/Cole

Microbiology (4 Credits)

This course is a basic biology course that provides students with learning experiences related to microbial diversity, nutrition and metabolism in microbes, methods and

techniques for microbial recognition, microbial growth and the factors that influence it, microbial applications.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Brock Biology of Microorganisms, 2012, Michael T. Mardigan, Benjamin Cummings.

Plant Physiology (3 Credits)

This course provides students with learning experiences related to biological processes in plants which include transportation of materials, nutrients, metabolism, motion, and growth in plants.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Plant Physiology, 2012, Hans Mohr, Peter Schopfer, Springer

Animal Physiology (3 Credits)

This course provides students with learning experiences related to biological processes in animals to maintain homeostatic conditions, including physiology of the nervous, muscular, sensory, endocrine, immune, respiration, coordination, digestion, reproduction and excretion.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Animal Physiology, 2017, Richard W. Hill, Gordon A. Wyse, Margaret Anderson, Sinauer Associates.

Biosystematics (3 Credits)

This course is a basic biology course that provides students with learning experiences related to the classification of organisms and their development, phylogenetic and phenetic methods, the concept of species, taxonomic characters, hierarchical categories, and nomenclature.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Textbook of Biosystematics, 2013, T. Pullaiah. Regency Publications

Ecology (4 Credits)

This course provides student learning experiences related to the ecological scope, life hierarchy, trophic level, population ecology, community and ecosystem, energy and matter in ecosystems, biogeochemical cycles.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Ecology: Principles and Application, 1999, JL. Chapman, MJ. Reiss, Cambridge

Cell and Molecular Biology (4 Credits)

This course provides student learning experiences related to the basic principles of life processes at the cellular and molecular levels.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Cell and Molecular Biology: Concepts and Experiments, 009, Gerald Karp,

Evolution (2 Credits)

This course provides student learning experiences related to the basic principles of life processes at the cellular and molecular levels.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Evolution: the Remarkable History of Scientific Theory, 2006, Edward J. Larson.

Biodiversity and Conservation (3 Credits)

This course is an integrated biology course that provides student learning experiences related to natural resource management and sustainability.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Conservation Biology: Foundations, Concepts, and Application, 2008, Fred Van Dyke

Bioproducts and Entrepreneurship (3 Credits)

This course is an integrated biology course that provides student learning experiences related to bioproduct diversity, bioproduct production processes, strategies for managing biological resources and overcoming environmental footprints, developing bioproduct business.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Bioproducts and Bioprocess

Bioethics (2 Credits)

This course is an integrated biology course that provides student learning experiences related to the influence of the development of biology and biotechnology on ethical, social, and religious aspects, bioethical conventions, local and religious values for bioethics, as well as current issues related to bioethics.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Bioethics: An Introduction to The History, Methods, and Practice

Biotechnology (2 Credits)

This course is an integrated biology course that provides students with learning experiences related to the understanding of biotechnology, history of biotechnology, conventional and modern biotechnology, metabolic engineering, reproductive engineering, genetic engineering, basic principles of molecular engineering, microbial and animal biotechnology, regulation, regulation and application of biotechnology.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Molecular Biology and Biotechnology,JM. Wakherm R. Rapley, EB. Gingold

Mathematics for Biology (3 Credits)

This course provides student learning experiences related to mathematical concepts used in biological studies.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Maths Skills for Biology a Level

Basic Science for Biology (4 Credits)

This course provides student learning experiences related to mathematical concepts used in biological studies.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Physics and Biology
c. Basic Chemistry for Biology

Assistance for Prophetic Biology (2 Credits)

This course provides experience and assistance to students related to the process of habituating religious attitudes and behaviors in biology learners.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Seri Buku HAMKA

Biochemistry (3 Credits)

This course is the basic science that supports biological studies which provides student learning experiences related to the organization of living matter, water as a solvent, the molecules of life.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Biochemistry, 2011, Mary K, Campbell, Shawn O. Farrel

Biostatistics (3 Credits)

This course is the basic science that supports biological studies which provides student learning experiences related to the organization of living matter, water as a solvent, the molecules of life.

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Biostatistics: Concepts and Applications for Biologists, 2017, Brian William.

Pancasila (2 Credits)

The Pancasila course contains study material and lessons aimed at providing an understanding of the historical reality of the journey of the Indonesian nation. Along with the development of national and state life in Indonesia, Indonesia's young generation in this reform era need to gain knowledge and understanding of the journey of their nation. This course is a course with an Indonesian character that is needed for all Indonesian people and the nation, especially for the younger generation so that they can shape behavior and attitudes with Indonesian character based on the national cultural values. This course discusses the notion of Pancasila, the foundation and objectives of the Pancasila, Pancasila courses in a theoretical, philosophical, ideological, juridical, sociological and cultural review and their dynamics in the life of society, nation and state. Specifically, it is deemed necessary for State Islamic University students to make a correlation between Pancasila and Islamic values.
Main references:

a. Fajar Sudjarwo, Kebudayaan Global dan Lokal, UGM, Yogyakarta, 2016
b. Faisal Ismail, Republik Bhinneka Tunggal Ika: Mengurai isu-isu konflik, Multikulturalisme, Agama dan Sosial Budaya, Kemenag RI, Jakarta, 2012
c. Yudi Latif, Negara Paripurna, Historisitas, Rasionalitas, dan Aktualitas Pancasila, Gramedia, Jakarta, 2012

d. Dan Nimmo, komunikasi Politik, Komunikator, Pesan dan Media, Rosdakarya, Bandung, 2015
e. ----------, Komunikasi Politik, Khalayak dan Efek, Rosdakarya, Bandung, 2015
f. Hamdan Daulay, Membangun Kerukunan Berpolitik dan Beragama di Indonesia, Kemenag RI, Jakarta, 2010
g. Hamdan Daulay, dkk, Pancasila dan Kewarganegaraan, UIN Suka, Yogyakarta, 2005
h. Mochtar Lubis, Memahami Media Massa, Balai Pustaka, Jakarta, 2000
i. Ronald H. Chilcote, Teori Perbandingan Politik, Grafindo, Jakarta, 2007
j. Ramlan Surbekti, Memahami Ilmu Politik, Grasindo, Jakarta, 2012
k. David Gerry Stoker, Teori Ilmu Politik, Nusamedia, Bandung, 2010

Additional references:

a. Hariyono, Ideologi Pancasila Roh Progresif Nasionalisme Indonesia, Malang, Intrans Publishing, 2014
b. Kaelan, Pendidikan Pancasila, Yogyakarta, Paradigma Offset, 2010
c. Kementerian Riset, Teknologi dan Pendidikan Tinggi Republik Indonesia, Pendidikan Pancasila untuk Perguruan Tinggi, Jakarta, 2016
d. Sinal, Mohamad, dkk, Buku Ajar Pancasila, Total Media, Yogyakarta, 2010
e. Kementerian Pendidikan dan Kebudayaan, Materi Ajar Mata Kuliah Pendidikan Pancasila, Jakarta, 2013
f. Winarno, Pendidikan Pancasila di Perguruan Tinggi, Surakarta, Yuma Pustaka, 2012

Indonesian Language (2 Credits)

As a compulsory subject for all tertiary institutions in Indonesia, the Indonesian language course emphasizes the skills of writing scientific papers using Indonesian that is good, correct, and responsible. Considering that Indonesian is a language known from birth and formally learning has been given for 12 years at the elementary, junior high and high school levels, Indonesian language material has a high content, namely scientific writing. In following this course students will learn the nature of scientific work to the latest technical language problems in packaging arguments into a scientific work.

Main references:

a. Adib Sofia, Metode Penulisan Karya Ilmiah, Yogyakarta: Bursa Ilmu, 2017.
b. Aninditya Sri Nugraheni, Bahasa Indonesia di Perguruan Tinggi Berbasis Pembelajaran Aktif, Jakarta: Prenada Media, 2017
c. Chaer, Abdul. 2011. Ragam Bahasa Ilmiah. Jakarta: Rineka Cipta.
d. Khairah, Miftahul. 2015. Sintaksis: Memahami Satuan Kalimat Perspektif Fungsi. Jakarta: Bumi Aksara.
e. Putrayasa, Ida Bagus. 2014. Kalimat Efektif. Bandung: Refika Aditama.
f. Rahardi, Kunjana. 2010. Bahasa Indonesia untuk Perguruan Tinggi. Jakarta: Erlangga.

Additonal references:

a. Bailey, Stephen. Academic Writing: A Handbook for International Students. 3rd Ed. London and New York: Routledge, 2011.
b. Chaer, Abdul. 2011. Tata Bahasa Praktis Bahasa Indonesia. Jakarta: Rineka Cipta.
c. Hernowo. 2001. Mengikat Makna. Bandung: Kaifa.
d. Pranowo. 2012. Berbahasa secara Santun. Yogyakarta: Pustaka Pelajar
e. Putrayasa, Ida Bagus. 2017. Sintaksis: Memahami Kalimat Tunggal. Bandung: Refika Aditama.
f. Rahardi, Kunjana. 2010. Penyuntingan Bahasa Indonesia Untuk Karang Mengarang. Jakarta: Erlangga

Introduction to Islamic Studies (4 Credits)

This course is a course that defines the university as an Islamic university, which provides students with knowledge about the scope of Islamic studies in higher education, as well as the relationship between Islamic studies and contemporary science and issues.

References:

a. Abudin Nata, Metodologi Studi Islam, Jakarta: Raja Grafindo Persada, 2002
b. Harun Nasution, Islam ditinjau dari Berbagai Aspeknya, Jakarta: UI Press, 1979.
c. Khoiruddin Nasution, Pengantar Studi Islam, Yogyakarta: Tazzafa, 2009
d. M. Amin Abdullah, Studi Agama: Normativitas atau Historisitas, Yogyakarta: Pustaka Pelajar 1996
e. M. Amin Abdullah, Studi Islam di perguruan Tinggi.Pendekatan Integratif Interkonektif. Yogyakarta: Pustaka Pelajar2006.

Ulumul Qur'an (2 Credits)

Students are able to apply the science of the study program based on the core values of UIN Sunan Kalijaga and Indonesianness comprehensively

Main references:

a. Abdul Jalal, "Ulumul Qur'an"
b. M. Quraish Shihab, "Wawasan al-Qur'an"
c. Muhammad Chirzin, "Al-Qur'an dan Ulumul Qur'an"
d. W. Montgomery Watt, "Pengantar Sejarah al-Qur'an"
e. Subhi ash-Shalih, "Membahas Ilmu-ilmu al-Qur'an"
f. Taufik Adnan Amal, "Rekonstruksi Sejarah al-Qur'an"
g. Ali ash-Shabuniy, "at-Tibyan fi Ulumul Qur'an"
h. M.M. A'Zami, "Sejarah Teks al-Qur'an: Dari Wahyu sampai Kompilasi"
i. Fazlur Rahman, "Tema-tema Pokok al-Qur'an"
j. Abdullah Saeed, "Pengantar Studi al-Qur'an"
k. Sahiron Syamsuddin, "Hermeneutika al-Qur'an dan Hadis"

Additional references:

a. M. Quraish Shihab, "Membumikan al-Qur'an"
b. M. Hasbi ash-Shiddieqy, "Sejarah dan Pengantar Ilmu al-Qur'an"
c. Yunahar Ilyas, "Kuliah Ulumul Qur'an"
d. Manna' al-Qaththan, "Membahas Ilmu-ilmu al-Qur'an"
e. Rosihon Anwar, "Ulumul Qur'an"
f. Harun Yahya, "al-Qur'an dan Sains"
g. Maurice Bucaille, "Qur'an dan Sains Modern"

Citizenship (2 Credits)

This Citizenship course is a medium for educating students to know the state and nation of Indonesia, understand their rights and obligations, and be active as citizens (good citizen and good students).

Main references:

a. Tim Dikti Diknas, Modul Kuliah Kewarganegaraan, Jakarta: Dikti Diknas, 2016.
b. Beni Kurniawan, Pendidikan Kewarganegaraan Untuk Mahasiswa, Sukabumi: Jelajah Nusantara, 2012.

Additional references:

a. Hamid Darmadi, Pendidikan Pancasila dan Kewarganegaraan di Perguruan Tinggi, Bandung: Alfabeta Bandung, 2013.
b. Kaelan dan Ahmad Zubaidi, Pendidikan Kewarga Negaraan untuk Penguruan Tinggi, Jogyakarta: Paradigma, 2010.

c. Sumarsono, Pendidikan Keraganegaraan, Jakarta: Gramedia Pustaka Indonesia, 2005.

Ulumul Hadith (2 Credits)

The Ulumul Hadith course is a compulsory university course. It discusses the basics of Ulumul Hadith, its branches and the position and function of hadith in Islamic teachings
Reference:

a. Ibn Shalah, Muqadimah Ibn Shalalh
b. M. A'jaj al-Khatib, Ushul al-Hadis wa Musthalahuhu.
c. Subhi al-Shalih, Ulumul hadis
d. Imam al-Suyuthi, Tadrib al-Rawi
e. Mahmud al-tahhan, Taisir Mustalah al-Hadis
f. Nuruddin Itr, Manhaj al-Naqd fi Ulum al-Hadis
g. Al-Khatib al-Baghdadi, Al-Kifayah fi Ilm al-Riwayah

Islam and Natural Sciences (2 Credits)

This course explains about Islam and science related to the structure of science, the development of science, contemporary issues of science in the context of interconnected integration.
References:

a. Ian Barber Sains to meet religion
b. Science and Religion (John F. Haought)/ terjemahan : Sains dan Agama
c. Nalar Ayat-ayat Semesta (Agus Purwanto :2015)
d. Memahami sains modern
e. Islam dan Sains modern
f. Filsafat sain dalam Al Qur'an

Islam and Social Humanities (2 Credits)

This course explains Islamic teachings related to the development of Social and Humanities sciences. After participating in this course, students will be able to take part in their study program while still prioritizing the values of Islamic teachings.
Reference:

Main:

a. Koentjaraningrat, Manusia dan Kebudayaan di Indonesia
b. Ali Syariati, sosiologi islam
c. Ibnu Khaldun. Muqaddimah
d. Kuntowijoyo, Paradigma Islam
e. Jasser Audah. Membumikan Hukum Islam
f. Fazlurrahman. Tema Pokok dalam al qur'a
g. Toshiko Isuzu. Relasi manusia dalam al qur'an
h. George Ritzer
i. Antony Gidden

Additonal;

a. Atha' Mudzahar, pendekatan dalam studi Islam
b. Amin Abdullah, islam normativitas dan historisitas
c. Musa Asy'ari, Islam, etos kerja, dan pemberdayaan ekonomi
d. Akh. Minhaji. Sejarah sosial dan studi Islam
e. Yudian Wahyudi, rekonstruksi peradaban Islam
f. Al Makin, Islam dan Keragaman

Islamic Civilization (2 Credits)

This course explains Islamic teachings related to the development of Social and Humanities sciences. It is hoped that after participating in this course, students will be

able to take part in their study program while still prioritizing the values of Islamic teachings.

References:

a. Mariam, (2004). Sejarah Peradaban Islam: dari Masa K, Ylasik hinggga Modern, Yogyakarta: LESFI.
b. Yatim, Badri. (1993). Sejarah Peradaban Islam-Dirasah Islamiyah II, Jakarta: PT. Raja Grafindo Persada
c. Ahmad Amin, (1975). Fajr al-Islam, Kairo: Maktabat al-Nahdhat al-Mishriah,
d. Syalabi, (1997) Sejarah Kebudayaan Islam, Bulan Bintang, Jakarta.
e. Hak, Nurul (2012) SEJARAH PERADABAN ISLAM Rekayasa Sejarah Daulah Bani Umayyah. Buku, Vol. 1 (Cet. 1). Gosyen Publishing, Yogyakarta.
f. Ummatin Khoiru, (2015) Sejarah Islam dan Budaya Lokal: Kearifan Islam atas Tradisi Masyarakat, Kalimedia Yogyakarta
g. Dan Jurnal Jurnal terkait

Additonal:

a. Hitti, Philip K., (2010) History of the Arabs: from the Earliest Times to the Present. terj. R. Cecep Lukman Yasin dan Dedi Slamet Riyadi, Jakarta: Serambi Ilmu Semesta,
b. Ahmad Amin, (1973) Dhuha al-Islam, Kairo: Maktabat al-Nahdhat al-Mishriah,.
c. Ahmad Amin, (1964) Dzuhrul Islam, jld IV, Kairo: Maktabah an Nahdh al Misriyah,.
d. Toynbee, Arnold, (2007). Sejarah Umat Manusia: Uraian Analitis, Kronologis, Narasi, dan Komparati, terj, Agung Prihantoro, dkk., cet. ke-4, Yogyakarta: Pustaka Pelajar,
e. Karim, M. Abdul, (2009) Sejarah Pemikiran dan Peradaban Islam, Yogyakarta: Pustaka Book Publisher

f. Compulsory Courses Syllabus

Animal Comparative Anatomy (3 credits)

This course is an elective course that provides learning experiences related to the comparison of morphological evolution in each class of vertebrates based on the relationship of structure and function which includes comparisons of organ systems.

Reference:

Kardong, K.V (2015). Vertebrates: comparative anatomy, function, evolution. 7th ed. McGraw Hill

Behavioral Biology (3 Credits)

This course provides students with learning experiences about various animal behavior and the physiological aspects that play a role in these behaviors.

Reference:

Kimball, W J. 1999. Biologi. Jakarta: Erlangga

Reproductive Biology (3 Credits)

This course provides student learning experiences related to the concept of reproductive biology and working principles of livestock reproduction biotechnology as well as verses from the Qur'an and Hadith related to Reproduction.

Reference:

Hafez, E. S. E., & B. Hafez. (2000). Reproduction in Farm Animals (7th ed.). Philadelphia: Lippincott Williams & Wilkins

Entomology (3 Credits)

This course is a course that examines the biology of the insect class which includes anatomy, physiology, structure and classification of insects as well as the relationship between insects and humans and their environment.

References:

a. Elzinga, R.J (1969). Fundamental of Entomology. New Delhi: Prentice Hall of India
b. Gullan, P.J & P.S. Crarston (2010). The Insect, An outline of Entomology. Wiley-Blacwell. A John Wiley & Sons, ltd.

Herpetology (3 Credits)

This course provides student learning experiences related to character and classification, anatomical and physiological structures, habitat and the role of amphibians and reptiles for humans based on existing local wisdom so that they know and are able to maintain the biodiversity of the amphibian and reptile classes.

Reference:

D.T. Iskandar. 1998. Amphibia Jawa Dan Bali

Ichtyology (3 Credits)

This course provides student learning experiences related to character and classification, anatomy and physiology structures, habitat and the role of the Pisces class for humans based on existing local wisdom so that they know how to maintain the biodiversity of the Pisces class.

References:

a. Rudie H. Kuiter. 1992. Tropical Reef-Fishes Of The Western Pacific And Indonesia Adjacent Water.
b. Fish Of The World

Immunobiology (3 Credits)

This course studies the immune system which includes innate and adaptic immune cells, studies the immune response and also the physiology of immune cells.

References:

a. Parham, P. (2015). The Immune System. 4th ed. Garlan science
b. Kuby, J. (2013) Immunobiology. 7th ed. By Owen, Punt, and Stranford outline of Entomology. Wiley-Blacwell. A John Wiley & Sons, ltd.

Mammalogy (3 Credits)

This course studies the character, identification, systematics of mammals to the family level as well as their adaptation and role to their environment

Reference:

Vaughan, T.A, J.M. Ryon, N, J. Czaplensky. (2015). Mamalogy. 6th Ed. Jones and Bartlett Publisher.

Ornithology (3 Credits)

This course provides student learning experiences related to character and classification, anatomical and physiological structures, habitat and the role of aves for humans so that they know and are able to maintain the biodiversity of aves class.

Reference:

Prawiradilga, D.M., S. Wijayamukti, A.Marakarunah, 2002. Buku panduan Identifikasi Burung Pegunungan di Jawa: Taman Nasional Gunung Halimun, Biodiversity Concervation Project LIPI-JICA-PHKA

Invertebrate Systematics (3 Credits)

This course provides students with a learning experience related to concepts, theory and practice in the field of invertebrates to witness the majesty of God with the existing kauniyah verses.

Reference:

Barnes, R. 2001. The Invertebrates. Blackwell Science.

Vertebrate Systematics (3 Credits)

This course provides student learning experiences related to character and classification, anatomy and physiology structures, habitat and the role of the Pisces class for humans based on existing local wisdom so that they know how to maintain the biodiversity of the Pisces class.

References:

a. Robert T. Orr. 1987. Vertebrate Biology.
b. Rudie H. Kuiter. 1992. Tropical Reef-Fishes Of The Western Pacific And Indonesia Adjacent Water.
c. D.T. Iskandar. 1998. Amphibia Jawa Dan Bali

Teratology (2 Credits)

This course studies abnormalities that occur in newborns until their development and studies their causes (teratogens).

References:

a. Anderson, D & D.H. Conint (1988). Eksperimen toxicology. The basic principle. Royal Society of chemistry. London
b. Sadler, T.W (1990). Medical Embriyology. 6th ed. William and Wilkin. Baltimore
c. Taylor, P. (1999). Practical Teratology. Academic Press. Ing. London

Comparative Anatomy of Plants (3 Credits)

This course examines the comparative anatomy of vascular plants, in this study studying the anatomy of ferns, gymnosperms and angiosperms. Students can study primitive plant anatomy and modern plant anatomy.

Reference:

Fahn, A. 1991. Anatomi Tumbuhan Edisi 3. Yogyakarta: Universitas Gadjah Mada Press.

Bryology (3 Credits)

This course studies abnormalities that occur in newborns until their development and studies their causes (teratogens).

References:

a. Crandall-Stotler, B., R.E. Stotler & D.G. L. Edinburgh. 2009. Phylogeny and Classification of the Marchantiophyta. Journal of Botany 66 (1): 155-198.
b. G.S. Michael. 1953. Plant Systematics. Elsevier Academic Press. USA.
c. Suparmi dan A.Sahri. 2009. Mengenal Potensi Rumput Laut : Kajian Pemanfaatan Sumber Daya Rumput Laut Dari Aspek Industri Dan Kesehatan: Sultan Agung 44 (118): 95-116.

Plant Morphogenesis (3 Credits)

The plant morphogenesis course provides students with learning experiences related to the process of plant morphogenesis, factors that influence morphogenesis, stages of plant development, autogenic differentiation, and plant regeneration and abnormalities.

References:

a. Sinnot,E.W, 1960, Plant Morphogenesis, McGrow-Hil Book Company, New York, Toronto, London
b. Esau, K. 1977. Anatomy of Seed Plants, 2nd edition, John Willey & Sons Inc. New York
c. B.M Johri.1984. Embryology of Angiosperm. Springer Verlag. Berlin

Orchidology (3 Credits)

This course is an applied biology course, in the orchidology course providing learning experiences to students related to orchid morphology, orchid biodiversity, orchid taxonomy, orchid cultivation techniques, and knowing the habitat of orchids, environmental factors that affect the growth of orchids, pests and diseases in orchid.

Reference:

Cullen. 1992. Orchid book: A Guide to the identification of cultivatd orchid species. Cambride University Press, UK.

Plant Systematics (3 Credits)

This course discusses the principles of plant taxonomy, covering the concept and importance of taxonomy for biology, the ability to describe, identify, and classify plants and nomenclature as well as the introduction of plant members in the Bryophyta, Pteridophyta and Spermatophyta groups.

Reference:

Michael. G. S. 1953. Plant Systematics. Elsevier Academic Press. USA.

Bacteriology (3 Credits)

This course is an elective course that provides student learning experiences related to morphology, physiology and the role of bacteria in nature.

References:

a. Amrita Rohilla, 2010, Handbook of Bacteriology
b. Goodfellow, M. & O,Donnell, A. G. (Eds.). 1993. Handbook of New Bacterial Systematics. Academic Press. London
c. Atlas, R.M. 1997. Principles of Microbiology. 2nd Edition. Wm. C. Brown. Publishers.USA.
d. Madigan, M.T., J.M. Martinko, and J. Parker. 2003. Brock Biology Of Microorganisms. 10th edition. Pearson Education, Inc. Upper Saddle River, New Jersey

Enzymology (3 Credits)

This course is an elective course that provides insights for students in terms of basic understanding of enzymes (molecular structure, character and working mechanisms), methods used for enzyme characterization and engineering, and the use of enzymes in various applicative fields. It requires a background in understanding biochemistry, and can be developed for a variety of more applicable purposes.

References:

D. L. Nelson & M. M. Cox (2010) Lehninger Principles of Biochemistry, 6th ed., W.H. Freeman and Company, New York, USA

Chaplin, M.F., Bucke, C. 1990. Enzyme Technology. Cambridge University Press.

Physiology (3 Credits)

This course is a basic biology course that provides students with learning experiences related to algae which include diversity, structure, function, ecology, and potential applications of algae.

References:

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Algae: Anatomy, Biochemistry and Biotechnology, 2006, Laura Barsanti, Paolo Gualtieri.

Microbial Physiology (3 Credits)

This course provides students with learning experiences related to physiological aspects of microbes such as nutritional needs, metabolic processes, growth and production of microbial primary and secondary metabolites, the techniques developed, and the application of microbial physiology in life.

References:

a. Atlas, R.M. 1997. Principles of Microbiology. 2nd Edition. Wm. C. Brown. Publishers.USA.
b. Brock Biology of Microorganisms, 2012, Michael T. Mardigan, Benjamin Cummings. Madigan, M.T., J.M. Martinko, and J. Parker. 2003.
c. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.

Mycology (3 Credits)

This course studies the biological aspects of fungi which include general characteristics of fungi, nutrition, metabolism, growth, reproduction, classification, interaction, as well as their application.

References:

a. Deacon, Jim. 2005. Fungal Biology. 4th edition. Blackwell Publishing.
b. Madigan, M.T., J.M. Martinko, and J. Parker. 2003. Brock Biology of Microorganisms. 10th edition. Pearson Education, Inc. Upper Saddle River, New Jersey

Microbial Systematics (3 Credits)

This subject studies the diversity of microbes and the kinship relationships between microbial members as well as Classification (Taxonomy practice), Nomenclature, and

Microbial Identification.

References:

a. Goodfellow, M. & O, Donnell, A. G. (Eds.). 1993. Handbook of New Bacterial Systematics. Academic Press. London
b. Atlas, R.M. 1997. Principles of Microbiology. 2nd Edition. Wm. C. Brown. Publishers.USA.
c. Madigan, M.T., J.M. Martinko, and J. Parker. 2003. Brock Biology of Microorganisms. 10th edition. Pearson Education, Inc. Upper Saddle River, New Jersey

Virology (2 Credits)

This course is an elective course that provides student learning experiences related to morphology, physiology and the role of viruses in nature.

References:

a. Basic Virology, 2008, Edward
b. Atlas, R.M. 1997. Principles of Microbiology. 2nd Edition. Wm. C. Brown. Publishers.USA.
c. Madigan, M.T., J.M. Martinko, and J. Parker. 2003. Brock Biology of Microorganisms. 10th edition. Pearson Education, Inc. Upper Saddle River, New Jersey

Environmental Quality Standards (3 Credits)

This course is a lesson about the suitability of environmental parameter quality to the regulatory regulations regarding value thresholds, so that environmental activities in an area do not violate the rules of the local area which provides student learning experiences related to the emission requirements of a human activity and several methods to improve environmental quality so that it is in accordance with quality standards

References:

a. Al-Qur'anul Karim
b. Mitchell, B., Setiawan B., dan Rahmi, D.H. 2007. Pengelolaan Sumberdaya dan Lingkungan. Penerbit Universitas Gadjah Mada. Yogyakarta
c. Kodoatir, R.J., dan Sjarief, R. 2008. Pengelolaan Sumber Daya Air Terpadu. Penerbit Andi. Yogyakarta
d. Ginting, P. 2007. Sistem Pengelolaan Lingkungan dan Limbah Industri. Penerbit Yrama Widya. Bandung

Animal Biotechnology (3 Credits)

Introduction to animal biotechnology, recombinant DNA techniques, gene cloning, vector and vector expression, transformation, transfection, PCR, genem instruction, DNA sequencing, the principle of nucleic acid transfer (southern, northen, western blotting), nucleic acid hybridization, application to plants (transfer embryos, IVF, artificial insemination, transgenic animals, animal tissue culture, cell lines), vaccinations, ethics

References:

a. Albert, et al. (2011). Molecullar biology of the cell. Garland Science
b. Freshnery, R.I (2005). Culture of animal cell. Wiley liss
c. Portner, R. (2007). Animal cell biotechnology. Humara Press

Microbial Biotechnology (3 Credits)

This course provides an overview of how microbes (for example bacteria, viruses and yeast) are manipulated and used to solve practical problems through biotechnology. Topics covered include the basics of life, microbial ecology and metabolism, methods used in microbial technology (from fermentation methods to genetic engineering), use of microbes in industry, microbes in drug development, interactions between microbes, plants and animals, microbes in the food sector, gut microbiota, and metagenomics. This subject requires a background in understanding microbiology, chemistry and biochemistry, as well as cell structure and function.

Reference:

Molecular Biotechnology. 2003. B. Glick & J. Pasternak. American Society of Microbiology

Plant Biotechnology (3 Credits)

The Plant Biotechnology course describes the notion of plant biotechnology, its development history, basic principles in plant biotechnology, plant genetic transformation methods, applications and the role of plant biotechnology in various fields such as forestry, agriculture, or industry.

Reference:

Abdin, M Z., Kiran, U., Kamaludin, M., Ali, A. 2017. Plant Biotechnology: Principles and Applications. Springer.

Economic Botany (3 Credits)

Economic Botany is a course of applied biology; Economic Botany is the study of the use of plants that have economic value for humans. Botanical economics discipline refers specifically to the study of the economic value of a plant, which emphasizes plant discovery efforts that can gain global importance or benefit the development of the country and society. Botanical research will be based on 3 potential pillars, namely collection, community socio-cultural potential and natural potential.

References:

a. Pandey, B.P. 1980. Economic Botany. New Delhi: S. Chand & Company Ltd.
b. Aimpaon, B.B & Ogorzaly, M.C. 1986. Economic Botany Plants in Our World. New York: McGraw Hill Book Company Inc.

Aquaculture (3 Credits)

This course is a lesson about the scope of aquaculture, aquaculture development and systems, aquaculture management which includes water quality, fish health, and feeding, economic analysis approaches, and the development of the aquaculture industry in Indonesia.

Reference:

Stuart W. Bunting. 2013. Principles of Sustainable Aquaculture: Promoting Social, Economic and Environmental Resilience. Taylor & Francis Group.

Plant Ecophysiology (3 Credits)

This course provides learning experiences for students related to the concept of ecology and physiology in plants, environmental influences on plants, environmental pollution,

adaptation and response of plants, rhizosphere concepts, and biotic and abiotic stresses in plants. Students are also taught to design a mini research so that their understanding of the material is better.

Reference:

Salisbury dan Ross. 1992. Fisiologi Tumbuhan. ITP Press. Bandung.

Aquatic Ecology (3 Credits)

This course is a lesson about aquatic ecosystems including seas, lakes, rivers, swamps, coral reefs, mangroves and organisms and the abiotic factors in them. Some techniques for taking and measuring factors and their relationships which provides student learning experiences related to the use of data collection tools and sampling of aquatic ecosystems

References:

a. Alqur'an dan Terjemahannya
b. Goldman C.R and A. J Horne, 1983. Limnology. Mc Graww Hill Inc. United State
c. Nybakken J.W.1992. Biologi laut suatu Pendekatan Ekologis (Terjemahan) PT Gramedia Pustaka Utama. Jakarta

Animal Ecology (3 Credits)

This course is a study about the relationship of individuals with their environment which includes physical factors and other organisms, as well as the consequences of these relationships on evolution, population growth, interactions between species, community composition and energy flow and nutrient cycles in the ecosystem.

Reference:

Simon A. Levin. 212. The Princeton Guide to Ecology. The Princeton University.

Population Genetics (3 Credits)

This course provides learning experiences for students related to the development of population genetics which includes the Hardy-Weinberg Balance Law, factors that play a role in changing allele frequencies and genotype frequencies, the interaction of factors that change allele frequencies and genotype frequencies, analysis of genetic variation of organisms in populations that are influenced by genetic factors, and application of population genetics concepts.

References:

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Frankham, R., Ballou, J.D., and Briscoe, D.A. 2002. Introduction to Conservation Genetics. Cambridge University Press. Melbourne

Nutrition and Health (3 Credits)

This course provides students with a learning experience related to food and nutrition and their role in body health. Students also know diseases that are influenced by nutritional factors in the body.

References:

a. Suhardjo dan Clara M.Kusharto. 1992. Prinsip-prinsip ilmu Gizi. Yogyakarta:

Percetakan Kanisius

b. Syahmien Moehyi. 1997. Pengaturan Makanan dan Diit untuk penyembuhan penyakit. Jakarta: Gramedia Pustaka Utama

Industrial Microbiology (3 Credits)

This subject is an elective course that provides student learning experiences through lectures and practicum related to the role and use of microbes in industry.

References:

a. Waites, M.J., Neil L. Morgan, John S. Rockey, Gary Higton, 2001, Industrial Microbiology: an Introduction, Blackwell Science
b. Okafor, Nduka, 2007, Modern Industrial Microbiology and Biotechnology, Science Publishers, New Hampshire
c. Atlas, R.M. 1997. Principles of Microbiology. 2nd Edition. Wm. C. Brown. Publishers.USA.
d. Madigan, M.T., J.M. Martinko, and J. Parker. 2003. Brock Biology Of Microorganisms. 10th edition. Pearson Education, Inc. Upper Saddle River, New Jersey

Environmental Microbiology (3 Credits)

This course is one aspect of microbiology that provides student learning experiences related to microbial interactions with the environment, microbial distribution in the environment, the role of microbes in the biogeochemical cycle, decomposition, and bioremediation as well as microbial applications in the environment.

References:

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Environmental Microbiology, 2015, Ian L. Pepper, Charles P. Gerba, Terry J. Gentry, Elsevier.

Food Microbiology (3 Credits)

This course is one of the aspects of microbiology that provides student learning experiences related to the scope of science of food microbiology, the role of microbes in making food, factors that influence microbial growth in the process of making food, the relationship of food microbiology and public health, microbes that cause diseases contained in food and the role of the fermentation process in the food process.

References:

Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.

Food Microbiology, 2008, Martin R. Adams, Maurice O. Moss, RSC Publishing.

Food Microbiology: Fundamental and Frontiers, 2013, Michael P.Doyle, Robert L. Buchanan, ASM Press.

Plant Nutrition (3 Credits)

This course discusses the definition of plant nutrition, nutrient classification, the role of nutrients in plant physiological processes, plant symptoms due to deficiency and excess of plant nutrients, factors that affect the availability of plant nutrients and the assimilation of plant nutrients.

References:

a. Agustina, L. 2004. Dasar Nutrisi Tumbuhan. Jakarta: Rineka Cipta.
b. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.

Environmental Impact Assessment (3 Credits)

This course is a lesson about documents, methods of analysis and assessment to decide that a major activity in an area requires an Environmental Impact Assessment (EIA/ AMDAL) document, which provides student learning experiences related to environmental issues that are often encountered. The discussion includes understanding, document components, stages, assessments and methods used to estimate the environmental impact assessment, and environmental feasibility.

References:

a. Fandeli, Chafid, 1995. Analisis Mengenai Dampak Lingkungan Prinsip Dasar dan Pemapanannya dalam Pembangunan. Liberty : Yogyakarta
b. Hadi, S.P., 1997. Aspek Sosial AMDAL. Gadjah Mada University Press. Yogyakarta.
c. Raharjo, Mursid, 2012. Memahami AMDAL. Graha Ilmu. Yogyakarta

Biomolecular Analysis (3 Credits)

This course studies the definition and function of biomolecules, an introduction to biomolecule analysis methods: methods of analyzing nucleic acids, proteins, carbohydrates and lipids.

Reference:

Albert, et al. (2011). Molecullar biology of the cell. Garland Science

Bioinformatics (2 Credits)

This course is an introduction to the use of bioinformatics databases in the field of biology, including introduction to biological databases (NCBI, PDB, etc.), basic principles of data exploration, processing (viewing, editing and alignment), and in silico data analysis. Students are also expected to be able to carry out a mini in silico research project and use the stages and methods studied to be applied in various research themes in the field of biology. Understanding this course requires a basic understanding of molecular biology.

Reference:

Essential Bioinformatics. 2006. Jin Xiong. Cambridge University

Biomonitoring (3 Credits)

Biomonitoring is a study of environmental quality monitoring using organisms. Physical and chemical monitoring of toxicants in nature is very dynamic with time and place. Biological systems can integrate almost all aspects of environmental variables on large time scales with easier measurement. It can be used for two broader impacts of air, water and soil pollution as a basis for developing its management. However, social, economic and political factors are also needed to support the success of its management.

Biomonitoring courses Discusses general aspects and integrative approaches of

biomonitoring; the concept of biomonitor, bioindicator, biomarker; international programs for biomonitoring; bioindicators and ecosystem management; bioindicators of algae, invertebrates, plants, vertebrates, mammals; biomarkers and ecotoxicology; biomonitoring and environmental conservation.

Reference:

Agrawal, A. and Gopal, K. 2013. Biomonitoring of waste and waste water. Springer

Bioremediation (3 Credits)

This course is a lesson about in situ and ex situ remediation techniques including bioventing, air sparging, composting, land treatment; bioremediation of liquid, semicair and solid pollutants. This course provides students with a learning experience related to the use of organism agents to improve the environment

References:

Alqur'an dan Terjemahannya
Nugroho, A., 2006, Bioremediasi Hidokarbon dan Minyak Bumi, Graha Ilmu, Jakarta.

Ecotoxicology (3 Credits)

This course is a study of frequently found toxic substances and their effects, conducting toxicity testing with various toxic substances and test organisms, and observing their changes and determining the lethal concentration of a pollutant. Which provides students with learning experiences related to the correct dosage in the use of toxic materials for certain purposes such as pesticides.

References:

a. Al quran dan terjemahnya
b. Duffus, J.H. 1980. Environmental Toxicology. Edward Arnold Ltd. London
c. Stine, K.E., and T.M. Brown. 1996. Principles of Toxicology. CRC Press, Inc. USA.
d. Wardhana, W.A. 1995. Dampak Pencemaran Lingkungan. Andi Offset. Yogyakarta

Biological and Environmental Instrumentation (3 Credits)

This course presents material that includes an overview of the basic principles of working in a laboratory, how to manage laboratories and work safety in the laboratory, the working principles of tools commonly used in research, monitoring and analysis of living and non-living natural resources in the field of biology and know how to operate correctly, safely and appropriately

Reference:

a. Prakash S. Bisen, Anjana Sharma. 2012Introduction to Instrumentation in Life Sciences. CRC Press.

Plant Tissue Culture (3 Credits)

This course studies the basic principles, methods and techniques of in vitro plant propagation, which include embryogenesis and organogenesis to various types of culture. This course also discusses the molecular basis of the development and problems of plant tissue culture.

References:

a. Plant Propagation by Tissue Culture 3rd Edition. 200. George, E. F., M. A. Hall, G. J. D. Klerk. Springer
b. Plants from Test Tubes: An Introduction to Micropropagation 3rd Edition. Lydiane Kyte and John Kleyn. 2010. Timber Press
c. Plant Cell and Tissue Culture – A Tool in Biotechnology: Basic and Application . 2009. Neuman, K.H., A. Kumar, and J. Imani. Springer

Analytical Microbiology (3 Credits)

This course is biology related to skills, especially in the field of microbiology so that it is able to provide students with learning experiences related to technical analysis carried out to study the shape, nature and role of microbes in a habitat or material.

References:

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Microbiologi : Laboratory Manual, 2019, James G. Cappucino, Emeritus, Chad Welsh, Pearson

Microtechnique (3 Credits)

This course studies the theory and practice of making biological preparations from animal and plant tissue non-permanent (fresh), semi-permanent (whole mount, sqush) and permanent (paraffin).

References:

a. Kiernan JA, 1990. Histological and Histochemical Methods: Theory and Practice 2th edition. Pergamon Press.
b. Ruzin, S. (1999): Plant Microtechnique and Microscopy. Oxford University Press Inc., Oxford.
c. Yeung, E.C.T., Stasolla, C., Sumner, M.J., Huang, B.Q. (Eds.) (2015), Plant Microtechniques and Protocols
d. Sass, J.H., (1971), Botanical Microtechnique

Computational Biology (Biological Modeling) (3 Credits)

This course discusses the development and application of data-analytical and theoretical, methods, mathematical modeling and engineering computational simulations to study biology, behavior, and social systems. Computational Biology is an interdisciplinary science that uses computers to store and process biological data.

Reference:

Biomedical Informatics- Computer application in Health Care and Biomedicine- Edward H Shortliffe and James J.Cimino

Plant Breeding (3 Credits)

This course discusses the life cycle and reproduction of plants, flower growth; pollination and fertilization, diversity, domestication and introduction, the basis of plant genetics, the basic methods of plant breeding, understanding of heritability and the progress of selection and production of seeds and seeds.

Reference:

Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.

Molecular Biology Engineering (3 Credits)

This course discusses making observations and analyzing molecules with molecular biology analysis techniques given in the form of practicum and lectures.
Reference:

Urban Farming (3 Credits)
This course discusses crop cultivation systems in narrow land. Alternative cultivation technologies that can be used include verticulture, hydroponics and aquaponics.
Reference:
Loveless, A.R. 1991. Prinsip-Prinsip Biologi Tumbuhan untuk Daerah Tropik. Gramedia. Jakarta.

Literature Review (2 Credits)
This course aims to enable students to develop skills in reading literature critically, evaluate studies or research in journals and identify gaps in the research being studied, conduct critical reviews, and then organize ideas that come from the results of studies in journals and objectively. Students must write it in a clear, concise, concise and easy to understand review.
References:

a. A Short Guide to Writing about Biology. 2004. Jan A. Pachenik. Pearson Education
b. How to Write & Publish a Scientific Paper. 1994. Robert A. Day. Cambridge University Press

Presentation Skill (3 Credits)
This course aims to equip students with the concepts of communication and public presentation, presentation techniques, and practice presentation skills. The scope of this course material includes the understanding of communication, communication ethics, communication in groups, understanding of presentations, planning presentation materials, selecting presentation applications, mastery of technical aspects, presentation presentation techniques, attitudes in presentations.
References:

a. Eko Nugroho. 2008. Pengenalan teori warna. Yogyakarta: Andi Offset
b. Helena Olii. 2010. Public Speaking. Jakarta: PT Indeks
c. Steward L.Tubbs & Sylvia Moss. 2005. Human Communication. Bandung: PT Remaja Rosdakarya

Studying and Learning (3 Credits)
This course provides understanding and application of concepts, principles, principles, approaches, strategies / models, methods, and studying and learning techniques in schools.
References:

a. Udin S.W. 1996/1997. Belajar dan Pembelajaran. Jakarta: Depdikbud.
b. Syaeful S. 2006. Konsep dan Makna Pembelajaran. Bandung: Alfabeta.
c. Moejiono, Dimyati. 1992/1993. Strategi Belajar Mengajar. Jakarta: Depdikbud.
d. Hasibuan, Moejiono. 1988. Proses Belajar Mengajar. Bandung: Remaja Karya.

Curriculum and Learning Design (3 Credits)

This course discusses and examines systems, concepts, principles, procedures for various learning designs that can be developed in macro and micro learning and training. In addition, this course also discusses the components of the learning design model.

References:

a. The Systematic Design of Instruction. 1985. Dick, W and Carey, L. Glenview II Scott Foresmen
b. Instructional Planning, A Guide for Teachers. 1996. Reiser, R. A and D, Walter. Florida State University Press

Learning Resources and Media (3 Credits)

This course provides material on media in biology learning, media functions, systematic planning of media use, and types of media that can be prepared or developed. Learning resources used in learning biology which cover all aspects of human life as members of society, including the relationship between humans and humans and humans with nature.

References:

a. Azhar Arsyad (2003), Media Pembelajaran, PT. Raja Grafindo Persada. Jakarta.
b. Sudjana, N. dan Rivai (1990), Media Pengajaran. CV. Sinar Baru Bandung.

Learning Assessment (3 Credits)

This course discusses the evaluation of learning outcomes, basic concepts of measurement, and evaluation of education.

References:

a. Direktorat Pembinaan Sekolah Menengah Kejuruan. (2005). Penilaian, Pengadministrasian dan Pelaporan Hasil Belajar Peserta Didik Sekolah Menengah Kejuruan. Depdiknas. Jakarta.
b. Ebel, R. L. & Frisbie, D. A. (1986). Essentials of Educational Measurement. Englewood Cliffs. N. J.: Prentice-Hall.
c. Ericson, R.C. & Wentling, T.L. (1988). Measuring Student Growth: Techniques and Procedures for Occupational Education. Illinois: Griffon Press
d. Sax, Gilbert. (1980). Principles of Educational and Psychologial Measurement and Evaluation. Caliornia. Wadsworth Publishing Company.
e. Winkel, W. S. (1983). Psikokogi Pendidikan dan Evaluasi Belajar. Jakarta: Gramedia.

Fiqh of Halal Products (4 Credits)

This course is an elective course for the profile of halal auditors or supervisors, covering discussion of the legal basis and rules of halal haram, limitations and criteria for halal products, methods of determining halal haram law, to case studies of the halalness of various types of products.

Reference:

Fiqih Muamalah

Material Critical Points (4 Credits)

This course is an elective course for the profile of halal auditors or supervisors, including discussion of the definitions, types and criteria of halal materials and products in terms of science (physics, chemistry, biology) and religion, requirements for halal materials

and products, halal production processes, to method of determining the halalness of materials.
Reference:
a. Fiqih Muamalah

Halal Slaughter Animals (2 Credits)
This course is an optional course for the profile of halal auditors or supervisors, covering discussion of the legal basis and rules of halal haram, limitations and criteria for halal slaughtered animals, the process of slaughtering according to sharia, to case studies of animal halalness.
Reference:
Fiqih Muamalah

Halal Audit (4 Credits)
This course is an elective course for the profile of halal auditors or supervisors, covering discussion of the legal basis and rules of halal haram, regulations and laws regarding halal product assurance, application of the Halal Assurance System, to practice / simulation of halal product audits.
Reference:
Fiqih Muamalah

Halal Testing Laboratory (4 Credits)
This course is an elective course for the profile of halal auditors or supervisors, including discussion of the criteria for halal products as well as supporting facilities and infrastructure, requirements for halal test labs, halal test lab management, various examples of product halal test methods in laboratories.
References:
a. Laboratory Management
b. Halal Assurance System Guide

Innovation Management (3 Credits)
This course is a supporting course to support students to become bio entrepreneurs who provide students with learning experiences related to innovation which includes developments, theories, types, sources of innovation and its management.
References:
a. Smith, David (2010), Exploring Innovation, 2nd Ed. London: Mc.Graw-Hill Education (UK) Limited
b. Tidd, Joe, Bessant, John (2009), Managing Innovation: Integrating Technological, Market and Organizational Change, 4th Ed, London, John Willey& Sons, Ltd

Project Management (3 Credits)
This course is a supporting course to support students to become bio entrepreneurs who provide students with learning experiences related to the methods used to design a project starting from five activities, namely idea initiation, planning and design, implementation and construction, monitoring and control systems as well as completion.

References:

a. Campbell Biology, 2019, Jane Reece, Lisa A. Urry, Peter V. Minorsky, Michael L. Cain, Steven A. Wasserman, Pearson.
b. Project Management: A System Approach to Planning, Scheduling and Controlling, 2017, Harold Kezner, Wiley.

Environmental Fiqh (3 Credits)

This course is a course that examines the concept of Islamic law regarding the environment. This course is a response to the current reality in the form of a serious problem of environmental damage. Therefore, the study of Islam and the environment is very significant

References:

a. Islam Ramah Lingkungan, Konsep dan Strategi Islam dalam Pengelolaan, Pemeliharaan, dan Penyelamatan Lingkunga Hidup. 2007. Najamudin Ramly. Grafindo.
b. Ri'aaytul Bi'ah fi Asy-syari'ah al Islamiyah. 2001. Yusuf al Qordhowi. Kairo, Daarul Syuruuq