module
handbook
curriculum 2020-2025

BIO. LOGY

Study Program of Biology
Faculty of Sains and Technology
UIN Syarif Hidayatullah Jakarta

CONTENTS

I. CURRICULUM STRUCTURE

SEMESTER I

No	Code of Course	Mandatory Course	Credit Points	ECTS
1	NAS6013203	Indonesian	3	3.13
2	UIN6021204	Arabic	3	3.13
3	UIN6032201	Islamic Studies	4	4.14
4	FST6095101	Basic Biology	2	2.43
5	FST6095102	Practicum Basic Biology	1	2,82
6	FST6094101	Calculus	2	2.43
7	FST6096201	Basic Chemistry	2	2.43
8	FST6096202	Practicum Basic Chemistry	1	2.82
9	FST6097114	Basic Physics	2	2.43
		Total Credit Points	**20**	**25.79**

SEMESTER II

No	Code of Course	Mandatory Course	Credit Points	ECTS
1	UIN6014203	English	3	3.13
2	FST6095105	Laboratory Technique	2	2.43
3	FST6095107	Plant Structure and Development	3	3.60
4	FST6095108	Practicum Plant Structure and Development	1	2.20
5	FST6095111	Animal Systematics	2	2.43
6	FST6095112	Practicum Animal Systematics	1	2.20
7	NAS6112201	Pancasila and Civic Education	3	3.13
8	FST6095124	Cell Biology	2	2.43
9	FST6091101	Introduction to Information and Communications Technology	2	2.74
10	UIN6033205	Practicum Qira'ah and Worship	2	4.38
		Total Credit Points	**21**	**28.69**

SEMESTER III

No	Code of Course	Mandatory Course	Credit Points	ECTS
1	FST6095103	Basic Ecology	3	3.13
2	FST6095104	Practicum Basic Ecology	1	2.20
3	FST6095144	Genetics	3	3.13
4	FST6095115	Practicum Genetics	1	2.20

5	FST6095106	Basic Microbiology	2	2.12
6	FST6095117	Practicum Basic Microbiology	1	2.20

7	FST6095128	Plant Systematics	2	3.13
8	FST6095109	Practicum Plant Systematics	1	2.20
9	FST6095110	Animal Structure and Development	3	3.13
10	FST6095129	Practicum Animal Structure and Development	1	2.20
11	FST6096225	Biochemistry	2	2.12
12	FST6096226	Practicum Biochemistry	1	2.20
		Total Credit Points	**21**	**29.98**

SEMESTER IV

No	Code of Course	Mandatory Course	Credit Points	ECTS
1	FST6094106	Elementary Statistics	3	3.60
2	FST6095132	Conservation Biology	2	2.43
3	FST6095113	Microbial Physiology	2	2.43
4	FST6095114	Animal Physiology	3	3.60
5	FST6095135	Practicum Animal Physiology	1	2.20
6	FST6095116	Plant Physiology	3	3.60
7	FST6095127	Practicum Plant Physiology	1	2.20
8	UIN6032202	Islam and Science	3	4.07
		Mandatory	**18**	**24.13**
		Electives		
1	FST6095202	Ornithology	2	2.74
2	FST6095204	Bacteriology	2	2.74
3	FST6095205	Phycology	2	2.74
4	FST6095207	Terrestrial Ecology	2	2.74
5	FST6095208	Urban Entomology	2	2.74
		Electives	**4**	**5.49**
		Total Credit Points	**22**	**29.62**

SEMESTER V

No	Code of Course	Mandatory Course	Credit Points	ECTS
1	FST6095118	Molecular Biology	2	2.74
2	FST6095119	Practicum Molecular Biology	1	2.20
3	FST6095120	Natural Resource and Management	2	2.74
4	FST6095121	Principles of Biotechnology	2	2.74

5	FST6096150	Chemical Environment	2	2.74
6	FST6096151	Practicum Chemical Environment	1	2.20
7	UIN6000208	Research Methodology	3	3.60

		Mandatory	**13**	**18.98**
		Electives		
1	FST6095209	Plant Tissue Culture	2	2.74
2	FST6095210	Aquatic Ecology	2	2.74
3	FST6095211	Mycology	2	2.74
4	FST6095212	Ethology	2	2.74
5	FST6095213	Secondary Metabolism	2	2.74
6	FST6095214	Mammalogy	2	2.74
7	FST6095215	Palynology	2	2.74
8	FST6095216	Population Genetics	2	2.74
9	FST6095217	Herpetology	2	2.74
10	FST6095218	Ecotourism	2	2.74
		Electives	**8**	**10.98**
		Total Credit Points	**21**	**29.96**

SEMESTER VI

No	Code of Course	Mandatory Course	Credit Points	ECTS
1	FST6095122	Evolution	2	2.43
2	FST6095123	Introduction to Bioinformatics	2	3.21
3	FST6095134	Scientific Communication Techniques	2	3.21
4	UIN6000207	Internship	4	7.33
		Mandatory	**10**	**16.19**
		Electives		
1	FST6095219	Food Microbiology	2	2.74
2	FST6095220	Parasitology	2	2.74
3	FST6095221	Plant Ecophysiology	2	2.74
4	FST6095222	Landscape Ecology	2	2.74
5	FST6095223	Ethnobotany	2	2.74
6	FST6095224	Embryology	2	2.74
7	FST6095225	Waste Management	2	2.74
8	FST6095226	Environmental Biotechnology	2	2.74
9	FST6095227	Plant Biotechnology	2	2.74
10	FST6095228	Introduction to Environmental Impact Analysis	2	2.74
11	FST6095229	Immunology	2	2.74

12	FST6092030	Halal Food	2	2.74
13	FST6095231	Malacology	2	2.74
14	FST6095232	Primatology	2	2.74
15	FTK6017150	Strategies and Learning Biology	2	2.74
16	FTK6017153	Media and Technology Learning Biology	2	2.74
17	FTK6017155	Evaluation of Biology Learning	2	2.74
18	FTK6017158	Planning Learning Biology	2	2.74
		Electives	**10**	**13.72**
		Total Credit Points	**20**	**29.91**

SEMESTER VII

No	Code of Course	Mandatory Course	Credit Points	ECTS
1	FST6095125	Bioethics	2	2.43
2	FST6092035	Technopreneurship	2	2.43
3	UIN6000206	Community Service Program	4	7.33
4	FST6095126	Proposal Seminar	1	2.44
		Mandatory	**9**	**14.96**
		Electives		
1	FST6095233	Industrial Microbiology	2	2.74
2	FST6095235	Phytopathology	2	2.74
3	FST6095236	Plant Breeding	2	2.74
4	FST6095237	Environmental Toxicology	2	2.74
5	FST6095238	Biomaterials and Nanotechnology	2	2.74
6	FST6095239	Genetics Engineering	2	2.74
7	FST6095242	Ichthyology	2	2.74
8	FST6095244	Marine Biology	2	2.74
9	FST6095240	Virology	2	2.74
		Electives	**6**	**8.23**
		Total Credit Points	**15**	**23,19**

SEMESTER VIII

No	Code of Course	Mandatory Course	Credit Points	ECTS
1	UIN 6000312	Final Project (Thesis)	6	11,00
2	UIN 6000313	Seminar	1	2.443
		Total Credit Points	**7**	**13.44**

		Total Credits (SKS or SCU) for Completion of Bachelor Program		**148,00**
		Total Credits (ECTS) for Completion of Bachelor Program		**210.58**

II. MAIN COMPETENCY COURSES (MAC)

NAS6013203 Indonesia

Module Name	Indonesian
Module level, if applicable	Undergraduate
Module Identification Code	NAS6013203
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Neneng Nurjanah, M.Hum.
Language	Indonesian
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Collaborative learning & discussion-based learning, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 3.13 Practical (ECTS) : 0.00 Total ECTS : 3.13
Credit points	3 Credit Hours ≈ 3.13 ECTS
Admission requirements and examination	• Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	-
Media employed	Board, LCD Projector, Laptop/Computer
Forms of assessment	Assignments (including assignment): 40%, Midterm exam: 30%, Final exam: 30%

Intended Learning Outcome

1. Speaking Skills in Academic Presentation: Students are able to speak in scientific presentations.
2. Understanding the Development of the Indonesian Language: Students can understand the development of the Indonesian language.
3. Understanding the Use of Letters and Words: Students can understand the use of letters and words.
4. Understanding Borrowed Words and Punctuation: Students can understand borrowed words and punctuation.
5. Proper Diction Usage: Students are able to use appropriate diction.

6. Crafting Effective Sentences: Students are able to create effective sentences.
7. Constructing Proper Paragraphs: Students are able to create proper paragraphs.
8. Understanding Plagiarism: Students understand plagiarism.
9. Essay Planning Abilities: Students are able to plan an essay.
10. Effective Reasoning Skills: Students are able to reason accurately.
11. Utilizing Scientific Notation Efficiently: Students are able to use scientific notation efficiently.
12. Producing Short Writings Correctly: Students are able to produce short writings correctly.
13. Reproduction of Writing Accurately: Students are able to reproduce writings accurately.

Module content

1. Speaking in Scientific Presentations;
2. Development of the Indonesian Language;
3. Usage of Letters and Words;
4. Borrowed Elements, Punctuation, and Transliteration;
5. Diction/Word Choice;
6. Effective Sentences;
7. Paragraphs;
8. Scientific Ethics/Plagiarism;
9. Essay Planning;
10. Reasoning;
11. Scientific Notation;
12. Short Writing Production;
13. Writing Reproduction.

Recommended Literatures

1. Paramaditha, I. (2020). *The wandering*. Gramedia Pustaka Utama.
2. Lestari, D. (2017). *Paper boats*. Penerbit Buku Kompas.
3. Pasaribu, N. E. (2020). *Sergius seeks Bacchus*. Gramedia Pustaka Utama.
4. Boellstorff, T. (2020). *The gay archipelago: Sexuality and nation in Indonesia*. Princeton University Press.
5. Pamuntjak, L. (2020). *The birdwoman's palate*. HarperCollins.
6. Gaudiamo, R. (2021). *The adventures of Na Willa*. Nusa Rimba.
7. Hollander, K. (2023). *Tales of wonder: Folk myths of Indonesia*. NUS Press.
8. Suryadi, B. (2020). *Language, culture, and identity in Indonesia*. Penerbit Universitas Indonesia.
9. Zuwir, H. (2022). *Indonesian literary criticism in the 21st century*. Jakarta Literary Institute.
10. Fitri, A. (2021). *Indonesian diction and syntax: From tradition to modern use*. Penerbit Erlangga.

UIN6021204 Arabic

Module Name	Arabic
Module level, if applicable	Basic
Module Identification Code	UIN6021204
Semester(s) in which the module is taught	1
Person(s) responsible for the module	Dr. Saifudin, M.Pd.I
Language	Arabic, Indonesian
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through discussion, quizzes, and example exercises by the lecturer which are enriched with relevant examples and followed by short question-answer. Textbook reading. Interactive dialogue.
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 3.13 Practical (ECTS) : 0.00 Total ECTS : 3.13
Credit points	3 Credit Hours ≈ 3.13 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to understand the basic knowledge of Arabic and its methods orally and in writing using good and correct Arabic and Indonesian in the development of the academic world and the non-academic world. Able to communicate both orally and in writing using Arabic and Indonesian in the development of the academic and	

non-academic world. Mastering four Arabic language skills, istima', kalam, qira'ah and kitabah and implementing them in social life.

Module content

1. Terminology: ta'rîf, aqsâm, syakl, 'alâmât, wa misâl (Words: definition, division, characteristics/form, characteristics/signs and examples)
2. Isim Nakirah-Ma'rifah wa mudzakar-Muannats: ta'rîf, aqsâm, 'alâmât, wa misâl
3. Isim Mufrad, Mutsanna, wa Jama': ta'rîf, aqsâm, 'alâmât, wa misâl
4. Isim Jama': ta'rîf, aqsâm, 'alâmât, wa misâl
5. 'Adad dan Ma'dud: ta'rîf, aqsâm, 'alâmât,tashrîf, wa misâl
6. Isim Isyarah: ta'rîf, aqsâm, 'alâmât,tashrîf, wa misâl
7. Isim Istifham : ta'rîf, aqsâm, 'alâmât,syakl, wa misâl
8. Isim Dlamir : ta'rîf, aqsâm, 'alâmât,tashrîf, wa misâl
9. Fi'il Madli : ta'rîf, aqsâm, 'alâmât,tashrîf, wa misâl
10. Fi'il Mudlari : ta'rîf, aqsâm, 'alâmât,tashrîf, wa misâl
11. Fi'il Amr : ta'rîf, aqsâm, 'alâmât,tashrîf, wa misâl
12. Maf'ul: ta'rîf, aqsâm, 'alâmât, syakl, wa misâl
13. Ismiyah number : ta'rîf, aqsâm, 'alâmât,tarkîb, wa misâl
14. Fi'liyah number: ta'rîf, aqsâm, 'alâmât,tarkîb, wa misâl

Recommended Literatures

1. Mastering Arabic Script: A Guide to Handwriting" by Jane Wightwick and Mahmoud Gaafar (2019)
2. Arabic Language and Culture Through Art" by Nasser Isleem and Ghazi Abuhakema (2021)
3. Practice Makes Perfect: Arabic Verb Tenses, 2nd Edition" by Jane Wightwick and Mahmoud Gaafar (2020)
4. Alif Baa: Introduction to Arabic Letters and Sounds, 4th Edition" by Kristen Brustad, Mahmoud Al-Batal, and Abbas Al-Tonsi (2021)
5. Ahlan wa Sahlan: Functional Modern Standard Arabic for Beginners, 3rd Edition" by Mahdi Alosh (2020)
6. Arabic Stories for Language Learners: Traditional Middle Eastern Tales in Arabic and English" by Hezi Brosh and Lutfi Mansur (2020)
7. Modern Standard Arabic Grammar: A Learner's Guide" by Mohammad T. Alhawary (2021)
8. Arabic: An Essential Grammar, 2nd Edition" by Faruk Abu-Chacra (2021)
9. Developing Writing Skills in Arabic" by Taoufik Ben Amor (2021)
10. The Connectors in Modern Standard Arabic" by Erwin Wendling (2019)

UIN6032201 Islamic Studies

Module Name	Islamic Studies
Module level, if applicable	Basic
Module Identification Code	UIN6032201
Semester(s) in which the module is taught	1
Person(s) responsible for the module	Dr. Saifudin, M.Pd.I
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through student paper review by lecturer which are enriched with relevant examples and followed by deep and comprehensive discussion. Students are divided into seven groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class. Case study about any contemporary issues in world, specially in Moslem countries.
Workload	Lecture (Face to Face) (SCU) : 4 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 46.67 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 74.67 Lecture (ECTS) : 4.14 Practical (ECTS) : 0.00 Total ECTS : 4.14
Credit points	4 Credit Hours ≈ 4.14 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Students are able to explain the basic concepts of Islam properly and correctly. Students are able to describe the source, history, position, and values as well as the methodology of Islamic teachings. Students are able to apply the values of Islamic teachings in academic social life.

Module content

1. Introduction, Object/Scope, Objectives, History and Methodology of Islamic Studies
2. Humans concepts, the Universe, and Religion in Islam
3. Islam: Definition, Sources, Position, Function and History
4. Al-Quran (Meaning, Position and Function, and History in Islam)
5. Hadith (Meaning, Object of Study, Position and Historical Function in Islam)
6. Islamic Doctrines and Teachings (Aqidah, Sharia and Akhlak), their Branches as well as Hierarchy and Relationships.
7. Tawhid and the Prophethood Concept: Meaning, Scope, Position and Function in Islam
8. Qadla, Qadar and the Actions of creatures in Islam: Definition, Object of Study, Position, Function and Lessons
9. Eschatology/Last Days in Islam: Understanding, Object of Study and Position, and Events
10. Shirk, Kufr, Nifaq, Fisq and al-Kabair According to Islam
11. Islam and its Shari'ah: Definition, Types, Functions, Objects of Study, Sources and History, and the Tasyri' Process
12. Morals and Ethics concepts in Islam
13. Islam and Civilization: History and Development of Islam from the Prophet SAW time to Islam at Indonesia
14. Islam in Indonesia: Concept, Implementation and Social History

Recommended Literatures

1. Al-Quran al-Karim
2. Ahmad, K. (2022). *Understanding Religion and Human Life: Perspectives from Islam and Other Faiths.* Routledge.
3. Al-Ghazali. (2020). *The Revival of Religious Sciences (Ihya' Ulum al-Din) (F. Karim, Trans).* Islamic Texts Society.
4. Asad, M. (2021). *The Principles of Islam and Their Relevance Today*. Islamic Book Trust.
5. Esposito, J. L. (2020). *Islam: The Straight Path (5th Ed).* Oxford University Press.
6. Hallaq, W. B. (2022). S*hari'a: Theory, Practice, and Transformations*. Cambridge University Press.
7. Kamali, M. H. (2021). *Shari'ah Law: an introduction (3rd Ed)*. Oneworld Publications.
8. Nasr, S. H. (2021). *Islam and The Perennial Philosophy: History and Culture of Islamic Thought.* HarperOne.
9. Ramadan, T. (2020). *The Essentials of Islam: A Guide to Faith and Practice*. Oxford University Press.
10. Saeed, A. (2022). I*slam in Modern Society: Faith, Values, and Practice*. Bloomsbury Academic.
11. Zain, M. M. (2023). *Comprehensive Islamic Teachings: Moral, Social, and Spiritual Insights.* Islamic Research Publications.

FST6095101 Basic Biology

Module Name	Basic Biology
Module level, if applicable	Basic
Module Identification Code	FST6095101
Semester(s) in which the module is taught	1
Person(s) responsible for the module	Prof. Dr. Megga Ratnasari Pikoli, M.Si.,
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology

Teaching methods, Contact hours	Collaborative learning & discussion-based learning, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	2 Credit Hours ≈ 2,43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 30%, Final exam 30%, Formative 40%
Intended Learning Outcome	
Generalize basic knowledge of biology which can lead to detailed knowledge at an advanced stage	
Module content	
1. Basic concepts of biology 2. Chemistry of life 3. Cell structure and function 4. Life energy 5. Energy release: cellular respiration 6. Energy capture: photosynthesis	

7. Cell division
8. Basics of genetics
9. Evolution and biodiversity
10. Plant structure and physiology
11. Animal structure and physiology
12. Ecology
13. Nature conservation
14. Biotechnology

Recommend Literatures

1. Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., Orr, R. B., Campbell, N. A. (2021). *Campbell biology*. Pearson Education, Inc., NJ.2.
2. Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Reece, J. B. (2018). *Campbell biology in focus* (Vol. 10). Boston, MA: Pearson.
3. Serva´ n, C.A., and Allesina, S. (2021). Tractable models of ecological assembly. Ecol. Lett. 24, 1029–1037
4. Campbell, N. A., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Orr, R. B. (2024). *Biology: A global approach* (12th ed.; Global ed.). Pearson.
5. Hoefnagels, M. (2024). *Biology: Concepts and investigations* (International student ed.). McGraw-Hill Education.
6. Mader, S., & Windelspecht, M. (2024). *Biology* (15th ed.; International student ed.). McGraw-Hill Education.

FST6095102 Practicum Basic Biology

Module Name	Practicum Basic Biology
Module level, if applicable	Basic
Module Identification Code	FST6095102
Semester(s) in which the module is taught	1
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with practicum, project based learning, class discussion, structured activities (quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.82 Total ECTS : 2.82
Credit points	1 Credit Hours ≈ 2.82 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, ● Students are able to work neatly and carefully ● Students are able to understand the methods applied in biological experiments ● Students are able to take the essence of each experiment conducted ● Students are able to understand the results of observations in accordance with the objectives of the experiment ● Students are able to understand and analyse a problem with scientific principles	
Module content	

1. Work techniques in a biological laboratory
2. Microscope and cell observation
3. Animal tissue
4. Plant tissue
5. Animal observation: the fish organs and organ systems
6. Plant observation: the Monocots and Dicots organs and organ systems
7. Photosynthesis
8. Respiration
9. Plant DNA extraction
10. Living things and the environment: air pollution
11. Fermentation
12. Basic principles of classification of living things

Recommended Literatures :

1. Angelton, A., & colleagues. (2023). General biology I laboratory manual. Campus Publishing.
2. Vodopich, D. S., & Moore, R. (2022). Biology laboratory manual (13th ed.). McGraw-Hill Education.
3. Wijayanti, F., Pikoli, M.R., & Astuti, P. Basic Biology Practicum Guide. Jakarta: Fakultas Sains dan Teknologi, Universitas Islam Negeri Syarif Hidayatullah

FST6094101 Calculus

Module Name	Calculus
Module level, if applicable	Undergraduate
Module Identification Code	FST 6094101
Semester(s) in which the module is taught	1
Person(s) responsible for the module	Prof. Dr. Agus Salim
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Collaborative learning & discussion-based learning, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	2 Credit Hours ≈ 2.43 ECTS
Admission and examination requirements	• Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	Student should be proficient in elementary algebra
Media employed	Board, LCD Projector, Laptop/Computer
Forms of assessment	Assignments (including quizzes and group project): 40%, Midterm exam: 30%, Final exam: 30%
Intended Learning Outcome	
After completing this course, students are able to determine the solution of problems related to calculus of real functions systematically	
Module content	
1. Real numbers, inequalities, absolute values, Cartesian coordinate system, functions and their graphs, operations on functions, trigonometric functions. 2. Limit intuition, definition of limit, limit theorems, limit of trigonometric functions, limit at infinity, infinite limit, function continuity 3. Definition of derivative, derivative rules, derivatives of trigonometric functions, chain rules, higher order derivatives, implicit derivatives, related rates, basic concepts of	

differentials
4. Maximum and minimum, monotonicity and steepness, local extremes and extreme values on open intervals, drawing curves of real functions of 1 variable, anti-derivatives
5. Intuition integral, definite integral, Fundamental Theorem I of Calculus, Fundamental Theorem II of Calculus, substitution method.
6. Area, volume of a rotating body.
7. Natural logarithm function, inverse function and its derivative, natural exponential function, generalised exponential function and generalised logarithm function, hyperbolic function and its inverse

Recommend Literatures

- Anton, H., Bivens, I., & Davis, S. (2020). *Calculus: Early Transcendentals* (12th Ed). Wiley.
- Stewart,J. (2021). *Calculus: Concept adn Contexts* (9th Ed). Cengage Learning.
- Rogawski, J., & Adams, C. (2019). *Calculus: Early Trancendentals* (4th Ed). W.H. Freeman and Company.
- Strang, G., & Herman, E. (2020). *Calculus volume 1* (Open Access Textbook). OpenStax.
- Hass, J., Heil, C., & Weir, M. D. (2020). *Thomas' calculus: Early transcendentals* (15th Ed.). Pearson.
- Briggs, W. L., Cochran, L., & Gillett, B. (2022). *Calculus: Early transcendentals* (4th Ed.). Pearson.

FST6096201 Basic Chemistry

Module Name	Basic Chemistry
Module level, if applicable	Basic
Module Identification Code	FST 6096101
Semester(s) in which the module is taught	1
Person(s) responsible for the module	Dr. Sri Yadial. M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into discussion groups of 3 to 4 members. Each group becomes a discussion center for its members in solving a given problem before being presented in class forum.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	2 Credit Hours (2-3) ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 30%, Final exam 30%, Quiz 20%, Structured assignment 20%

Intended Learning Outcome

Students are able to use the basic principles of chemistry in studying sciences related to chemical calculations, explaining the nature of matter, changes in matter, compounds and mixtures, basic laws of chemistry, balancing chemical reaction equations, development of the periodic system of elements, formation of chemical bonds. , Solutions, Colligative Properties Chemical Equilibrium, Acids, Bases and Buffers, Introduction to Organic Chemistry

Module content

1. Contract of practicum
2. Basic concepts of chemistry
3. Basic laws of chemistry
4. Chemical reaction equations
5. Periodic system of elements
6. Atomic structure and electron configuration
7. Chemical bonds and naming of covalent and ionic compounds
8. Solution
9. Colligative Properties
10. Chemical equilibrium
11. Acids, Bases and buffers
12. Introduction to Organic Chemistry

Recommended Literatures

- Chang, R., & Overby, J. (2021). *Chemistry* (14th ed.). New York, NY: McGraw-Hill Education. ISBN 978-1260784473.
- Oxtoby, D. W., Gillis, H. P., & Campion, A. (2016). *Principles of Modern Chemistry* (8th ed). Belmont, Ca: Brooks/Cole, Cengage Learning.
- Petrucci, R. H., Herring, F. G., Madura, J. D., & Bissonnette, C. (2017). General chemistry: Principles and modern applications. Prentice Hall.
- Brady, J. E., Jespersen, N. D., & Hyslop, A. (2015). *Chemistry*. (7th ed.). Wiley: ISBN 978-111-8717-27-1

FST6096202 Practicum Basic Chemistry

Module Name	Practicum Basic Chemistry
Module level, if applicable	Basic
Module Identification Code	FST 6096102
Semester(s) in which the module is taught	1
Person(s) responsible for the module	Ahmad Fathoni, M.Si ; Agus Rimus Liandi, M.Si ; Nurul Amilia, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with practicum, class discussion, structured activities (quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.82 Total ECTS : 2.82
Credit points	1 Credit Hours ≈ 2.82 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Laboratory tools and equipments; Classical teaching tools with whiteboard and PowerPoint presentation

Forms of assessment	Midterm exam 20%, Final exam 20%, Quiz 10%, Structured assignment 50%
Intended Learning Outcome	
Students are able to conduct experiments and do data analysis in basic chemistry experiments which can support understanding in a more specific field of chemistry.	
Module content	
Experiment 1: Introduction to Chemical Laboratory Equipment as well Experiment 2: Solution Making Experiment 3: Changes in the Physical and Chemical Properties of Elements and Compounds Experiment 4: Chemical reaction Experiment 5: Limiting Reaction Experiment 6: Unsaturated, saturated and supersaturated solutions Experiment 7: Titration and Acid Base Equilibrium: pH Indicators and Measurements Experiment 8: Buffer Solution Experiment 9: Chemical equilibrium	
Recommended Literatures ● Chemistry Department Lecturer Team. (2023). Module of basic chemistry laboratory work I. Jakarta, Indonesia: Faculty of Science and Technology, UIN Syarif Hidayatullah Jakarta.	

FST6097114 Basic Physics

Module Name	Basic Physics
Module level, if applicable	Basic
Module Identification Code	FST 6097114
Semester(s) in which the module is taught	1
Person(s) responsible for the module	Muhammad Nafian, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Collaborative learning & discussion-based learning, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	2 Credit Hours (2-3) ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to understand and apply how a physical system is seen from the perspective of mechanics and thermodynamics.	
Module content	
1. Measurement of physical quantities and vector properties 2. Motion in one, two and three dimensions 3. Newton's laws and their applications 4. Work and kinetic energy 5. Law of conservation of energy 6. Law of conservation of linear momentum 7. Rotational dynamics 8. Angular momentum	

9. Gravity
10. Fluid mechanics
11. Temperature and kinetic theory of gasses
12. Heat and the first law of thermodynamics
13. Second law of thermodynamics
14. Thermal processes and properties

References :

1. Serway, R. A., Vuille, C., & Bennett, C. (2018). College Physics (11th Ed.). Cengage Learning.
2. Wolfson, R. (2017). Essential University Physics (3rd Ed.). Pearson.
3. Hewitt, P. G. (2016). Conceptual Physics (12th Ed.). Pearson.
4. Wilson, J. D., Buffa, A. J., & Lou, B. (2015). College Physics (8th Ed.). Pearson.
5. Giancoli, D. C. (2016). Physics Principles with Applications; Global Edition 7th Ed. Pearson.

UIN6014203 English

Module Name	English
Module level, if applicable	Basic
Module Identification Code	UIN6014203
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Inni Ayati, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into five groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 3.13 Practical (ECTS) : 0.00 Total ECTS : 3.13
Credit points	3 Credit Hours ≈ 3.13 ECTS
Admission and examination requirements	● Enrolled in this course ● Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	● Assignments (including quizzes and assignment): 40% ● Midterm exam: 30% ● Final exam: 30%
Intended Learning Outcome	

1. Able to implement reading strategies such as "skimming" and "scanning", identifying pronoun references, using punctuation correctly, recalling oral information, and introducing oneself.
2. Understanding the main ideas and supporting ideas in a reading, using "verbs" and "adverbs" using "mind mapping", and discussing daily activities.
3. Knowing the difference between facts and opinions in a reading, using adjectives appropriately, understanding simple opinions, and being able to describe someone.
4. Identifying important information from the reading text, writing simple sentences, being able to ask and answer about directions.
5. Able to draw conclusions from the reading text, understanding the use of pronouns and articles, writing a memo, making/receiving/declining meeting appointments.
6. Paraphrasing sentences from the reading text, using the "simple present tense", writing a postcard, expressing likes or dislikes.
7. Identifying the meanings of words or phrases in the reading text, making conclusions, using the "simple future tense" appropriately, writing simple advertisements, and being verbally inviting.
   Identifying the purpose of writing in a reading text, using the "simple past tense" correctly, writing personal information.

Module content

1. Mastering Effective Reading Strategies
2. Comprehension and Language Proficiency
3. Information Extraction and Language Expression Skills
4. Language Transformation and Expressing Preferences
5. Enhancing Vocabulary and Future Expressions
6. Understanding Writing Purpose and Past Expression

Recommended Literatures

1. Azkiyah, Siti Nurul et al.(2020). General English 1 (A course for University Students). Malaysia: Oxford University Press.
2. Baldick, C. (2021). *The Oxford concise dictionary of literary terms* (4th ed.). Oxford University Press.
3. Barry, P. (2017). *Beginning theory: An introduction to literary and cultural theory* (4th ed.). Manchester University Press.
4. Eagleton, T. (2019). *Literary theory: An introduction* (Anniversary ed.). Wiley-Blackwell.
5. Greenblatt, S., Christ, C., & Abrams, M. H. (2022). *The Norton anthology of English literature* (10th ed.). W. W. Norton & Company.
6. Tyson, L. (2018). *Critical theory today: A user-friendly guide* (3rd ed.). Routledge.

FST6095105 Laboratory Technique

Module Name	Laboratory Technique
Module level, if applicable	Basic
Module Identification Code	FST6095105
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Fahri Fahrudin, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through discussing the main source of reference which are enriched with relevant examples (discussion of problem-based learning) or experiments related to the material.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	Credit Hours (1-3) ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are: 1. Able to explain the basic concepts, functions, and mechanisms of work safety in the laboratory 2. Able to use basic laboratory tools to make specimens and simple research designs 3. Able to identify and explain materials in the laboratory, both biological and chemical materials	
Module content	

1. Introduction: Laboratory scope (K3 lab, MSDS, and BSL)
2. Introduction to basic laboratory equipment
3. Introduction to chemical and biological materials.
4. Laboratory management
5. Work safety in the laboratory
6. Basic skills in the laboratory
7. Advanced skills in using advanced equipment in the laboratory.
8. Types of microscopes and their uses.
9. Paraffin method histology.
10. Techniques for making wet and dry preserves
11. Techniques for making plant specimens
12. Techniques for making animal specimens
13. Techniques for making microorganism specimens
14. Design research experiments in the laboratory

Recommended Literatures

1. Albert, D. R. (2023). Chemistry Techniques and Explorations. University of Minnesota.
2. Dey, P. (2022). Basic and Advanced Laboratory Techniques in Histopathology and Cytology (2nd ed.). Springer.
3. Šachl, R., & Amaro, M. (2023). Fluorescence Spectroscopy and Microscopy in Biology (Vol. 20). Springer.
4. Seidman, L., Moore, C., & Mowery, J. (2023). Basic Laboratory Methods for Biotechnology (3rd ed.). CRC Press.Barger, A. M., & MacNeill, A. L. (2024). *Clinical pathology and laboratory techniques for veterinary technicians* (2nd ed.). Wiley-Blackwell.
5. Hau, J., & Schapiro, S. J. (2021). *Handbook of laboratory animal science: Essential principles and practices* (4th ed.). CRC Press.
6. Gerardus Blokdyk (ed./kompilasi), 2020 (2021 Edition), *Good Laboratory Practice: A Complete Guide (2021 Edition)*, 5STARCooks, ISBN 978-1-867489-10-8.
7. World Health Organization (WHO), 2020, *Laboratory Biosafety Manual (4th Edition)*, Geneva, World Health Organization.

FST6095107 Plant Structure and Development

Module Name	Plant Structure and Development
Module level, if applicable	Basic
Module Identification Code	FST6095107
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Dr. Priyanti, M.Si., Ardian Khairiah, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with project based learning, class discussion, structured activities (quizzes).
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 70.00 Lecture (ECTS) : 3.60 Practical (ECTS) : 0.00 Total ECTS : 3.60
Credit points	3 Credit Hours (2-3) ≈ 3.60 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture

Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course students are able to analyse the morphological and anatomical characteristics of plant organs	

Module content

1. Concept of structure and development of plants in morphology and anatomy and the relatives with Qur'an
2. Root morphology and function
3. Root anatomy and development
4. Stem morphology and function
5. Stem anatomy and development
6. Leaf morphology and function
7. Leaf anatomy and development
8. Flower morphology and function
9. Flower anatomy and development
10. Fruit morphology and function
11. Fruit anatomy and function
12. Seed morphology and function
13. Seed anatomy and development
14. Review articles about the morphological and anatomical characters of plants per group

Recommended Literatures

1. Anonim. 2022. Botany: Plant Morphology. Kota. Career Point
2. Khandare, M.S. 2023. Text Book of Plant Anatomy. More Venkatrao Arjunrao. Maitree Prakhasan, Latur. India
3. Novita, A. & Basri, A.H.H. 2024. Botani: Pengenalan Morfologi dan Anatomi Tumbuhan. UMSU Press. Medan, Indonesia.
4. Ramdhini, R.N., et al. 2021. Anatomi Tumbuhan. Penerbit Yayasan Kita Menulis, Medan. Indonesia
5. Vidanapathirana, N. P. & Rifnas, L.M. 2023. Plant Morphology. University of Colombo Institute for Agro - Technology and Rural Sciences, Weligatta New Town, Hambantota, Sri Lanka

FST6095108 Practicum Plant Structure and Development

Module Name	Practicum Plant Structure and Development
Module level, if applicable	Basic
Module Identification Code	FST6095108
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Ardian Khairiah, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology

Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with practicum, project based learning (filedtrip), class discussion, collaborative learning, structured activities (quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20
Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to analyse information and data on morphology, anatomy, development, and function of plant organs.	
Module content 1. Morphology and function of root organs 2. Anatomy and development of root organs	

3. Morphology and function of stem organs
4. Anatomy and development of stem organs
5. Morphology and function of leaf organs
6. Anatomy and development of leaf organs
7. Modification of roots, stems, leaves, stem branching form and leaf layout on the stem
8. Morphology and function of floral organs
9. Anatomy and development of floral organs
10. Morphology and function of fruit organs
11. Anatomy and development of fruit organs
12. Morphology and function of seed organs and germination
13. Anatomy and development of seed organs and germination
14. Fieldtrip

Recommended Literatures

1. Anonim. 2022. Botany: Plant Morphology. Kota. Career Point
2. Khandare, M.S. 2023. Text Book of Plant Anatomy. More Venkatrao Arjunrao. Maitree Prakhasan, Latur. India
3. Novita, A. & Basri, A.H.H. 2024. Botani: Pengenalan Morfologi dan Anatomi Tumbuhan. UMSU Press. Medan, Indonesia.
4. Ramdhini, R.N., et al. 2021. Anatomi Tumbuhan. Penerbit Yayasan Kita Menulis, Medan. Indonesia
5. Vidanapathirana, N. P. & Rifnas, L.M. 2023. Plant Morphology. University of Colombo Institute for Agro - Technology and Rural Sciences, Weligatta New Town, Hambantota, Sri Lanka

FST6095111 Animal Systematics

Module Name	Animal Systematics
Module level, if applicable	Basic
Module Identification Code	FST 6095111
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Narti Fitriana, M.Si., Fahri Fahrudin, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Collaborative learning & discussion-based learning, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	2 Credit Hours ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students can understand biological concepts supported by other relevant knowledge to understand developing problems and issues with their applications. Students can apply the biological concept and their applications with relevant knowledge.	
Module content	

1. Introduction, basic concepts of animal taxonomy and rules of scientific nomenclature
2. History and development of animal systematics
3. Porifera and Coelenterata
4. Helminthology I (Platyhelminthes)
5. Helminthology II (Nemathelminthes dan Annelida)
6. Mollusca
7. Arthropoda
8. Echinodermata
9. Superclass Pisces
10. Amfibi
11. Reptile
12. Aves
13. Mamalia
14. The program application creates a dendogram

Recommended Literatures

1) Brower, A. V. Z. (2021). *Biological systematics: Principles and applications* (3rd ed.). Oxford University Press.
2) Saxena, S. (2024). *Text book of animal taxonomy*.
3) Legare Street Press. (2022). *An introduction to animal morphology and systematic zoology*.
4) Monro, A. K., & Mayo, S. J. (Eds.). (2022). *Cryptic species: Morphological stasis, circumscription, and hidden diversity*. Cambridge University Press.
5) Jegla, T., & Simonson, B. T. (2023). Taxonomy and evolution of ion channels. In *Textbook of ion channels volume II: Properties, function, and pharmacology of the superfamilies* (pp. 1–14). CRC Press.
6) Pramithya, Eka, Hastinah (2025) Veterinary Histology an Introduction To Animal Tissue Structure.

FST6095112 Practicum Animal Systematics

Module Name	Practicum Animal Systematics
Module level, if applicable	Basic
Module Identification Code	FST6095112
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Narti Fitriana, M.Si., Fahri Fahrudin, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with practicum, project based learning, class discussion, structured activities (quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20
Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV, video
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to analyse information and data on morphology, anatomy, cell development, and organ function in animals	
Module content	
1.Introduction to animal systematics practicum 2. Phylum Porifera 3. Phylum Coelenterata 4. Helminthology 5. Mollusca	

6. Arthropods
7. Echinoderms
8. World of fish
9. Reptiles
10. Amphibians
11. Aves
12. Mammals
13. Field trip
14. Kinship analysis based on similarities-differences character

References

1. Brower, A. V. Z. (2021). *Biological systematics: Principles and applications* (3rd ed.). Oxford University Press.
2. Saxena, S. (2024). *Text book of animal taxonomy*.
3. Legare Street Press. (2022). *An introduction to animal morphology and systematic zoology*
4. Monro, A. K., & Mayo, S. J. (Eds.). (2022). *Cryptic species: Morphological stasis, circumscription, and hidden diversity*. Cambridge University Press.
5. Jegla, T., & Simonson, B. T. (2023). Taxonomy and evolution of ion channels. In *Textbook of ion channels volume II: Properties, function, and pharmacology of the superfamilies* (pp. 1–14). CRC Press.
6. Modul Praktikum Sistematika Hewan. 2015.Prodi Biologi-FST, UIN Syarif Hidayatullah Jakarta.
7. Gonz´alez-Villanueva, M., Galaiya, (2025) The role of microglia in neuropathic pain: A systematic review of animal experiments. Int. J. Mol. Sci

NAS6112201 Pancasila and Civic Education

Module Name	Pancasila and Civic Education
Module level, if applicable	Undergraduate
Module Identification Code	NAS6112201
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Dr. Gerafina Djohan, MA
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Lecture, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 3.13 Practical (ECTS) : 0.00 Total ECTS : 3.13

Credit points	3 Credit Hours ≈ 3.13 ECTS
Admission and examination requirements	• Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	-
Media employed	Board, LCD Projector, Laptop/Computer
Forms of assessment	• Assignments (including quizzes and assignment): 40% • Midterm exam: 30% • Final exam: 30%
Intended Learning Outcome	
After completing this course, the students should have: 1. Explaining the History of the Formulation of Pancasila 2. Stressing the Importance of Civic Education as a Platform for Shaping the Character of the Civilized Indonesian and English Nation 3. Describing the Competency Standards of Civic Education 4. Presenting the Scope of Pancasila and Civic Education Material 5. Concluding the Importance of Civic Education for the Development of a Democratic Culture in Indonesia	
Module content	

1. History of the Formulation of Pancasila
2. Pancasila as a National Ideology
3. Pancasila as a Paradigm for Community, Nation, and State Life
4. Islamic Perspectives on the Content of Pancasila
5. National Identity
6. Globalization
7. Democracy
8. Constitution and Legislation in Indonesia
9. State, Religion, and Citizenship
10. Human Rights (HAM)
11. Regional Autonomy
12. Good Governance
13. Corruption Prevention
14. Civil Society

Recommended Literatures

1. Anshori, A. G. (2021). *Pancasila sebagai ideologi bangsa dan dasar negara: Kajian teoritis dan praktis*. Rajawali Pers.
2. Kaelan, M. S. (2020). *Pancasila: Yuridis, filosofis, dan historis*. Paradigma Press.
3. Alfian, M., & Zubaedi. (2022). *Pendidikan kewarganegaraan: Membangun karakter bangsa di era globalisasi*. Rajawali Pers.
4. Nawawi, I., & Saputra, R. (2019). *Pancasila dan kewarganegaraan: Perspektif historis dan konstitusional*. Deepublish.
5. Ramlan, S. (2021). *Demokrasi, HAM, dan good governance: Tantangan pembangunan di Indonesia*. Kencana.
6. Wibowo, P. (2020). *Identitas nasional dan globalisasi: Relevansi Pancasila dalam kehidupan berbangsa dan bernegara*. Gava Media.
7. Hidayat, R., & Hidayatullah, S. (2019). *Pendidikan kewarganegaraan: Teori dan implementasi*. Bumi Aksara.
8. Nuryanti, T., & Prasetyo, Y. T. (2022). *Pancasila dan civil society: Kajian kritis dalam konteks demokrasi Indonesia*. Deepublish.
9. Utomo, S. (2020). *Pancasila dalam lintasan sejarah: Peran dan tantangan di era modern*. Gramedia Pustaka Utama.
10. Suwarno, P., & Sutrisno. (2021). *Pendidikan Pancasila dan kewarganegaraan: Mengembangkan karakter bangsa berlandaskan nilai-nilai luhur*. Graha Ilmu.

FST6095124 Cell Biology

Module Name	Cell Biology
Module level, if applicable	Basic
Module Identification Code	FST6095124
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Dr. Nani Radiastuti, M.Si., Dr. drh. Raden Rara Bhintarti Suryohastari, M. Biomed.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Discussion-based learning per-group, structured activities (quizzes), problem-based learning by journal related with biology cell
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	2 Credit Hours (2-3) ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV, video
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students can apply cell biology concepts in biology activities supported by other relevant knowledge to understand developing problems and issues. Students can understand the implementation of cell biology theory in their research	

Module content

1. Lecture contracts
2. History of the Cell theory
3. Prokaryotic and Eukaryotic Cells
4. Cell Membrane Structure and Function
5. Nucleus and Ribosomes
6. Endomembrane System I: Endoplasmic Reticulum and Golgi Body
7. Endomembrane System II : Vacuoles, Peroxysomes, and Lysosomes
8. Mitochondria
9. Chloroplast
10. Cytoskeleton and Cell Motile Structure
11. Cell Cycle
12. Extracellular Matrix and Cell Junctions
13. Cell Communications
14. Journal discussion

Recommended Literatures

1. Lodish, Harvey; Berk, Arnold; Kaiser, Chris A.; Krieger, Monty; Bretscher, Anthony; Ploegh, Hidde; Kelsey C. Martin; Michael Yaffe; Angelika Amon, 2021, ***Molecular Cell Biology*** (9th ed.), New York, W. H. Freeman & Company.
2. Alberts, Bruce; Hopkin, Karen; Johnson, Alexander; Morgan, David; Raff, Martin; Roberts, Keith; Walter, Peter (eds.), 2020, ***Essential Cell Biology*** (5th ed.), New York, W. W. Norton & Company.
3. Jović, Dragomirka; Liang, Xue; Zeng, Hua; Lin, Lin; Xu, Fengping; Luo, Yonglun, 2022, *Single-cell RNA sequencing technologies and applications: a brief overview*, *Clinical and Translational Medicine*, 12(3): e694. DOI: 10.1002/ctm2.694.
4. Lee, Jong-Hoon (J. Lee), 2020, *Single-cell multiomics: technologies and data analysis*, *Experimental & Molecular Medicine*, (review) — ringkasan teknologi single-cell multi-omics dan analisis data. DOI & detail artikel tersedia pada halaman jurnal.
5. Wu, X.; Flynn, E.; dkk., 2023, *Single-cell multi-omics: methods and applications* (review on advances in single-cell multi-omics), *Annual Review of Biomedical Data Science*
6. Zuela-Sopilniak, N.; dkk., 2022, *Mechanobiology and disease* (review tentang peran gaya mekanik pada sel dan implikasinya pada penyakit), *Communications Biology* / *related journal* (open access review). DOI/PMCID tersedia pada PubMed Central.
7. Nelson, C. M., 2024, *Mechanobiology: shaping the future of cellular form and function* (review / perspektif pada teknik & aplikasi mekanobiologi modern), *Cell* (review). (lihat detail jurnal untuk volume/halaman).
8. Wang, S.; dkk., 2023, *The evolution of single-cell RNA sequencing technology and applications* (review teknologi dan aplikasi terbaru), *International Journal of Molecular Sciences*, vol. 24, art. 2943 (2023). DOI tersedia pada halaman jurnal.

FST6091101 Introduction to Information and Communications Technology

Module Name	Introduction to Information and Communications Technology
Module level, if applicable	Undergraduate
Module Identification Code	FST6091101
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Mohamad Irvan Septiar Musti, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Short discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class (Discussion based learning, problem-based learning, technology-based learning)
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74

Credit points	2 Credit Hours ≈ 2.74 ECTS
Admission and examination requirements	• Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	-
Media employed	Board, LCD Projector, Laptop/Computer
Forms of assessment	● Assignments (including quizzes and assignment): 40% ● Midterm exam: 30% ● Final exam: 30%
Intended Learning Outcome	

After completing this course

1. Students are able to understand the history, role, and benefits of Information and Communication Technology (ICT).
2. Students are able to explain an overview of computer systems.
3. Students are able to explain the concepts and tasks of operating systems.
4. Students are able to explain the history of Unix, Linux, and Windows operating systems.
5. Students can explain the definition, benefits, and workings of computer networks and the internet.
6. Students are able to explain the processes that occur at the OSI Layer.
7. Students are able to explain the types of IP Addresses and how they work.
8. Students can understand the development of computing and cloud computing.
9. Students are able to explain the architecture, storage media, and security mechanisms in cloud computing.
10. Students have the ability to describe various types of databases and provide explanations regarding the benefits of databases. Additionally, students can identify the uses and practical applications of databases in various industries and sectors.
11. Students have the ability to describe and understand the fundamental concepts of the Data Ecosystem, encompassing various important aspects of data management.
12. Students have the ability to comprehensively explain programming languages. They understand the definition and purpose of programming languages and also comprehend the significant role of programming languages in software development.
13. Students have the ability to comprehensively describe various aspects of cybercrime. They understand the definition of cybercrime, referring to illegal or harmful activities
conducted online, including attacks and violations of computer systems and networks.

Module content

1. Introduction: History of the Development of Information and Communication Technology
2. Computer system
3. Operating system
4. Computer Networks and Internet Networks
5. Reference Model (OSI Layer)
6. IP Address Basics
7. Cloud Computing System
8. Architecture, Security Mechanisms and Storage Media in Cloud Computing
9. Database Basics
10. Ecosystem Data
11. Programming language
12. Cyber Crime and Security

Recommended Literatures:

1. Turban, Efraim; Pollard, Carol; Wood, Gregory, 2021, *Information Technology for Management: Driving Digital Transformation to Increase Local and Global Performance, Growth and Sustainability*, Hoboken, Wiley.

2. Kurose, James F.; Ross, Keith W., 2020, *Computer Networking: A Top-Down Approach* (8th ed.), Boston, Pearson.
3. Stair, Ralph M.; Reynolds, George W., 2021, *Principles of Information Systems* (14th ed.), Boston, Cengage Learning
4. inmaz, H.; 2022, *A systematic review on digital literacy: definitions, frameworks and implications for education*, *Smart Learning Environments*, 9: 18. DOI: 10.1186/s40561-022-00204-y.
5. Msafiri, M. M.; 2023, *A systematic review of ICT integration in secondary schools: benefits, barriers and research gaps*, *Education and Information Technologies* (Springer). DOI: 10.1007/s44217-023-00070-x.
6. Ali, O.; 2022, *A comprehensive review of the Internet of Things (IoT): enabling technologies, applications and challenges*, *Sensors (MDPI)*, vol. 22, art. (review). DOI / PMC: PMC8840251.

UIN6033205 Practicum Qira'ah and Worship

Module Name	Practicum Qira'ah and Worship
Module level, if applicable	Basic
Module Identification Code	UIN6033205
Semester(s) in which the module is taught	2
Person(s) responsible for the module	Dr. Saifudin, M.Pd.I.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through student paper review by lecturer which are enriched with relevant examples and followed by deep discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class. Exercise and live practice on subject matter in or out class. Case study on contemporer issues that are relevant.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : 0 Number of Practical Per Semester : 0 Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 105 Lecture (ECTS) : 4.38 Practical (ECTS) : 0.00 Total ECTS : 4.38
Credit points	2 Credit Hours = 4.38 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	White/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome

After completing this course, students are able to :

- Understand the basics, concepts, and theories of Tajweed and Qiraat well and correctly;
- Understand various rules, methods and manners of reading the Quran according to the provisions of Tajweed Science
- Read and memorise Juz 30 and other selected letters orally and in writing
- Understand the basis, concepts and theories of various worship in Islam in accordance with the rules of Jurisprudence and Ushul Fiqh
- Implement knowledge, methods and practices of worship properly and correctly.

Module content

A.Practicum Qiroah

1. The Concept of Hijâiyah Letters: Classification, Types, and Makharij and Characteristics of Letters
2. Al-Qamariyah and al-Syamsiyah
3. Ahkâm al-Nûn al-Sâkinah wa al-Tanwîn
4. Ahkâm al-Mîm al- Sâkinah
5. Idlghâm al-Mutaqâribain wa al-Mutajânisain
6. Ahkâm al-Madûd (1 dan 2)
7. Al-Qalqalah
8. Al-Washl wa al-Waqf
9. Qirâah Gharîbah
10. Types of Qirâat in the al Quran
11. Memorize Juz Amma, Juz 28, Juz 29 and Surah Al-Kahfi, Al-Rahman, Al-Waqi'ah, Al-Mulk, Al Sajdah, Yasin,

B. Practicum Worship

1. The Concept of Worship in Islam
2. Thaharah (Hadas, Uncleanness, Wudlu, Tayamum, Bathing)
3. Concepts and Practices of Dressing According to Islam
4. Dhikr and Prayer
5. Obligatory Prayers (5 Times Prayer, Jama' and Qashar, Prayer in the Vehicle and Khauf)
6. Sunnah prayers (Rawatib, Tahajjud/Tarawih, Dluha, Istikharah, Istisqo, Kusuf/Khusuf)
7. Tajhiz al-Janazah (Pre-Death, Tajhiz al-Janazah Process: Bathing, Shrouding, Praying and Burying, and related matters)
8. Zakat/Alms (Compulsory and Sunnah)
9. Fasting (Compulsory, Sunnah and Haram)
10. Hajji and 'Umrah
11. Marriage and Family in Islam
12. Eating, Drinking and Communicating Manners
13. Mu'amalah (Types of Business in Islam)

Recommended Literatures

1. *Al-Quran al-Karim*
2. Al-Hussary, M. A. (2021). *The art of Qur'an recitation: Practical tajwid guide for learners*. Dar Al-Taqwa.
3. Al-Qahtani, A. (2020). *Perfecting tajwid: An in-depth study of Qur'anic recitation rules*. Islamic Foundation.
4. Dabbagh, M. (2022). *Learning tajweed: A step-by-step practical approach to Qur'anic pronunciation*. Wisdom Publications.

5. Hidayat, R., & Alwi, S. (2021). *Tajwid praktis: Panduan lengkap membaca Al-Qur'an dengan benar*. Pustaka Amanah.
6. Saad, H. R. (2019). *Tilawah and tajweed: Mastering the recitation of the Qur'an*. Al-Huda Press.
7. Rahman, A. A. (2022). *Understanding worship: A practical guide to mahdlah and ghairu mahdlah acts in Islam*. Darussalam Publications.
8. Yusuf, A. (2020). *Memorization of Qur'anic Surahs: Techniques and Strategies for Beginners.* Islamic Academy Press.
9. Hassan, A., & Karim, M. (2021). *The beauty of Tajweed: Rules, Practice, and Articulation.* Noorani Publishing.
10. Umar, M. I. (2022). *Practical Islamic Workship: Step-by-Step Guide to Daily Acts of Workship*. Iqra Press.
11. Halim, R., & Fadilah, T. (2019). *Tajwid and Qira'ah: A Practical Guide for Learners and Practitioners.* Nurul Hidayah Press.

FST6095103 Basic Ecology

Module Name	Basic Ecology
Module level, if applicable	Basic
Module Identification Code	FST6095103
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Discussion-based learning per-group, structured activities (quizzes), problem-based learning by journal related with basic ecology)
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 3.13 Practical (ECTS) : 0.00 Total ECTS : 3.13

Credit points	3 Credit Hours (2-3) ≈ 3.13 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

1. Students are able to explain the background of ecology and the development of ecological science
2. Students are able to explain the concepts of environmental ecology, plant ecology and animal ecology
3. Students are able to master the thermodynamic principles of ecosystems and their constituent components
4. Students are able to describe methods for measuring and analyzing ecosystems
5. Students are able to analyze ecosystem problems with their expertise in the field of biology to develop their commitment to environmental conservation in an effort to create an independent, honest and tough character.
6. Students are able to communicate the results of ecological research effectively both orally and in writing
7. Able to make decisions based on ecological data as a form of responsibility in carrying out tasks

Module content

1. Basic concepts of ecosystems
2. The process of forming an ecosystem and the distribution of species in the ecosystem
3. Energy in ecosystems
4. Biogeochemical Cycles
5. Law of tolerance and limiting factors
6. Ecosystem types
7. Population and community
8. Interspecific and intraspecific interactions
9. Plant ecology
10. Animal Ecology and animal behavior
11. Biogeography

Recommended Literatures

- Yang, Y., Foster, K.R., Coyte, K.Z., and Li, A. (2023). Time delays modulate the stability of complex ecosystems. Nat. Ecol. Evol. 7, 1610–1619.
- Korkmazhan, E., and Dunn, A.R. (2022). High-order correlations in species interactions lead to complex diversity-stability relationships for ecosys tems. Phys. Rev. E 105, 014406.
- Pigani, E., Sgarbossa, D., Suweis, S., Maritan, A., and Azaele, S. (2022). Delay effects on the stability of large ecosystems. Proc. Natl. Acad. Sci. USA 119, e2211449119
- Baron, J.W., and Galla, T. (2020). Dispersal-induced instability in complex ecosystems. Nat. Commun. 11, 6032.

FST6095104 Practicum Basic Ecology

Module Name	Practicum Basic Ecology
Module level, if applicable	Basic
Module Identification Code	FST6095104
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Practicum, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20
Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Intended Learning Outcome	
● Students are able to explain the background of ecology and the development of ecological science ● Students are able to explain the concepts of environmental ecology, plant ecology and animal ecology ● Students are able to use tools to measure environmental abiotic factors ● Students are able to describe methods for measuring and analyzing ecosystems ● Students are able to analyze ecosystem problems with their expertise in the field of biology to develop their commitment to environmental conservation in an effort to create an independent, honest and tough character. ● Students are able to communicate the results of ecological research effectively both orally and in writing	

● Able to make decisions based on ecological data as a form of responsibility in carrying out tasks

Module Content
1. Physical Chemical Factors 2. Decomposer Population 3. Soil Macro Fauna 4. Carbon Cycle 5. Intraspecific and Interspecific Competition 6. Allelopathy 7. Secondary Succession 8. Vegetation Analysis 9. Profile Diagram 10. Animal Populations and Communities I (Mammals) 11. Animal Populations and Communities II (Birds)
Recommended Literatures ● Yang, Y., Foster, K.R., Coyte, K.Z., and Li, A. (2023). Time delays modulate the stability of complex ecosystems. Nat. Ecol. Evol. 7, 1610–1619. ● Korkmazhan, E., and Dunn, A.R. (2022). High-order correlations in species interactions lead to complex diversity-stability relationships for ecosys tems. Phys. Rev. E 105, 014406. ● Pigani, E., Sgarbossa, D., Suweis, S., Maritan, A., and Azaele, S. (2022). Delay effects on the stability of large ecosystems. Proc. Natl. Acad. Sci. USA 119, e2211449119 ● Baron, J.W., and Galla, T. (2020). Dispersal-induced instability in complex ecosystems. Nat. Commun. 11, 6032.

FST6095144 Genetics

Module Name	Genetics
Module level, if applicable	Basic
Module Identification Code	FST6095144
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Dr. Dasumiati, M.Si., Fahri Fahrudin, M.Si.

Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through discussing the main source of reference (e-book) which are enriched with relevant examples (discussion of problem-based learning) or experiments related to the material.
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 3.13 Practical (ECTS) : 0.00 Total ECTS : 3.13
Credit points	3 Credit Hours ≈ 3.13 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

After completing this course,

- Students are able to analyse the diversity of plants and animals both within the same species and family.
- Students are able to test the concept of mendelism of observation results against the theory of chance, the Khi Kuadrat test, and the applicability of the Hardy-Weinberg Law to a population.

Module content

1. Basic concepts of genetics
2. Hereditary characteristics
3. Gene expression
4. Mendelism
5. Probability and Chi-Square tests
6. Mendel's Law Deviations (multiple alleles, gene interactions, lethal genes) extrachromosomal DNA and its inheritance
7. Sex determination and sex-linked
8. Gene and chromosomal mutations
9. Linkage, crossing over and recombination
10. Genetic mapping
11. Population genetics
12. Special topics on genetic phenomena
13. Special topics on applications of genetics

Recommended Literatures

1. Snustad, DP. & Simmons, MJ.. 2016. Principle of Genetic. Wiley.
2. Kumar, A., Dinkar, D., & Dwivedi, N. 2023. Plant Genetic Resources Consevation and Utilization. Elite Publishing House New Delhi
3. Efendi, Y. 2020. Genetika Dasar. Pustaka Rumah C1inta.
4. Hartl, DL. & Jones, EW. 1998. Genetics: Principles and Analysis. Jones and Bartlett Publishers Canada.
5. Research journals and e-books published less than the last 5 years.

FST6095115 Practicum Genetics

Module Name	Practicum Genetics
Module level, if applicable	Basic
Module Identification Code	FST6095115
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Dr. Dasumiati, M.Si., Fahri Fahrudin M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through practicum, project based learning, class discussion, structured activities (quizzes) and learning based on mini projects.
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20
Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome

1. Students are able to analyze the diversity of plants and animals both within the same species and family
2. Students are able to test the concept of mendelism as a result of observations of probability theory, the Chi-Square test, and the application of the Hardy-Weinberg Law to a population.

Module content

1. Recognizing the Diversity of Characteristics of Living Creatures.
2. Probability Theory and Chi-Square Test.
3. Monohybrid Experiment Analogy
4. Analogy of Mendel's Dihydride Experiment.

5. Making and Observing Plant Chromosome Specimens
6. Observation and Observation of Animal Chromosome Specimens.
7. Making Eukaryotic Chromosome Karyotypes and Recognizing Human Fingerprints.
8. Life Cycle and Sex Ratio of Fruit Flies.
9. Mutation.
10. Hardy Weinberg's Law.
11. Multiple Alleles and Gene Frequency Determination.
12. Introduction to Polymerase Chain Reaction PCR)
13. Introduction to Electrophoresis.
14. Observation of Giant Chromosomes (Polytene Chromosomes).

Recommended Literatures

1. Klug, W. S., Cummings, M. R., Spencer, C. A., Palladino, M. A., & Killian, D. J. (2021). *Concepts of genetics* (12th ed.). Hoboken, NJ: Pearson.
2. Snustad, D. P., & Simmons, M. J. (2021). *Principles of genetics* (8th ed.). Hoboken, NJ: Wiley.
3. Hartl, D. L., & Ruvolo, M. (2020). *Genetics: Analysis of genes and genomes* (9th ed.). Burlington, MA: Jones & Bartlett Learning.
4. Brooker, R. J. (2017). *Genetics: Analysis and principles* (6th ed.). New York: McGraw-Hill Education.
5. Griffiths, A. J. F., Wessler, S. R., Carroll, S. B., & Doebley, J. (2015). *Introduction to genetic analysis* (11th ed.). New York: W. H. Freeman and Company.

FST6095106 Basic Microbiology

Module Name	Basic Microbiology
Module level, if applicable	Basic
Module Identification Code	FST6095106
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Prof. Dr. Megga Ratnasari Pikoli, M.Si., Dr. Nani Radiastuti, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Discussion-based learning per-group and presentation each group, structured activities (quizzes), Learning based on mini project
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 37.33 Lecture (ECTS) : 2.12 Practical (ECTS) : 0.00 Total ECTS : 2.12
Credit points	2 Credit Hours ≈ 2.12 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Able to understand organisms that include within the scope of microbiology and able to carry out research activities related to microbiology	
Module Content	

1. History and development of microbiology throughout time
2. Characterization of microorganisms: prokaryotic and eukaryotic cell structure
3. Basic methods in microbiology
4. Structure and development of Bacteria
5. Structure and development of the Archaea
6. Structure and development of Microalgae
7. Structure and development of Viruses
8. Structure and development of Fungi
9. Control the growth of microorganisms
10. Interaction of microorganisms
11. Bioprocess
12. Applied microbiology in the food and industrial sector
13. Applied microbiology in the field of environment and health

Recommended Literatures

1. Chin-Hong, P., Joyce, E. A., Karandikar, M., Matloubian, M., Rubio, L. A., Schwartz, B. S., & Levinson, W. E. (2024). *Levinson's review of medical microbiology and immunology: A guide to clinical infectious disease*. McGraw-Hill Professional.

2. Das, S., & Dash, H. R. (Eds.). (2024). *Microbial diversity in the genomic era: Functional diversity and community analysis*. Elsevier.

3. Madigan, M. T., Bender, K. S., Buckley, D. H., Sattley, W. M., & Stahl, D. A. (2022). *Brock biology of microorganisms*, 16th Edition (Global Edition). Pearson Education Limited.

4. Supporting materials: the latest international journal articles

FST6095117 Practicum Basic Microbiology

Module Name	Practicum Basic Microbiology
Module level, if applicable	Basic
Module Identification Code	FST6095117
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Prof. Dr. Megga Ratnasari Pikoli, M.Si., Dr. Nani Radiastuti, M.Si, Arina Findo Sari, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through practicum, project based learning, class discussion, structured activities (quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20
Credit Points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are sble to master the principles and techniques used in the field of basic microbiology	
Modul Content	
1. Lecture contract & introduction to laboratory K3, principles in basic microbiology practicum 2. Basic preparation and treatment in microbiology I 3. Basic preparation and treatment in microbiology II: Inoculation 4. Making dry preparations and staining bacterial cells. 5. Movement of bacteria	

6. Enumeration using the turbidimetry method and growth curve of microorganisms.
7. Enumeration using the TPC method and growth curve of microorganisms
8. The influence of environmental factors on the cultivation of microorganisms.
9. Biochemical activity of microorganisms.
10. Control of microorganisms.
11. Isolation of microorganisms from the environment.
12. Water microbiology: Standard qualitative analysis using the MPN method
13. Food microbiology: Making sticky rice tape, tempeh and nata de coco
14. Review practical reports

Recomended Literatures

1. Cappuccino, J. G., & Sherman, N. (2019). Microbiology: a laboratory manual. 12th Edition. Pearson Higher Ed.
2. Erkmen, O. (2021). *Laboratory practices in microbiology*. Academic Press.
3. Radiastuti, N. & Pikoli, M.R. (2015). *Penuntun praktikum mikrobiologi dasar*. Fakultas Sains dan Teknologi Universitas Islam Negeri Syarif Hidayatullah Jakarta Syarif Hidayatullah Jakarta.
4. Smith, D., Ryan, M. J., & Buddie, A. (2023). *Managing Microorganisms*. GB: CABI.

FST6095128 Plant Systematics

Module Name	Plant Systematics
Module level, if applicable	Basic
Module Identification Code	FST6095128
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Dr. Priyanti, M.Si., Ardian Khairiah, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Discussion-based learning per-group, structured activities (quizzes), problem-based learning by journal related with plant systematics.
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 3.13 Practical (ECTS) : 0.00 Total ECTS : 3.13
Credit points	3 Credit Hours ≈ 3.13 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	none
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome

After completing this course students are able to analyse plant diversity based on morphological and evolutionary traits.

Module content

1. The systematics concepts, taxonomy, properties and characteristics, their relationship with other sciences, and the holy Qur'an
2. History of taxonomy
3. Description, identification and classification
4. Diversity of micro and macroalgae and their evolution
5. Bryophyte diversity, life cycles, and evolution
6. Diversity of Lichens and their benefits
7. Pteridophyta diversity, life cycle, and evolution

8. Gymnosperm diversity and evolution
9. Diversity, properties and characteristics of Magnoliids
10. Diversity, properties and characteristics of Commelinids
11. Diversity, properties and characteristics of Fabids
12. Diversity, properties and characteristics of Malvids
13. Diversity, properties and characteristics of Campanulids
14. Diversity, properties and characteristics of Lamiids.

Recommended Literatures

1. Ghildiyal, C.J., Kandpal, H., Juyal, P., Rajwaar, G.S., & Tewari, L. 2019. Pteridology, Gymnosperms, Palaebotany. Uttarakhan Open University, Haldwani.
2. Indrawan, M., Anargha, S., Wellyzar, S., & Himmah R. 2024. Spesies Apakah Itu? Yayasan Pustaka Obor Indonesia. Jakarta, Indonesia
3. Mustaqim, W.A. & Nikmah, I.A. 2024. Sistematika Tumbuhan. UI Publishing. Indonesia
4. Nurainas, Febriamansyah, T.A., Zulaspita, W., Yasra, F., Maideliza, T., Chairul, & Syamsuardi. 2024. Kekayaan Jenis Tumbuhan Berbunga di Area Geopark Silokek, Sijunjung, Sumatera Barat. *Jurnal Biologi Universitas Andalas,* 12(1), 47-57
5. Pandey, A.K. & Kasana, S. 2021. Plant Systematics. CRC Press. Delhi, India
6. Sympson, M.G. 2019. Plant Systematics. Elsevier. California, USA

FST6095109 Practicum Plant Systematics

Module Name	Practicum Plant Systematics
Module level, if applicable	Basic
Module Identification Code	FST6095109
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Dr. Priyanti, M.Si., Ardian Khairiah, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through practicum (fieldtrip), project based learning, class discussion, structured activities (quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20
Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to analyse plant diversity in oral and written form.	
Module content	
1. The concept of plant taxonomy, diversity and character variations 2. Morphological Diversity of Microalgae	

3. Morphological Diversity of Macroalgae.
4. Morphological diversity of mosses (Bryophyta).
5. Lichen morphological diversity
6. Morphological diversity of Pteridophytes
7. Diagnostic characteristics of plants
8. Comparison of plant morphology.
9. Key to plant identification.
10. Anatomical characteristics of plants.
11. Palynological characteristics of plants
12. Morphological Diversity of Gymnosperms
13. Morphological Diversity of Angiosperms
14. Herbarium techniques

Recommended Literatures

1. Ghildiyal, C.J., Kandpal, H., Juyal, P., Rajwaar, G.S., & Tewari, L. 2019. Pteridology, Gymnosperms, Palaebotany. Uttarakhan Open University, Haldwani.
2. Indrawan, M., Anargha, S., Wellyzar, S., & Himmah R. 2024. Spesies Apakah Itu? Yayasan Pustaka Obor Indonesia. Jakarta, Indonesia
3. Mustaqim, W.A. & Nikmah, I.A. 2024. Sistematika Tumbuhan. UI Publishing. Indonesia
4. Nurainas, Febriamansyah, T.A., Zulaspita, W., Yasra, F., Maideliza, T., Chairul, & Syamsuardi. 2024. Kekayaan Jenis Tumbuhan Berbunga di Area Geopark Silokek, Sijunjung, Sumatera Barat. *Jurnal Biologi Universitas Andalas,* 12(1), 47-57
5. Pandey, A.K. & Kasana, S. 2021. Plant Systematics. CRC Press. Delhi, India
6. Sympson, M.G. 2019. Plant Systematics. Elsevier. California, USA
7. Ulum, F.B., Setyawati, D., & Su'udi, M. 2022. Plant Systematics Practical Book. Biology Department. Faculty of Matematics and Sciences. Jember University. Indonesia

FST6095110 Animal Structure and Development

Module Name	Animal Structure and Development
Module level, if applicable	Basic
Module Identification Code	FST 6095110
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Narti Fitriana, M.Si., Fahri Fahrudin, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Learning activities in class focus on assignments, questions and answers, discussions, presentations, or experiments related to the material. The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class (Discussion based learning and problem-based learning)
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 3.13 Practical (ECTS) : 0.00 Total ECTS : 3.13
Credit points	3 Credit Hours ≈ 3.13 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome
Students can understand biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students take an active role in developing science and technology throughout their lives.
Module content
1. Biology cell and spectrum concept 2. Basic tissue structure and histology 3. Structure and histology of the integumentary system and its derivatives 4. Structure and histology of the musculoskeletal system (muscles and skeleton) 5. Structure and histology of the digestive system, digestive organs and glands 6. Structure and histology of the circulatory, respiratory and excretory systems 7. Structure and histology of the reproductive system 8. Gametogenesis, structure and development of sperm and ovum and integration of Islamic values 9. Primate reproductive cycle 10. Fertilization and implantation 11. Extra-embryonic membranes and twinning 12. Development of invertebrate animal embryos (Echinodermata) 13. Pisces embryo development, amphibians and reptiles 14. Embryonic development of Aves and Mammalia
Recommended Literatures 1. Pramithya, Eka, Hastinah (2025) Veterinary Histology an Introduction To Animal Tissue Structure. Jakarta 2. Mitdun Joseph (2022) Building Blocks of Animals and Plants Animal Structure and Classification" Paperback Inn. 3. Gonz´alez-Villanueva, M., Galaiya, H., Staniland, P., Staniland, J., Savill, I., Wong, T.S.,Tee, K.L., 2021. Adaptive laboratory evolution of Cupriavidus necator H16 for carbon co-utilization with glycerol. Int. J. Mol. Sci. 20, 5737. https://doi.org/ 10.3390/ijms20225737. 4. Gutschmann, B., H¨ogl, T.H., Huang, B., Maldonado Sim˜oes, M., Junne, S., Neubauer, P., 5. Grimm, T., Riedel, S.L., 2023a Polyhydroxyalkanoate production from animal by products: Development of a pneumatic feeding system for solid fat/protein-emulsions. Microb. Biotechnol. 16, 286–294. https://doi.org/10.1111/1751-7915.14150.

FST6095129 Practicum Animal Structure and Development

Module Name	Practicum Animal Structure and Development
Module level, if applicable	Basic
Module Identification Code	FST6095129
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Narti Fitriana, M.Si.,
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through practicum, project based learning, class discussion, structured activities (quizzes) and learning based on mini projects.
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20
Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white/glass board and PowerPoint presentation with LCD/smart TV
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to analyze information and data on morphology, anatomy, cell development and organ function in animals	
Module content	

1. Basic concepts of the structure and development of animal cells
2. Basic tissue
3. Integumentary system, structure of scales, feathers and skin
4. Muscle and skeletal tissue
5. Anatomical structure and morphology of Osteichthyes
6. Anatomical structure and morphology of Amphibians
7. Anatomical structure and morphology of Reptiles
8. Anatomical structure and morphology of Aves
9. Anatomical structure and morphology of Mammalia
10. Anatomical structure and development of the ovaries
11. Anatomical structure and development of the testicles
12. Anatomical structure and development of the sea urchin embryo
13. Anatomical structure and development of frog embryos
14. Anatomical structure and development of chicken embryos

Recommended Literatures

1. Gonz´alez-Villanueva, M., Galaiya, (2025) The role of microglia in neuropathic pain: A systematic review of animal experiments. Int. J. Mol. Sc

FST6095128 Biochemistry

Module Name	Biochemistry
Module level, if applicable	Basic
Module Identification Code	FST6095128
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Dr. Laode Sumarlin, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Discussion based learning, problem-based learning
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 37.33 Lecture (ECTS) : 2.12 Practical (ECTS) : 0.00 Total ECTS : 2.12
Credit points	2 Credit Hours (2-3) ≈ 2.12 ECTS

Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to understand biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to apply biological concepts and their applications with relevant knowledge. Students are able to work independently and in teams according to their skills. Students are able to demonstrate the results of conceptual, analytical, logical and innovative thinking in oral and written form.	
Module content	

1. Understanding Biochemistry
2. Water and buffer
3. Biomolecules in Cells/Cell Organelles
4. Carbohydrate
5. Lipid
6. Amino Acids and Proteins
7. Enzyme
8. General Aspects of Metabolism (Cross-Metabolism and Metabolism Regulation)
9. Glycolysis and the Citric Acid Cycle
10. Gluconeogenesis and glycogen metabolism
11. Lipid metabolism (Oxidation of fatty acids and biosynthesis of fatty acids, fats and cholesterol)
12. Amino Acid Metabolism and amino acid proteins)

Recommended Literatures

1. Abali, E. E., Cline, S. D., Franklin, D. S., & Viselli, S. M. (2025). Lippincott illustrated reviews: Biochemistry (9th ed.). Lippincott Williams & Wilkins.
2. Nelson, D. L., & Cox, M. M. (2022). Lehninger principles of biochemistry (8th ed.). W. H. Freeman.
3. Sumarlin, L. 2020. BIOKIMIA: Dasar-Dasar Biomolekul dan Metabolisme, Raja Grafindo, Jakarta

FST6096226 Practicum Biochemistry

Module Name	Practicum Biochemistry
Module level, if applicable	Basic
Module Identification Code	FST6096226
Semester(s) in which the module is taught	3
Person(s) responsible for the module	Tarso Rudiana, M.Si

	Nurul Amilia, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Practicum, class discussion, structured activities (homework, quizzes)
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 28 Lecture (ECTS) :2.20 Practical (ECTS) : 0.00 Total ECTS : 2.20
Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

- After attending this lecture:
- Students are able to explain the use of biomolecules contained in the Qur'an and Hadith.
- Students are able to understand the basic principles related to the isolation, characterisation and biosynthesis of primary metabolites (carbohydrates, lipids, and proteins).
- Students have the skills to use experimental tools related to biochemical experiments.
- Students are able to make reports in accordance with correct scientific principles.
- Students are able to directly prove biochemical theories, phenomena/reactions through experimental activities.
- Students are able to develop understanding and thinking skills in designing biochemical experiments for research activities.

Module content

1. Qualitative Analysis
2. Carbohydrate Hydrolysis
3. Qualitative Analysis of Lipids
4. Qualitative Analysis of Protein I
5. Qualitative Analysis of Protein II
6. Temperature characteristics of Amylase Enzyme
7. pH characteristics of Amylase Enzyme
8. Kinetics of Amylase Enzyme

Recommended Literatures

- Lasseter, B. F. (2020). Biochemistry in the lab: a manual for undergraduates. CRC Press.
- Sinton, M. (2021). Laboratory experiments for general, organic, and biochemistry. Kendall Hunt Publishing.

FST6094106 Elementary Statistics

Module Name	Elementary Statistics
Module level, if applicable	Basic
Module Identification Code	FST6094106
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Prof. Dr. Lily Surayya Eka Putri, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered in three activities: Provide material to students along with several examples for discussion in class Assignments are given in class and students must explain the results in class, then the lecturer will carry out an evaluation giving take-home assignments
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 70.00 Lecture (ECTS) : 3.60 Practical (ECTS) : 0.00 Total ECTS : 3.60
Credit points	3 Credit Hours ≈ 3.60 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation

Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to master the concept of statistics with the approach of various problems in Biology research and can then be used to process their research data.	

Module content
1.Statistics concept 2. Variables and Data 3. Frequency distribution 4. Central value measurement 5. Dispersion measurement 6. Normal distribution 7. Hypothesis test 8. Chi-Square Distribution 9. Simple correlation and regression 10. Correlation and multiple regression 11. ANOVA: Completely Randomized Design and Randomized Block Design 12. ANOVA: Factorial and Advanced Test (Duncan Test)
Recommended Literatures 1. Bluman, A. G. (2022). Elementary statistics: A step-by-step approach (11th ed.). McGraw-Hill Education. 2. Triola, M. F. (2021). Elementary statistics (14th ed.). Pearson. 3. Moore, D. S., Notz, W. I., & Fligner, M. A. (2021). The basic practice of statistics (9th ed.). W.H. Freeman. 4. Weiss, N. A. (2020). Introductory statistics (11th ed.). Pearson. 5. Larson, R., & Farber, B. (2019). Elementary statistics: Picturing the world (7th ed.). Pearson. 6. Navidi, W., & Monk, B. (2021). Elementary statistics (3rd ed.). McGraw-Hill Education. 7. Sullivan, M. (2020). Fundamentals of statistics (6th ed.). Pearson. 8. Mann, P. S. (2021). Introductory statistics (10th ed.). Wiley. 9. Levine, D. M., & Szabat, K. A. (2020). Statistics for managers using Microsoft Excel (9th ed.). Pearson. 10. Keller, G. (2020). Statistics for management and economics (11th ed.). Cengage Learning.

FST6095132 Conservation Biology

Module Name	Conservation Biology
Module level, if applicable	Basic
Module Identification Code	FST6095132
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si., Etyn Yunita, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Discussion-based learning per group, structured activities, problem-based learning by journal related with conservation biology. The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43

Credit points	2 Credit Hours ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome
Able to explain the background and history of the conservation movement, conservation ethics, and the concept of nature conservation in Islam. Able to categorize biodiversity, conservation species, and conservation areas. Able to describe threats to biodiversity. Able to explain conservation area planning, conservation priorities, and national international conservation strategies
Module content
1. Background to the conservation movement, figures from the Conservation Movement and their contributions 2. Conservation ethics 3. The concept of nature conservation in Islam 4. Biodiversity and biodiversity value 5. Threats to biodiversity 6. Conservation of species 7. Conservation priorities 8. Conservation Area Planning 9. National and international conservation strategies 10. Cost-benefit analysis of conservation areas 11. Consideration of area legalization 12. Local wisdom
Recommended Literatures 1. Andreou, M., Delipetrou, P., Kadis, C., Tsiamis, G., Bourtzis, K., Georghiou, K., 2021. An integrated approach for the conservation of threatened plants: the case of Arabis kennedyae (Brassicaceae). Acta Oecol. 37, 239–248. 2. Barnett, A., Doubleday, Z., 2020. The growth of acronyms in the scientific literature. eLife 9, e60080 3. Mondragon, D., 2019. Population viability analysis for Guarianthe aurantiaca, an ornamental epiphytic orchid harvested in Southeast Mexico. Plant Species Biol. 24, 35–41. 4. Tsintides, T., Christodoulou, Ch.S., Delipetrou, P., Georghiou, K., 2017. The Red Data Book of the Flora of Cyprus. Cyprus Forestry Association, Lefkosia

FST6095113 Microbial Physiology

Module Name	Microbial Physiology
Module level, if applicable	Basic
Module Identification Code	FST6095113
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Dr. Nani Radiastuti, M.Si., Arina Findo Sari, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Mini project based learning, class discussion per-group each different topic according to RPS, structured activities (searching and discussion of journal)
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	2 Credit Hours ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Students are able to understand microbial physiology which is supported by other relevant knowledge to carry out microbiology applications/research. Students are able understand to condition in bioprocess

Module content
1. Lecture contract and explanation of independent assignments 2. Structure and function of subcellular organs of microorganisms 3. Tools for bacterial movement 4. Microbial genetic processes 5. Microbial growth 6. Microbial stress response 7. Carbon metabolism 8. Other carbon metabolism 9. Lipid metabolism 10. Nitrogen metabolism 11. Differentiation and Qourum sensing 12. Environmental factors that influence initial microbial growth and reproduction 13. Application example (journal review) 14. Application example (journal review)
Recommended Literatures 1. Spormann, A. M. (2023). Principles of microbial metabolism and metabolic ecology. Springer. 2. Stevens, A. M., Ditty, J. L., Parales, R. E., & Merkel, S. M. (2024). Microbial physiology: Unity and diversity. John Wiley & Sons.

FST6095114 Animal Physiology

Module Name	Animal Physiology
Module level, if applicable	Basic
Module Identification Code	FST6095114
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Dr. drh. Raden Rara Bhintarti Suryohastari, M. Biomed. Fahri Fahrudin, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through discussing the main source of reference. Learning activities in class focus on assignments, questions and answers, discussions, presentations, or experiments related to the material. Students can ask questions about things that are unclear so as not to cause misunderstandings about the material they have studied

Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 70.00 Lecture (ECTS) : 3.60 Practical (ECTS) : 0.00 Total ECTS : 3.60
Credit points	3 Credit Hours ≈ 3.60 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

1. Able to analyze the basic concepts of animal physiology including homeostasis, thermoregulation, osmoregulation and the working mechanisms of organ systems in the animal
2. Able to describe and explain how organ systems work in the animal
3. Able to correlate organ system processes working in an animal's body with environmental factors

Module content

1. The scope of physiology (between form, structure and function)
2. Basic concepts of homeostasis
3. Thermoregulation, hibernation, torpor, and estivation.
4. Digestive System 1
5. Digestive System 2
6. Circulation/cardiovascular system
7. Respiratory system
8. Osmoregulation and urination
9. Immune system/immunity
10. Endocrine/hormonal system
11. Reproductive system
12. Nervous system
13. Movement system (skeletal and muscular)
14. Sensory system (sensory mechanism)

Recommended Literatures

1. Aspinall, V., & Cappello, M. 2024. Introduction to animal and veterinary anatomy and physiology. CABI.
2. Brzozowski, T., & Zaman, G. S. 2023. Recent Advances in Homeostasis. BoD–Books on Demand.
3. Gonzalez-Rivas, P. A., Chauhan, S. S., Ha, M., Fegan, N., Dunshea, F. R., & Warner, R. D. 2020. Effects of heat stress on animal physiology, metabolism, and meat quality: A review. Meat science, 162, 108025.
4. Hill Tudor, J. 2022. Homeostasis. In Encyclopedia of Animal Cognition and Behavior (pp. 3132-3137). Cham: Springer International Publishing.
5. Jin, X., Wang, X., Tse, W. K. F., & Shi, Y. 2022. Homeostasis and physiological regulation in the aquatic animal during osmotic stress. Frontiers in Physiology, 13, 977185.
6. Montgomery, R. M. (2025). The Role of the Nervous and Endocrine Systems in Animal Homeostasis: An Integrative Review of Contemporary Mechanisms and Emerging Paradigms.
7. Natarajan, S. K., Zheng, H., Chandra, S., Schultz, H. D., & Chen, W. C. 2025. Frontiers in the midlands society of physiological sciences (2023-2024). Frontiers in Physiology, 16, 1654264.

FST6095135 Practicum Animal Physiology

Module Name	Practicum Animal Physiology
Module level, if applicable	Basic
Module Identification Code	FST6095135
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Narti Fitriana, M.Si., Fahri Fahrudin, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through practicum, project-based learning, class discussion, structured activities (quizzes) and learning based on mini projects.
Workload	Lect ure (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 23.33 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.04 Total ECTS : 2.04
Credit points	1 Credit Hours ≈ 2.04 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to analyse information and data arising from animal physiology activities.	
Module content	

1. Basic concepts of animal physiology
2. Homoiotherm thermoregulation
3. Poikilotherm thermoregulation
4. Calculation of the number of erythrocytes and HB levels
5. Leukocyte counting and blood coagulation
6. Cytosol and diastole measurements
7. Osmoregulation
8. Measurement of CO2 molecules resulting from respiration
9. Sensory and motor tests
10. Check fat levels
11. Liver function examination (liver enzyme levels)
12. Blood glucose levels
13. Urine glucose levels
14. Mini research/base case (independent observation of animal physiology)

Recommended Literatures

8. Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., Orr, R. B., & Campbell, N. A. (2020). *Campbell biology* (12th ed.). New York, NY: Pearson.
9. Moyes, C. D., & Schulte, P. M. (2022). *Animal physiology* (4th ed.). New York, NY: Oxford University Press.
10. Sherwood, L., Klandorf, H., & Yancey, P. H. (2022). *Animal physiology: From genes to organisms* (3rd ed.). Boston, MA: Cengage Learning.
11. Sherwood, L. (2016). *Human physiology: From cells to systems* (9th ed.). Boston, MA: Cengage Learning.
12. Tortora, G. J., & Derrickson, B. (2021). *Principles of anatomy and physiology* (16th ed.). Hoboken, NJ: John Wiley & Sons.

FST6095116 Plant Physiology

Module Name	Plant Physiology
Module level, if applicable	Basic
Module Identification Code	FST6095116
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Dr. Dasumiati, M.Si., Ardian Khairiah, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The learning methods used are problem-based, flipped and case studies. Material is discussed in groups. The topics discussed are in accordance with the learning material.
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 70.00 Lecture (ECTS) : 3.60 Practical (ECTS) : 0.00 Total ECTS : 3.60
Credit points	3 Credit Hours ≈ 3.60 ECTS

Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to analyse cases related to plant physiology based on the concept of plant physiology.	
Module content	

1. Introduction: concepts of plant physiology, plant cells, energy and enzymes.
2. Transport and translocation of water and solutions: properties of water, diffusion, osmosis, role of water for plants, absorption and transport of water and transpiration
3. Nutrients and their transportation
4. Assimilation of nutrients: nitrogen, sulfur and phosphate.
5. Photosynthesis: light reactions, dark reactions, translocation in phloem.
6. Respiration and lipid metabolism: respiration, glycolysis, citric acid cycle, electron transport and ATP synthesis, and lipid metabolism
7. Secondary metabolism and its role.
8. Growth and development: embryogenesis, differentiation, organogenesis, dormancy and germination, and juvenile phase, physiology of flower formation, ABC modeling in flower formation, and fruit and seed formation.
9. Growth and development: physiology of flowering formation, ABC modeling in flower formation, fruit and seed formation.
10. Plant growth regulator.
11. Ecophysiology: photoperiodism, vernalization and stress physiology.
12. Applications of plant physiology in other fields.
13. Cases related to plant physiology in other fields

Recommended Literatures

1. Taiz, L., Møller, IM.. Murphy, A., Zeiger, E. 2023. Plant Physiology and Development. Oxford University Press.
2. Lambers, H., Chapin, F.S.&Pons, T.L, R. E. (2019). *Plant Physiology Ecology*. Springer Science Business Media, LLC, 233 Spring Street, New York, USA.
3. Bhatla, S.C. & Lal, M.A. 2023. *Plant Physiology, Development and Metabolism.* Springer Nature Singapore Pte Ltd. Singapore
4. Grimoldi, A. A., & Di Bella, C. E. (2024). *Forage plant ecophysiology under different stress conditions*. Plants, *13*(10), 1302. https://doi.org/10.3390/plants13101302
5. International research journals and e-books published less than the last 5 years.

FST6095127 Practicum Plant Physiology

Module Name	Practicum Plant Physiology
Module level, if applicable	Basic
Module Identification Code	FST6095127
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Dr. Dasumiati, M.Si., Ardian Khairiah, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Practicum, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 23.33 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.04 Total ECTS : 2.04
Credit points	1 Credit Hours ≈ 2.04 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to use standard methodologies and software to solve problems related to biology and their implementation. Students are able to interpret research data.	
Module content	

1. Introduction: K3 in the plant physiology laboratory
2. Solution.
3. Diffusion, osmosis and imbibition processes.
4. Germination and dormancy and influencing factors.
5. The relationship between plants and water.
6. Respiration in plants
7. Photosynthesis
8. Plant hormones
9. Enzyme
10. Growth and development.
11. Plant nutritional needs and deficiencies.
12. Transpiration and factors of transpiration

Recommended Literatures

1. Taiz, L., Møller, IM.. Murphy, A., Zeiger, E. 2023. Plant Physiology and Development. Oxford University Press.
2. Lambers, H., Chapin, F.S.&Pons, T.L, R. E. (2019). *Plant Physiology Ecology*. Springer Science Business Media, LLC, 233 Spring Street, New York, USA.
3. Bhatla, S.C. & Lal, M.A. 2023. *Plant Physiology, Development and Metabolism.* Springer Nature Singapore Pte Ltd. Singapore
4. International research journals and e-books published less than the last 5 years.

UIN6032202 Islam and Science

Module Name	Islam and Science
Module level, if applicable	Basic
Module Identification Code	UIN6032202
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Dr. Saifudin, MPd.I
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 84 Lecture (ECTS) : 4.07 Practical (ECTS) : 0.00 Total ECTS : 4.07
Credit points	3 Credit Hours ≈ 4.07 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to master the concepts, theories and principles of Islamic teachings and its branches in depth. Students are able to understand the sources, history, position, and values as well as the methodology of Islamic religious teachings. Students are able to analyze the history, theory, methodology and value of Islamic sciences in order to develop holistic Islamic thinking. Students are able to integrate the values of Islamic teachings and science	

in social life and academically.

Module content

1. Introduction, Learning: History, Object/Scope, Objectives, and Methodology of Islamic and Science Courses
2. Humans, the Universe, and Islam and Their Relations
3. Islam: Religion, Philosophy, Science, and Civilization
4. Soul, Heart, Reason and Knowledge: Position, Relationship and Process and Formation of Knowledge
5. The Concept of Science in Islam: Definition, Source, Methodology, Object of Study, Position, Function, and Hierarchy/Structure of Science
6. Adab and Culture of Science in Muslim Societies: Concepts, Systems, Values and Social History
7. Epistemology, Ontology and Axiology as well as Logic and Language of Science from an Islamic Perspective
8. History of the Growth and Development of Science in Islam: Theological and Historical Studies
9. Ushuluddin and Sharia Sciences: Concept, Scope, Methodology and Role in Life
10. Natural and Health Sciences in Islam: Concept, Scope, Methodology and Role in Life
11. Humanities and Social Sciences in Islam: Concept, Scope, Methodology and Role in Life
12. Islam, Technological Engineering and Social Change: Information Technology, Biotechnology, Cyber War, Climate Change and Social Disruption
13. The Future and Challenges of Science in the Islamic World: Secularism, Liberalism, Colonialism and Taqlidism and Their Impact on Human Civilization
14. Islamization and Integration of Knowledge in Islam: Concept and Implementation in Islamic Higher Education

Recommended literature

- Ahmad, K. (2020). *Islam and science: An intellectual reappraisal*. Islamic Book Trust.
- Nasr, S. H. (2021). *Science and civilization in Islam* (New ed.). Harvard University Press.
- Dhanani, A. (2018). *The physical world in the Islamic thought: Essential readings in classical and modern texts*. Brill.
- Lumbard, J. E. B. (2022). *Islamic science and the making of the European Renaissance*. Harvard University Press.
- Alatas, S. F. (2019). *Applying Ibn Khaldun: The recovery of a lost tradition in sociology*. Routledge.
- Ashworth, W. J., & Elshakry, M. T. (2021). *Islamic cosmopolitanism: History, science, and culture*. Oxford University Press.
- Daiber, H. (2020). *Knowledge and science in classical Islam: Religious and philosophical foundations*. Brill.
- Osman, A. (2018). *Islam and science: The linkages between religion and modern scientific thought*. I.B. Tauris.
- Mozaffari, M. (2019). *Science and religion in Islam: The life of reason in Islamic thought*. Cambridge University Press.
- Saliba, G. (2021). *Islamic science and the scientific revolution: The legacy of medieval Arab-Islamic science*. MIT Press

FST6095118 Molecular Biology

Module Name	Molecular Biology
Module level, if applicable	Basic
Module Identification Code	FST6095118
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. Nani Radiastuti, M.Si., Dr. drh. Raden Rara Bhintarti Suryohastari, M.Biomed.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Class discussion per-group with different topic according to RPS, structured activities (searching and discussion of journal and quizzes).
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS

Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to master the concepts of Molecular Biology, the processes that occur in changes in genetic material in living things, technological processes using living things, the benefits of molecular biology in human life and able to conduct research related to molecular biology.	
Module content	

1. Lecturer contract
2. Introduction to the Central Dogma
3. DNA and RNA Structure
4. DNA Replication
5. Transcription
6. Translation
7. PCR analysis
8. Regulation of Gene Expression and Genetic Mutation
9. Protein-DNA Interactions
10. Post-Translational Modifications
11. Proteomics
12. Proteome Concepts and Complexity
13. 2D-PAGE Protein Analysis
14. Future Directions in Proteomics and Biomedical Proteomics (Clinical, Cancer, Degenerative Diseases):

Recommended Literatures

1. Aleksander, S. A., Balhoff, J., Carbon, S., Cherry, J. M., Drabkin, H. J., Ebert, D., ... & Zarowiecki, M. (2023). The gene ontology knowledgebase in 2023. Genetics, 224(1), iyad031.
2. Allison, L. A. (2021). Fundamental molecular biology. John Wiley & Sons.
3. Donald, B. R. (2023). Algorithms in structural molecular biology. MIT Press.
4. Lodish, H. F., Berk, A., Kaiser, C., Krieger, M., Bretscher, A., Ploegh, H. L., ... & Amon, A. (2021). Molecular cell biology (Vol. 1). New York: WH Freeman.
5. Karp, G., Iwasa, J., & Marshall, W. (2020). Karp's Cell and Molecular Biology. John Wiley & Sons.
6. Pecorino, L. (2021). Molecular biology of cancer: mechanisms, targets, and therapeutics. Oxford university press.
7. Schleif, R. (2023). Genetics and molecular biology. The Johns Hopkins University Press.
8. UniProt: the universal protein knowledgebase in 2023. Nucleic acids research. (2023). 51.D1: D523-D531.

FST6095119 Practicum Molecular Biology

Module Name	Practicum Molecular Biology
Module level, if applicable	Basic
Module Identification Code	FST6095119
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. drh. Raden Rara Bhintarti Suryohastari, M.Biomed. Arina Findo Sari, M.Si

Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Practicum, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28.00 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20
Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to master the principles and techniques used in the field of molecular biology	
Module content	

1. Lecture contract & introduction to laboratory K3 principles in molecular biology practicum
2. Introduction to molecular biology analysis tools
3. Preparation of materials for molecular biology analysis
4. Isolation of bacterial chromosomal DNA
5. Isolation of plant DNA
6. Isolation of fungal DNA
7. Isolation of leukocyte DNA
8. Quantitative DNA test
9. Qualitative DNA testing
10. Preparation for DNA amplification via PCR
11. DNA amplification via PCR and visualization of PCR result DNA
12. Protein isolation
13. Quantitative test/protein content
14. SDS-PAGE Electrophoresis

Recommended Literatures

1. Alberts, B., Johnson, A., Lewis, J., Morgan, D., Raff, M., Roberts, K., & Walter, P. (2022). *Molecular biology of the cell* (7th ed.). New York: Garland Science.
2. Yuwono, T. (2020). *Biologi molekuler* (Edisi Revisi). Jakarta: Erlangga.
3. Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., Bretscher, A., Amon, A., Ploegh, H., & Scott, M. P. (2021). *Molecular cell biology* (9th ed.). New York: W. H. Freeman and Company.
4. Lewin, B., Krebs, J. E., Goldstein, E. S., & Kilpatrick, S. T. (2018). *Lewin's genes XII*. Burlington, MA: Jones & Bartlett Learning.
5. Brown, T. A. (2016). *Gene cloning and DNA analysis: An introduction* (7th ed.). Hoboken, NJ: Wiley-Blackwell.

FST6095120 Natural Resource and Management

Module Name	Natural resource management
Module level, if applicable	Basic
Module Identification Code	FST6095120
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Prof. Dr. Lily Surayya Eka Putri, M.Env.Stud., Etyn Yunita, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Class discussion per-group, structured activities (searching and discussion of journal), problem based learning
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None

Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to explain biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to apply biological concepts and their applications with relevant knowledge. Students are able to analyze environmental problems.	
Module content	

1. Natural resources concept
2. Global environmental problems
3. Management of marine and coastal resources
4. Forest management
5. Air and water management
6. Energy management
7. Mineral management
8. Population
9. Sustainable development (SDGs)
10. Introduction to AMDAL
11. Discuss the research results

Recommended Literatures

- The Handbook of Natural Resources, Second Edition, Six Volume Set ; Yeqiao Wang (2020); CRC Press; 2337 pages; e-book ISBN:9780429446283
- Integrated Natural Resources Management (2021); Dr. Lawrence K. Wang. Prof. Mu-Hao Sung Wang, Dr. Yung-Tse Hung, Prof. Nazih K. Shammas, Hanbook Environmental Engineering ; Springer International Publishing;
- Sustainable Development and Resource Productivity: The Nexus Approaches (2020);by Harry Lehmann; Publisher: Routledge; ISBN 9780367612269;386 pages
- The Handbook of Natural Resources, Second Edition, Six Volume Set (2020)
- Pengelolaan Sumber Daya Alam dan Lingkungan: Teori dan Pemikiran by Bonaraja Purba, dkk. Medan : Yayasan Kita Menulis; (2023);
- Pengelolaan Sumber Daya Alam by Iswandi U. dan Indang Dewata (2020); Book Chapter : Cetakan ke 1 ISBN: 978-623-02-1828-6; Deepbulish
- Global Approaches in Natural Resource Management for Climate Smart Agriculture (GNRSA-2020)
- Malik, K. E. S. (2021). *Pengelolaan lingkungan hidup* (Edisi Revisi). Jakarta: PT RajaGrafindo Persada.
- Suryani. (2018). *Kependudukan, ekologi, dan lingkungan* (Edisi Revisi). Jakarta: Kencana.
- Nybakken, J. W., & Bertness, M. D. (2020). *Marine biology: An ecological approach* (8th ed.). New York: Pearson.
- Dahuri, R., Rais, J., Ginting, S. P., & Sitepu, M. J. (2020). *Pengelolaan sumber daya pesisir dan lautan secara terpadu* (Edisi Revisi). Bogor: PKSPL IPB & Pradnya Paramita.
- Effendi, H. (2022). *Telaah kualitas air: Bagi pengelolaan sumber daya dan lingkungan perairan* (Edisi Revisi). Yogyakarta: Kanisius.
- Fardiaz, S. (2020). *Polusi air dan udara* (Edisi Revisi). Yogyakarta: Kanisius.
- Sutarno. (2022). *Sumber daya energi* (Edisi Revisi). Yogyakarta: Graha Ilmu.
- Kebijakan Mineral dan Batubara Indonesia. 2021. Direktorat Jenderal Mineral dan Batubara, Kementerian Enegi dan Sumberdaya Mineral RI.
- Kepmen dan Permen tentang Lingkungan Hidup
- International research journals and e-books published less than the last 10 years.
- Articles published in mass media

FST6095121 Principles of Biotechnology

Module Name	Principles of Biotechnology
Module level, if applicable	Basic
Module Identification Code	FST6095121
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. drh. Raden Rara Bhintarti Suryohastari, M. Biomed.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Class discussion per-group, structured activities (quizzes), problem based learning (by discussing cases in reputable international journals)
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Upon successful completion of the Basic Principles of Biotechnology, students are expected to:

1. Demonstrate comprehensive knowledge of the fundamental concepts and principles of biotechnology.
2. Articulate a clear definition of biotechnology and analyze its benefits and applications across diverse fields of life.
3. Describe and explain analytical processes that employ biotechnological techniques.
4. Formulate and propose research ideas grounded in biotechnological concepts and methods.

Module content

1. History & Development of Biotechnology
2. Scope of Biotechnology
3. Red, Yellow, Green, Blue, Gray, Black, White, Gold, and Purple Biotechnology
4. Basic Applications of Natural Variations in Biotechnology
5. Basic Identification and Isolation of Genes
6. Basic DNA Cutting and Pasting
7. Basic Applications of Gene Insertion
8. Basic Transformation and Recombination
9. Basic Gene Cloning and Gene Expression
10. Basic Stem Cell Technology
11. Basic Monoclonal Antibody Technology
12. Basic Gene Therapy Technology
13. Basic mRNA Vaccine Technology
14. Basic CRISPR-Cas9 Technology

Recommended Literatures

1. De la Vega Hernández, I. M., Díaz Amorin, J., & Fernández-Gomez, R. (2024). Mapping global research in the field of health biotechnology for the period 1990–2023. A bibliometric analysis. Journal of Science and Technology Policy Management.
2. Dubey, R. C. (2022). A textbook of Biotechnology. S. Chand Publishing.
3. Fatima, Z., & Tahir, S. Integrating Nano-Biotechnology and Biotechnology: Advancements and Applications in Biomedical and Health. Nanobiotech in Holistic Health: Innovations of Integrated Well–being, 133.
4. Khan, F. A. (2020). Biotechnology fundamentals Third Edition. CRC Press.
5. Maddela, N. R., & García, L. C. (Eds.). (2021). Innovations in biotechnology for a sustainable future. Berlin/Heidelberg, Germany: Springer.
6. Renneberg, R. (2023). Biotechnology for beginners. Academic Press.
7. Saranya, S., Thamanna, L., & Chellapandi, P. (2024). Unveiling the potential of systems biology in biotechnology and biomedical research. Systems Microbiology and Biomanufacturing, 4(4), 1217-1238.
8. Sayers, E. W., Bolton, E. E., Brister, J. R., Canese, K., Chan, J., Comeau, D. C., ... & Sherry, S. T. (2022). Database resources of the National Center for Biotechnology Information in 2023. Nucleic acids research, 51(D1), D29.
9. Stevens, H. (2024). Biotechnology and society: an introduction. University of Chicago Press.

FST6096150 Environmental Chemistry

Module Name	Environmental Chemistry
Module level, if applicable	Basic
Module Identification Code	FST6096150
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Etyn Yunita, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Mini project based learning

Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

1. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise natural resource management including environmental pollution problems
2. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise natural resource management including Waste Problems
3. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise natural resource management including Water Pollution
4. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise natural resource management including Soil Pollution
5. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise natural resource management including Air Pollution
6. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise natural resource management including environmental toxicology
8. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise management of natural resources including Food and Drug Pollution
9. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise management of natural resources including pollution by industry
7. After attending this lecture, students are expected to be able to understand environmental problems scientifically, understand how to manage pollution and be able to design wise natural resource management including biogeochemical cycles

Module content

1. Pollution Problems
2. Water Pollution
3. Soil Pollution
4. Air Pollution
5. Environmental toxicology
6. Food and Drug Pollution
7. Pollution by industry
8. Biogeochemical cycles

Recommended Literatures

1. Manahan, S. E., 2022, *Environmental Chemistry (Eleventh Edition)*, Boca Raton, FL, CRC Press.
2. Sparks, D. L., 2023, *Environmental Soil Chemistry (Third Edition)*, San Diego, CA, Academic Press (Elsevier).
3. Beard, J. M. & Murphy, R. A., 2021, *Environmental Chemistry in Society (Third Edition)*, Boca Raton, FL, CRC Press.
4. Osman, A. I.; Fawzy, S.; Abdel Maksoud, M. I. A.; Elgarahy, A. M.; Rooney, D. W., 2023, "Environmental science and engineering of the chemical processes of plastics degradation and the proactive role of a circular bioeconomy", Environmental Chemistry Letters, 21: 2129–2169, DOI: 10.1007/s10311-023-01593-3.
5. Ma, Z.; Zhou, Y.; Wei, W.; Gao, B.; Li, H.; Wang, S., 2021, "Recent advances in advanced oxidation processes (AOPs) for removal of emerging contaminants in water", Chemosphere, 275: 130104, DOI: 10.1016/j.chemosphere.2021.130104.
6. Meegoda, J. N.; Li, B.; Patel, K.; Wang, L., 2022, "A review of the applications, separation, characterization, and environmental impacts of microplastics", International Journal of Environmental Research and Public Health, 19(24): 16397, DOI: 10.3390/ijerph192416397.
7. Phiri, E.; Nyembe, S.; Banda, S.; Tembo, D.; Busiku, S., 2024, "Utilization of biochar for remediation of heavy metals in aqueous environments: A review and bibliometric analysis", Heliyon, 10(4): e25785, DOI: 10.1016/j.heliyon.2024.e25785.
8. Nie, G.; Guo, X.; Zhu, W.; Wang, T.; Liu, Y.; Zhu, Z., 2024, "Biochar–TiO2 composites for pollutants removal from wastewater: spin-casting approach during photocatalysis and adsorption", RSC Advances, 14: 478, DOI: 10.1039/D3RA06910A.
9. Yu, X.; Zhuang, L.; Wang, Q.; et al., 2021, "Electrochemical degradation of per- and polyfluoroalkyl substances (PFAS): A review", Chemical Engineering Journal, 420: 127639, DOI: 10.1016/j.cej.2020.127639.

FST6096151 Practicum Environmental Chemistry

Module Name	Practicum Environmental Chemistry
Module level, if applicable	Basic
Module Identification Code	FST6096151
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Etyn Yunita, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Practicum, class discussion, structured activities (homework, quizzes).
Workload	Lecture (Face to Face) (SCU) : 0 Number of lecture per Semester : 0 Practical (at Laboratory or filed) (SCU) : 1 Number of Practical Per Semester : 14 Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 35.00 Total Hours of Structure and Self Study Per semester : 28.00 Lecture (ECTS) : 0.00 Practical (ECTS) : 2.20 Total ECTS : 2.20

Credit points	1 Credit Hours ≈ 2.20 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After this course, students will have the ability to apply fundamental concepts of environmental chemistry in environmental chemistry laboratory experiments	
Module content	

1. Introduction
2. Module 1: Introduction to Sampling Equipment and Air
3. Module 2: Water Sampling and In-Situ Parameter Measurement
4. Module 3: Ammonia (N-NH3) Analysis in Water Using the Phenate Method
5. Module 4: Sulfate (SO4)2- Analysis in Water by Spectrophotometry
6. Module 5: Lead and Cadmium Analysis in Water Using AAS (Atomic Absorption Spectrophotometer)
7. Module 6: Air Sampling and Noise Measurement
8. Module 7: Particulate Dust Measurement Using Gravimetric Methods
9. Module 8: Ammonia Air Measurement
10. Module 9: Nitrite Air Measurement
11. Module 10: SO2 Air Measurement

Recommended Literatures

1. Environmental Chemistry Laboratory Module
2. APHA, AWWA & WEF. 2022. *Standard Methods for the Examination of Water and Wastewater* (24th Edition). Washington, DC: American Public Health Association, American Water Works Association, and Water Environment Federation. ISBN 978-0-87553-299-8.
3. **SNI 8995:2021**, *Metode pengambilan contoh uji air* (untuk pengujian fisika dan kimia)—berlaku umum untuk badan air permukaan dan akuifer; mencakup perencanaan, alat, pengambilan, pengawetan, pengendalian mutu.
4. **SNI 8990:2021**, *Metode pengambilan contoh uji air limbah untuk pengujian fisika dan kimia*—melanjutkan pedoman sampling untuk air limbah secara luas.
5. **SNI 9063:2022**, *Sampling mikrobiologi di air dan air limbah*—metode sampling untuk parameter mikrobiologi (koliform, dsb).

UIN6000208 Research Methodology

Module Name	Research Methodology
Module level, if applicable	Basic
Module Identification Code	UIN6000208
Semester(s) in which the module is taught	5

Person(s) responsible for the module	Prof. Dr. Lily Surayya Eka Putri, M.Env.Stud.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered in 3 activities: 1. Provide material to students along with several examples of research activities for discussion in class 2. Students make a draft of a research proposal and students must present it in class, followed by discussion in class and then the lecturer will carry out an evaluation. 3. Giving some research paper from Journal and discuss in class
Workload	Lecture (Face to Face) (SCU) : 3 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 35.00 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 70.00 Lecture (ECTS) : 3.60 Practical (ECTS) : 0.00 Total ECTS : 3.60
Credit points	3 Credit Hours (2-3) ≈ 3.60 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation

Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome

After completing this course, students are able to master the concept of scientific research and master how to conduct scientific research and be able to plan and write research proposals with the right scientific research format that is appropriate and correct

Module content

1. Basic concepts of scientific research
2. Problems, variables and research methods
3. Framework of thinking
4. Hypothesis
5. Research design
6. Sampling technique
7. Data collection technique
8. Data analysis technique
9. Bibliography writing techniques
10. Techniques for making research proposals
11. Journal article writing techniques
12. Proposal presentation
13. Proposal presentation
14. Proposal presentation

Recommended Literatures

1. Prathapan K. 2023. Research Methodology for Scientific Research. I.K. International Pvt. Ltd.
2. Flick, U. 2025. Introducing Research Methodology, 4th edition. Sage Publ.
3. Pajo, B. 2022. Research Method: A Hand of Approach. Sage Publ.
4. Writing guidelines in the Al-Kauniyah Journal. Biology Study Program, Faculty of Science & Technology, UIN Jakarta.
5. Guidelines for writing a thesis for Biology Study Program, FST, UIN Jakarta
6. International research journals and e-books published less than the last 10 years.
7. Articles published in mass media

FST6095122 Evolution

Module Name	Evolution
Module level, if applicable	Basic
Module Identification Code	FST6095122
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si., Dr. Priyanti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Discussion-based learning per-group, structured activities (quizzes), Learning based on mini project with journal related evolution.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.67 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43

Credit points	2 Credit Hours (2-3) ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students can illustrate the process of animal and plant evolution	

Module content
1. Facts supporting the theory of pre- and post-Darwinist evolution 2. Mendel's Laws, Huge De Fries and Hardy Weinberg's Laws and Their Deviations 3. Phylogeny and Evolution of the genome, Favored race 4. Adaptation, selection, physical and reproductive isolation mechanisms 5. Gene pool, genetic drift and founder effect and bottle neck mechanism 6. Earth's evolutionary history 7. Verses from the Koran relating to the evolution of the earth and their interpretations 8. History of human evolution based on fossil findings 9. Evolution of human culture 10. The theory of evolution according to Islamic scientists 11. Current debates in evolutionary theory 12. History of paleobotany 13. Evolution of aquatic plants and evolution of land plants 14. Evolution of vascular and nonvascular plants
Recommended Literatures 1. Conroy-Beam, D., & Buss, D. M. (2017). Euclidean distances discriminatively predict short-term and long-term attraction to potential mates. Evolution and Human Behavior, 38(4), 442–450 2. T˘rebický, V., Delplanque, S., Ferdenzi, C., Fink, B., Jelínkov´a, L., P´atkov´a, ˘Z., … Havlí˘cek, J. (2023). Cross-modal associations of human body odour attractiveness with facial and vocal attractiveness provide little support for the backup signals hypothesis: A systematic review and meta-analysis. Evolution and Human Behavior, 44(1), 19–29 3. Yukilevich, R., & Aoki, F. (2022). Evolution of choosiness dictates whether search costs of mate choice enhance speciation by sexual selection. Journal of EvolutionaryBiology, 35(8), 1045–1059.

FST6095123 Introduction to Bioinformatics

Module Name	Introduction to Bioinformatics

Module level, if applicable	Basic
Module Identification Code	FST6095123
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Nani Radiastuti, Prof. Dr. Megga Ratnasari Pikoli, M.Si.
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through a flipped learning method by introducing the learning material before class with classroom time then being used to deepen understanding through discussion. The student capabilities are polished by practicing using some software.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 70 Lecture (ECTS) : 3.21 Practical (ECTS) : 0.00 Total ECTS :3.21
Credit points	2 Credit Hours (2-3) ≈ 3.21 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with laptop and PowerPoint presentation, database DNA and protein
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
ahasiswa memiliki pemahaman tentang perangkat lunak yang umum digunakan dalam bioinformatika After completing this course, students have an understanding of commonly used software in bioinformatics	
Module content	

1. Introduction (background to bioinformatics)
2. DNA and protein sequence database
3. Data format
5. Data submission and retrieval
6. Electropherogram analysis
7. BLAST (Basic Local Alignment Search Tool)
8. Multiple sequence alignment
9. Phylogenetic tree reconstruction
10. Data interpretation of phylogenetic tree
11. Primer design
12. Genome annotation
13. Protein structure modeling
14. Discussion of mini project result
15. Discussion of mini project result
16. Discussion of mini project result

Recommended Literatures

1. Dandekar, T., & Kunz, M. (2023). *Bioinformatics: an introductory textbook*. Springer Nature.
2. Hasija, Y. (2023). *All about bioinformatics: From Beginner to Expert*. Elsevier.
3. Tiwary, B. K. (2022). *Bioinformatics and computational biology*. Springer Singapore.

FST6095134 Scientific Communication Techniques

Module Name	Scientific Communication Techniques
Module level, if applicable	Basic
Module Identification Code	FST6095134
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Prof. Dr. Megga Ratnasari Pikoli, M.Si., Dr. Dasumiati, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through flipped learning methods by introducing the learning material before class with classroom time. Student understanding is sharpened by discussing problems of related topics.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 3.21 Lecture (ECTS) : 3.21 Practical (ECTS) : 0.00 Total ECTS : 3.21

Credit points	2 Credit Hours (2-3) ≈ 3.21 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation, video
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to express the results of their research and thoughts in the form of scientific papers, and present them according to the correct rules.	
Module content	

1. General description of scientific research and reporting
2. Types and characteristics of scientific papers
3. Techniques for writing scientific papers
4. Language of science: terms and definitions
5. Scientific language: effective sentences
6. Scientific language: paragraphs
7. Abstract and introduction
8. Results and discussion
9. Tables, figures and diagrams
10. Citation and referencing techniques
11. Common writing errors
12. Ethics in publication
13. Techniques for creating presentation media
14. Presentation techniques

Recommended Literatures

1. American Psychological Association (APA). (2020). Publication manual of the American Psychological Association, 7th Edition. https://apastyle.apa.org/products/publication-manual-7th-edition?utm_source=chatgpt.com
2. Committee on Publication Ethics (COPE). https://publicationethics.org/guidance
3. Dionne, J. P. (2022). *Presentation skills for scientists and engineers*. Springer Nature Switzerland AG.
4. Elsevier. (2025). ***Mendeley*** [Website]. https://www.mendeley.com
5. Elsevier. (2025). *Publishing ethics*. https://www.elsevier.com/about/policies-and-standards/publishing-ethics#4-duties-of-authors
6. Hartono, J. (2025). *Penulisan ilmiah: Pedoman penulisan skripsi-tesis-disertasi dan artikel*. UGM PRESS.
7. Nycyk, M. (2018). Academic and scientific poster presentation: a modern comprehensive guide. Taylor & Francis.
8. Program Studi Biologi. (2019). *Panduan skripsi untuk mahasiswa S1 Program Studi Biologi*. Program Studi Biologi Fakultas Sains Dan Teknologi Universitas Islam Negeri Syarif Hidayatullah Jakarta.
9. SK Rektor Nomor 507 Tahun 2017 – Pedoman Penulisan Karya Ilmiah (Skripsi, Tesis, Disertasi)
10. Kuile, B. (2024). *Life sciences research and scientific writing*. Springer.

IN6000207 Internship

Module Name	Internship
Module level, if applicable	Undergraduate
Module Identification Code	UIN6000207
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Chair of Bc-Bio
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Students submit applications to take part in internships at companies, laboratories, and government or non-government institutions related to the field of biology. The study program appoints one supervisor from the study program and asks the institution to appoint one field supervisor. Internships are carried out for 22 working days following the regulations applicable to the institution and study program.
Workload	Lecture (Face to Face) (SCU) : 4 Number of lecture per Semester : 22 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 0.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 220 Lecture (ECTS) : 7.33 Practical (ECTS) : 0.00 Total ECTS : 7.33
Credit points	7.33 ECTS
Admission and examination requirements	Enrolled in this course.
Recommended prerequisites	
Media employed	Paper, Laptop/Computer
Forms of assessment	Internship examinations are conducted after a student completes his internship report. The elements of evaluation consist of a feasibility assessment topics, the level of student participation during internship, academic writing, presentation, and oral test about content

	of internship report
Intended Learning Outcome	
Students are able to apply the basics and applied of biology to the problems in the field and develop a good communication and teamwork, also they can write internship report in a comprehensive manner	
Module content	
Topic is appointed by university or group of students.	
Recommended Literatures UIN Syarif Hidayatullah Jakarta. (2025). *Praktik Kerja Lapangan (PKL)*. SOP UIN Jakarta. https://sop.uinjakarta.id/#pkl	

FST6095125 Bioethics

Module Name	Bioethics
Module level, if applicable	Applied
Module Identification Code	FST 6095125
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Dr. Priyanti, M.Si Dr. drh. Raden Rara Bhintarti Suryohastari, M.Biomed.
Language	Indonesian and English
Relation in Curriculum	Compolsory course for undergraduate program in Biology

Teaching methods, Contact hours	Discussion of problem-based learning. presentations of several topics, structured activities (quizzes)
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 46.7 Lecture (ECTS) : 2.43 Practical (ECTS) : 0.00 Total ECTS : 2.43
Credit points	2 Credit Hours (2-3) ≈ 2.43 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
● Able to explain the history of the development of bioethics and why it needs to be studied ● Able to explain and find solutions to value conflicts related to technology ● Able to work together in international ethical terms, both in the academic environment and in everyday life	
Module content	

1. Understanding Bioethics and Applications in Life
2. History of the Development of Bioethics and Ethical Clearance
3. Basic Principles in Bioethics
4. Bioethical Issues in the Medical World (1)
5. Bioethical Issues in the Medical World (2)
6. Basic Principles of Bioethics in the Use of Experimental Animals
7. Basic Principles of Bioethics for Research on Human Subjects
8. Basic Principles of Bioethics in Research on Humans as Objects
9. Bioethics in Plants and Natural Resources
10. Basic Principles of Bioethics in Writing and Publicating Scientific Work
11. Basic Principles of Bioethics in the Use of Stored Biological Materials (BBT)
12. Bioethics in Epidemiological and Sociocultural Research
13. Explanation After Approval (PSP) / Informed Consent
14. Health Research Ethics Committee

Recommended Literatures

1. Banerjee, T., Nawani, N., & Pal, J. K. 2022. Ethics in Biomedicine and Biosafety in Textbook of Medical Ethics, Bioethics and Medical Law (eds. Russell D'Souza & Avinash De Sousa). Paras Medical Publishers, Chennai.
2. Beauchamp, T. L., & Childress, J. F. 2019. Principles of biomedical ethics. Edicoes Loyola.
3. Elmahjub, E. 2022. Normative account of Bioethics in end-off life care. Informa, UK Ltd.
4. Ghaly, M. 2019. Islam Ethics and the Genome Question. Koninklijke Brill NV. Doha, Qatar
5. Handijani, J., & Nugroho, M. A. 2024. Tinjauan terhadap Praktik Kedokteran dan Kesehatan Berdasarkan Prinsip Etika Confidentiality yang Berpedoman terhadap Hukum Kesehatan Journal of Syntax Literate, 9(1).
6. Jecker, N. A. S., Jonsen, A. R., & Pearlman, R. A. 2007. Bioethics: an introduction to the history, methods, and practice. Jones & Bartlett Learning.
7. Rajendran, T. P. 2022. Ethics and Safety Concerns. In Molecular Approaches for Sustainable Insect Pest Management (pp. 395-421). Singapore: Springer Singapore.
8. Rizka, S. A., & Arief Budiono, S. H. 2022. Hukum Kesehatan. Muhammadiyah University Press.
9. Saleem, S.M. & Jan, S.S. 2022. Islam, Ethics, and Modern Medicine from Theory to Medical Practice: A Narrative Review. *Millah: Jurnal Studi Agama,* 21(2): 465-490
10. Sateesh, M. K. 2013. Bioethics and biosafety. IK International Pvt Ltd.

FST6092035 Technopreneurship

Module Name	Technopreneurship
Module level, if applicable	Applied
Module Identification Code	FST 6092035
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Prof. Dr. Achmad Tjahja Nugraha, M.P.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	Class discussion per-group, structured activities (quiz), problem based learning
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	82,33 / 30 = 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 75% attendance in lecture
Recommended prerequisites	-
Media employed	Classical teaching tools with white board and Power Point presentation

Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing the course, the Students will have the ability to develop an entrepreneurial spirit and analyze entrepreneurial activities.	
Module content	
Lecture (Class Work) 1 Technopreneurship and Inspiration 2 Motivation and Technopreneurship Opportunities 3 Technopreneurship Organizational Governance 4 Technopreneurship Ownership 5 Ethical Considerations in Technopreneurship 6 Technopreneurship Intelligence 7 Capital and Financial Management	

8	Product Design
9	Forms of Marketing
10	Environmental Analysis
11	Competitor Analysis
12	Monitoring and Evaluation
13	Technopreneurship Revolution
14	Business Plan

Recommended Literatures

1. Inayah, Nur, Achmad Tjachja, and Moh. Irvan, 2021, *Introduction to Entrepreneurship, Andi Publisher*, Yogyakarta.
2. Ika Sari Dewi, S.S., M.Si., and I.K. Sihombing, M.Si., *Entrepreneurship and Strategic Management of Rural SMEs*, 2019.
3. Muh. Saleh Malawat, *Entrepreneurship in Education*, 2019.
4. Nathanael Sitanggang and Putri Lynna A. Luthan, *Entrepreneurship Management in the Furniture Industry*, 2019.
5. Rachmat Hidayat, SKM., M.Kes, *Cultivating Entrepreneurial Spirit*, 2019.
6. Prof. Dr. H. Saban Fchdar, S.E., M.Si, Dr. Maryadi, S.E., M.M, *Business Ethics and Entrepreneurship*, 2019.
7. Taneja, S. (2020). *Technopreneurship: An Entrepreneurial Approach to the Digital Economy*. Springer.
8. Kuratko, D. F., & Morris, M. H. (2021). *Corporate Innovation and Entrepreneurship: A Case Study Approach*. Cengage Learning.

UIN6000206 Community Service Program

Module Name	Community Service Program
Module level, if applicable	Undergraduate
Module Identification Code	UIN6000206
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Center for Community Service UIN Syarif Hidayatullah Jakarta
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Community service programs are carried out in groups. Each group consists of 10 to 20 students from various study programs. Each group creates a work program to be carried out in the village within one month. Each group is guided by one supervisor who collaborates with the local government where the community service is held
Workload	Lecture (Face to Face) (SCU) : 4 Number of lecture per Semester : 22 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 0.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 220 Lecture (ECTS) : 7.33 Practical (ECTS) : 0.00 Total ECTS : 7.33
Credit points	7.33 ECTS
Admission and examination requirements	Enrolled in this course
Recommended prerequisites	The student has to register the Center for Community Service to the study load card (KRS) in Semester VI. The Center for Community Service can be done during free time between the sixth and the seventh semesters
Media employed	Paper, Laptop/Computer, and village.

Forms of assessment	The final mark will be decided by considering some criteria involving the independence and team work ability,

	attitude and ethic, and substance of the Center for Community Service. The components will be taken from the lecturers and the chair of the village where the students work for the Center for Community Service. A: 80-100; B: 70-79,9; C: 60- 69,9; D: 50-59,9; E: <50
Intended Learning Outcome	
After completing this course, the students should have: strong insight in local wisdom and high sensitivity to the problems in the society	
Module content	
Topic is appointed by a university or group of students.	
Recommended Literatures https://sop.uinjakarta.id/#kkn	

FST6095126 Proposal Seminar

Module Name	Proposal Seminar
Module level, if applicable	Undergraduate
Module Identification Code	FST609512
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Chair of Bc-Bio
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The students present their research plan and discussion. Students are supervised by supervisors or more
Workload	Lecture (Face to Face) (SCU) : 1 Number of lecture per Semester : 22 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 0.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 73.33 Lecture (ECTS) : 2.44 Practical (ECTS) : 0.00 Total ECTS : 2.44
Credit points	2.44 ECTS
Admission and examination requirements	To be able to take part in the proposal seminar, students must have completed 6 semesters of lectures and have made a research proposal that has been approved by their supervisor
Recommended prerequisites	
Media employed	Paper, Laptop/Computer, and village.
Forms of assessment	The assessment consists of the ability to deliver proposal papers, the ability to answer and the accuracy of answer (40%), the attitude (20%), writing skills (20%), integration of Islamic values in the script (10%), and language or text presentation in foreign language (10%)
Intended Learning Outcome	
Students are able to compile and present the research proposals in scientific forums	
Module content	
The topic and content are discussed with the supervisor before starting the work	
Recommended Literatures : https://sop.uinjakarta.id/#skripsi	

UIN6000312 Final Project (Thesis)

Module Name	UIN 6000312 Final Project (Thesis)
Module level, if applicable	Undergraduate
Module Identification Code	UIN 6000312
Semester(s) in which the module is taught	8
Person(s) responsible for the module	Chair of Bc-Bio
Language	Indonesian and English and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Students are supervised by supervisors or more. The final project is supervised by two supervisors according to the research topic and tested by two examining lecturers.
Workload	Lecture (Face to Face) (SCU) : 6 Number of lecture per Semester : 30 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 0.00 Hours of Midterm And Final Exam Per Semester : 0.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 360 Lecture (ECTS) : 12.00 Practical (ECTS) : 0.00 Total ECTS : 12.00
Credit points	12.00 ECT.
Admission and examination requirements	To be able to take the final project students must complete the course (minimum 136-138 credits) without having a D grade
Recommended prerequisites	-
Media employed	Paper, Laptop/Computer
Forms of assessment	Final project examinations are conducted after the student completes his final project manuscript. The elements of evaluation consist of feasibility assessment topics, academic writing, presentation, and oral test about the content of the final project. final exam using the agreed system $80 \leq A \leq 100$; $70 \leq B < 80$; $60 \leq C < 70$; $60 \leq D < 50$.
Intended Learning Outcome	
Apply the knowledge, experience, and skills learned in Bc-Biology to the chosen topic and case, write scientific papers in a comprehensive manner. Students have professional ethics and soft skill: presentation, communication, discussion, and reason.	

Module content
The topic and content of the final project are discussed with the supervisor before starting the work
Recommended Literatures https://sop.uinjakarta.id/#skripsi

UIN6000313 Seminar

Module Name	Seminar
Module level, if applicable	Undergraduate
Module Identification Code	UIN 6000313
Semester(s) in which the module is taught	8
Person(s) responsible for the module	Chair of Bc-Bio
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	Final project presentation and discussion Students are supervised by supervisors or more
Workload	Lecture (Face to Face) (SCU) : 1 Number of lecture per Semester : 22 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 0 Hours of Midterm And Final Exam Per Semester : 0 Total Hours Practical : 0 Total Hours of Structure and Self Study Per semester : 73.3 Lecture (ECTS) : 2.44 Practical (ECTS) : 0 Total ECTS : 2.44
Credit points	2.44 ECTS
Admission and examination requirements	To be able to take part in the seminar, students must have completed their research and written a research report that has been approved by their supervisor
Recommended prerequisites	-
Media employed	Paper, Laptop/Computer
Forms of assessment	Assessment includes: Clarity and attitude in providing answers to questions, criticism and suggestions (30%) Mastery of understanding the research material (30%), Systematisation and thesis writing (20%), Timeliness presentation (10%) and language or text presentation in foreign language (10%)
Intended Learning Outcome	
Students are able to arrange and submit the results of their final assignment studies in scientific forums	

Module content
The topic and content of the final project are discussed with the supervisor before starting the work
Recommended Literatures https://sop.uinjakarta.id/#skripsi

III.COMPLEMENTARY COMPETENCIES

FST6095202 Ornithology

Module Name	Ornithology
Module level, if applicable	Basic
Module Identification Code	FST6095202
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Walid Rumblat, M.Si
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students have knowledge of theoretical concepts in ornithology	
Module content	

1. Origin and Evolutionary History
2. Body characteristics and functions of birds
3. Behaviour and Environment
4. Behaviour and Communication
5. Population Dynamics and Conservation
6. Birds and people
7. Introduction to waterbirds
8. Bird surveying and photography techniques

Recommended Literatures

1. Wallace GJ dan Mahan HD. an Introduction to Ornithology. 1975. MacMillan

2. Menkhorst, P., Rogers, D., Clarke, R., & Clarke, R. (2017). The Australian bird guide. CSIRO Publishing.

3. Menkhorst, P., Rogers, D., Clarke, R., & Clarke, R. (2022). The compact Australian bird guide. CSIRO Publishing.

4. Svensson, L., Mullarney, K., Zetterström, D., & Grant, P. J. (2022). Collins bird guide (3rd ed.). HarperCollins.

5. Clements, J. F., Schulenberg, T. S., Iliff, M. J., Billerman, S. M., Fredericks, T. A., Sullivan, B. L., & Wood, C. L. (2024). The Clements checklist of birds of the world (v2024). Cornell Lab of Ornithology. https://www.birds.cornell.edu/clementschecklist

6. American Ornithological Society. (2024). Check-list of North American birds (65th Supplement). https://americanornithology.org/publications/north-and-middle-american-checklist/

FST6095204 Bacteriology

Module Name	Bacteriology
Module level, if applicable	Basic
Module Identification Code	FST6095204
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Prof. Dr. Megga Ratnasari Pikoli, M.Si., Arina Findo, M.Si
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through flipped learning method by introducing the learning material before class with classroom time. Student understanding is sharpen by discussing problems of related topics from reputable international journals. Students' skills are enriched by carrying out miniprojects.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation

Forms of assessment	Midterm exam 30%, Final exam 30%, Formative 40%
Intended Learning Outcome	

Students are able to explain biological concepts supported by other relevant sciences to understand developing problems, issues and their applications. Students are able to use standard methodologies to solve problems related to biology and their implementation. Students are able to demonstrate the results of conceptual, analytical, logistical and innovative thinking in oral and written form. Students are able to participate actively in the development of science and technology throughout their lives.

Module content

1. Introduction (background history and general properties of bacteria)
2. External structure of bacteria
3. Internal structure of bacteria
4. Isolation and cultivation of bacteria
5. Identification of bacteria by cultivation-dependent method
6. Identification of bacteria by cultivation-independent method
7. Classification of bacteria
8. Bacterial environment
9. Groups of bacteria in nature
10. Groups of pathogenic bacteria in human

Recommended Literatures

1. Hugenholtz, P., Chuvochina, M., Oren, A., Parks, D. H., & Soo, R. M. (2021). Prokaryotic taxonomy and nomenclature in the age of big sequence data. *The ISME Journal*, *15*(7), 1879-1892.
2. Kushkevych, I. (2022). *Bacterial physiology and biochemistry*. Elsevier.
3. Lengeler, J. W., Drews, G., & Schlegel, H. G. (Eds.). (2009). *Biology of the prokaryotes*. John Wiley & Sons.
4. Snyder, L. A. (2024). *Bacterial genetics and genomics*. Second Edition. CRC Press.
5. Todar, K. (archived August 2023). *Todar's online textbook of bacteriology*. https://controses.com/product/todars-online-textbook-of-bacteriology-archived-august-2023/?utm_source=chatgpt.com
6. Supporting materials: the latest international journal articles.

FST6095205 Phycology

Module Name	Phycology
Module level, if applicable	Basic
Module Identification Code	FST6095205
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Prof. Dr. Megga Ratnasari Pikoli, M.Si., Ardian Khairiah, M.Si
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through flipped learning method by introducing the learning material before class with classroom time. Student understanding is sharpen by discussing problems of related topics from reputable international journals.

Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 30%, Final exam 30%, Formative 40%
Intended Learning Outcome	
Students are able to understand biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to apply biological concepts and their applications with relevant knowledge. Students are able to analyze environmental problems.	

Module content
1. Introduction to algal cell structure 2. Physiology of algae 3. Nutrition of algae 4. Isolation and purification of algae 5. Cultivation and preservation of algae 6. Classification of algae 7. Identification of algae 8. Cyanobacteria and Glaucophyta 9. Rhodophyta 10. Chlorophyta 11. Euglenophyta 12. Dinophyta 13. Another group of algae 14. Algal environment
Recommended Literatures 1. Barsanti, L., & Gualtieri, P. (2022). *Algae: anatomy, biochemistry, and biotechnology*. CRC Press. 2. Graham, Linda E.; Graham, James M.; Wilcox, Lee W.; Cook, Martha E. (2022). *Algae* (4th ed.). LJLM Press. 3. Mallick, P., & Chatterjee, S. (2024). *Textbook of Algae*. Techsar Pvt. Ltd. 4. Mishra, A., & Varma, A. (Eds.). (2025). *Soil algae: Morphology, ecology and biotechnological applications*. Springer Nature. 5. Sahu, N., & Sridhar, S. (Eds.). (2024). *Algal biotechnology: Current trends, challenges and future prospects for a sustainable environment*. CRC Press. 6. Show, P.L., Chew, K.W., Khoo, K.S, & Cheah, W.Y. (2025). *Algae Classification And Species.* Elsevier. 7. Supporting materials: the latest international journal articles.

FST6095207 Terrestrial Ecology

Module Name	Terrestrial Ecology
Module level, if applicable	Basic
Module Identification Code	FST6095207
Semester(s) in which the module is taught	4
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through flipped learning method by introducing the learning material before class with classroom time. Student understanding is sharpen by discussing problems of related topics from reputable international journals. Students' skills are enriched by carrying out miniprojects.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome
1. Students are able to explain the background of ecology and the development of ecological science 2. Students are able to explain the concepts of environmental ecology, plant ecology and animal ecology 3. Students are able to master the thermodynamic principles of ecosystems and their constituent components 4. Students are able to describe methods for measuring and analyzing ecosystems 5. Students are able to analyze ecosystem problems with their expertise in the field of biology to develop their commitment to environmental conservation in an effort to create an independent, honest and tough character. 6. Students are able to communicate the results of ecological research effectively both orally and in writing 7. Able to make decisions based on ecological data as a form of responsibility in carrying out tasks
Module content
1. Basic concepts of ecosystems 2. The process of forming an ecosystem and the distribution of species in the ecosystem 3. Energy in ecosystems 4. Biogeochemical Cycles 5. Law of tolerance and limiting factors 6. Ecosystem types 7. Population and community 8. Inter specific and intra specific interactions 9. Plant ecology 10. Animal Ecology and animal behavior 11. Biogeography
Recommended Literatures 1. Cooper, L., MacFarlane, D., 2023. Climate-smart forestry: promise and risks for forests,society and climate. PLOS Clim. 2. Filewod, B., McCarney, G., 2023. Avoiding carbon leakage from nature-based offsets by design. One Earth 6 (7), 790–802 3. IPCC. 2023. Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. https://doi.org/10.1017/ 9781009325844. 4. Isabel, N., Holliday, J.A., Aitken, S.N., 2020. Forest genomics: advancing climate adaptation, forest health, productivity, and conservation. Evolut. Appl. 13 (1), 3–10

FST6095208 Urban Entomology

Module Name	Urban entomology
Module level, if applicable	Basic
Module Identification Code	FST6095208

Semester(s) in which the module is taught	4
Person(s) responsible for the module	Narti Fitriana, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome
Generalise basic knowledge of entomology that can lead to detailed knowledge at an advanced stage
Module content
1. Introduction and introduction to the world of insects 2. Familiarity with insect morphology 3. Body structure and physiology of insects 4. Insect metamorphosis 5. Insect collection techniques 6. Ecological role of insects 7. Butterfly conservation in urban areas 8. Bioecology of social insects 9. Bioecology of solitary insects 10. Familiarity with insects in housing 11. Getting to know insects in warehouses 12. Insects and phytosanitary 13. Journal presentation 14. Journal presentation

Recommended Literatures

1. Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., Orr, R. B., & Campbell, N. A. (2020). *Campbell biology: Concepts & connections* (10th ed.). Hoboken, NJ: Pearson.
2. Triplehorn, C. A., & Johnson, N. F. (2021). *Borror and DeLong's introduction to the study of insects* (8th ed.). New York, NY: Oxford University Press.
3. Robinson, W. H. (2018). *Urban insects and arachnids: A handbook of urban entomology* (2nd ed.). Cambridge: Cambridge University Press.

FST6095209 Plant Tissue Culture

Module Name	Plant Tissue Culture
Module level, if applicable	Basic
Module Identification Code	FST6095209
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. Dasumiati, M.Si., Ardian Khairiah, M.Si
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The learning methods used are flipped and mini projects. Material is discussed in groups. The topics discussed are in accordance with the learning material.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74

Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Students are able to explain biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to apply biological concepts and their applications with relevant knowledge. Students are able to use standard methodologies and software to solve problems related to biology and their implementation. Students are able to work independently and in teams according to their skills. Students are able to interpret research data.

Module content

1. Introduction to plant tissue culture: Understanding and benefits of tissue culture, the science underlying plant tissue culture, the scope of tissue culture studies, the history of the development of tissue culture
2. Basic principles of Tissue Culture: Cell Totipotency, proliferation, cell differentiation & dedifferentiation, embryogenesis and organogenesis, and in vitro cell growth factors
3. Explants in plant tissue culture: leaves, meristems, seeds, anthers, embryo cultures, callus
4. Tissue culture applications on solid media: sterilization, media (P)
5. Tissue culture applications on solid media: explants, planting and maintenance (P
6. Tissue culture applications on solid media: maintenance, observation (P)
7. Haploid culture and protoplast fusion
8. Tissue culture applications on liquid media: sterilization, media (P)
9. Tissue culture applications on liquid media: explants, planting and maintenance (P
10. Tissue culture applications on liquid media: maintenance, observation (P)
11. Acclimatization: Acclimatization techniques and supporting factors (P)
12. In vitro selection and somaclonal variation
13. Micropropagation: horticultures, woody plants, flowers, tubers
14. Meristem culture (virus-free culture)

Recommended Literatures

1. Funnekotter, B., Mancera, R. L., & Bunn, E. (2023). *A simple but effective combination of pH indicators for plant tissue culture.* Plants, 12(4), Article 740.
2. Kong, E. Y. Y., Biddle, J. B., Kalaipandian, S., & Adkins, S. W. (2023). *The development of a cell suspension culture system for the scaling up of coconut embryogenic callus production.* Plants, 12(4), Article 968
3. Neumann, KH., Kumar, S., Imani, J. 2020. Plant Cell and Tissue Culture –A Tool in Biotechnology. Springer Nature Switzerland AG.
4. Smith , R.H., 2013, Plant Tissue Culture, Academic Press is an imprint of Elsevier.
5. International research journals and e-books published less than the last 5 years.

FST6095210 Aquatic Ecology

Module Name	Aquatic Ecology
Module level, if applicable	Basic
Module Identification Code	FST6095210
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Prof. Dr. Agus Salim, S.Ag,M.Si
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Students are able to explain biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to apply biological concepts and their applications with relevant knowledge. Students are able to analyze environmental problems.

Module content

1. The term ecology, levels of organization of life,
2. Division of ecology, relationship of ecology with other sciences, and aquatic ecology
3. Aquatic ecosystem.
4. Stagnant water ecosystems include introduction, objectives, benefits, determining stations
5. Determination of physical, chemical, biological parameters.
6. Flowing water ecosystem.
7. brackish water ecosystem,
8. Mangrove ecosystem.
9. Marine ecosystems consisting of seagrass ecosystems, seagrass zoning.
10. Identify seagrass.
11. Determination of water quality parameters (physical parameters) of mangrove ecosystems
12. Determination of water quality parameters (chemical parameters) of mangrove ecosystems
13. Determination of water quality parameters (biological parameters) of mangrove ecosystems
14. Field trips

Recommended Literatures

1. Akhtar, N., Ishak, M.I.S., Ahmad, M.I., Umar, K., Md Yusuff, M.S., Anees, M.T., Qadir, A., Ali Almanasir, Y.K., 2021. Modification of the water quality index (WQI) process for simple calculation using the multi-criteria decision-making (MCDM) method: a review. Water-Sul. 13 (7), 905.
2. Nong, X., Shao, D., Zhong, H., Liang, J., 2020. Evaluation of water quality in the South-to-North Water Diversion Project of China using the water quality index (WQI) method. Water Res. 178 (115781), 115781
3. Wen, Y., You, T., Xu, Y., Lin, S., Ning, J., You, X., Xiao, Y., 2022. Comprehensive Evaluation of the Level of Water Ecological Civilization Construction in the Min River Basin, China. Sustainability - Basel 14 (23), 15753. https://doi.org/10.3390/su142315753.
4. Wilson, J.R., Wilkerson, F.P., Blaser, S.B., Nielsen, K.J., 2021. Phytoplankton community structure in a seasonal low-inflow estuary adjacent to coastal upwelling (Drakes Estero, CA, USA). Estuar. Coast. 44, 769–787. https://doi.org/10.1007/s12237-020- 00792-

FST6095211 Mycology

Module Name	Mycology
Module level, if applicable	Basic
Module Identification Code	FST6095211
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. Nani Radiastuti, M.Si., Reno Fitri, M.Si
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	Short discussion by students and divided into 8 groups of discussion. Each group was assigned to work on a specific topic relevant to the topik lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS

Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Students are able to apply knowledge about fungi in everyday life to society, industry and the environment. Students are able to recognize the diversity of macro and micro fungi Students are able to carry out research related to fungi

Module content

1. Lecture contract, Concept of the position of fungi in the plant world
2. Fungal growth and metabolism
3. Reproduction of fungi 1
4. Reproduction of fungi 2
5. Macroscopic, microscopic characteristics, reproductive organs and the diversity of Oomycetes, Zymycetes
6. Macroscopic, microscopic characteristics, diversity and reproductive organs of Ascomycetes
7. Macroscopic, microscopic characteristics, reproductive organs, and diversity Basidiomycetes
8. How to identify fungi
9. Fungi and deterioration
10. The role of fungi in food and industry
11. The role of fungi in health and the environment
12. Mushroom cultivation
13. Discussion of mini project reports
14. Discussion of mini project reports
15. Discussion of mini project reports

Recommended Literatures

1. Alexopoulos, C. J., Mims, C. W., & Blackwell, M. (2020). Introductory mycology (4th ed., reprint). Hoboken, NJ: John Wiley & Sons.

2. Cappuccino, J. G., & Welsh, C. T. (2019). Microbiology: A laboratory manual (12th ed.). New York: Pearson.

3. Watkinson, S. C., Boddy, L., & Money, N. P. (2016). The fungi (3rd ed.). London: Academic Press.

4. Webster, J., & Weber, R. (2021). Introduction to fungi (3rd ed., reprint). Cambridge: Cambridge University Press.

5. Carlile, M. J., Watkinson, S. C., & Gooday, G. W. (2023). The fungi (4th ed.). London: Academic Press.

FST6095212 Ethology

Module Name	Ethology
Module level, if applicable	Basic
Module Identification Code	FST6095212
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome
Students can understand the theories and concepts of animal behavior, understand how to observe animal behavior, analyze animal behavior, conduct animal behavior research and identify potential values obtained from animal behavior.
Module content

1. Animal behavior and human behavior
2. Elements of behavior: ways of studying
3. Different capacities: anatomy and behavior
4. Internal causes: the physiology of behavior
5. Learning: the influence of experience
6. Heredity and behavior
7. Intelligence: the organization of behavior
8. Social behavior and social organization
9. Communication: Animal language
10. Behavior and environment
11. Behavior and evolution

Recommended Literatures

1. Alcock, J. (2021). *Animal behavior: An evolutionary approach* (12th ed.). Sunderland, MA: Sinauer Associates.
2. Breed, M. D., & Moore, J. (2022). *Animal behavior* (3rd ed.). Oxford: Academic Press.
3. Barnard, C. (2021). *Animal behavior: Mechanism, development, function, and evolution* (2nd ed.). London: Pearson.
4. Dugatkin, L. A. (2020). *Principles of animal behavior* (5th ed.). Chicago: University of Chicago Press.
5. Reece, S. E., & Okasha, S. (Eds.). (2019). *Evolutionary behavioral ecology*. Oxford: Oxford University Press.

FST6095213 Secondary Metabolism

Module Name	Secondary Metabolism
Module level, if applicable	Basic
Module Identification Code	FST6095213
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Drs, Dede Sukandar, M.Si
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology

Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

After attending this lecture students are expected to:

1. Able to apply the process of isolation and identification of secondary metabolic compounds
2. Able to analyse the classification, structural variation, tatanama, biosynthesis and synthesis of terpenoids.
3. Able to analyse the classification, structure, stereochemistry and activity of steroids
4. Able to analyse the classification and origin of phenylpropanoids
5. Able to synthesise the structure, biosynthesis, properties and synthesis of polyketides
6. Able to analyse the classification, structure, interconversion and synthesis of flavonid
7. Able to analyse the classification, structure, rearrangement and synthesis of alkaloids
8. Able to synthesise useful natural material compounds
9. Able to apply metabolomics and biotransformation approaches

Module content

1. Isolation and identification of secondary metabolic compounds
2. Classification and biosynthesis of terpenoids
3. Structure and stereochemistry of terpenoids 4.
4. Cyclisation and Wagner-Meerwein Rearrangement
5. Structure and Properties of Steroids
6. Structure and Activity of Steroids
7. Classification and Origin of Phenylpropanoids
8. Structure and Biosynthesis of Polyketides
9. Properties and Synthesis of Phenylpropanoids and Polyketides
10. Classification and Structure of Flavonids
11. Interconversion and Synthesis of Flavonoids
12. Classification and Structure of Alkaloids
13. Alkaloid Rearrangement and Synthesis
14. Useful Natural Material Compounds
15. Metabolomics and biotrasformation approaches of secondary metabolism

Recommended Literatures

1. Parijadi, R. A. A., & Putri, S. P. (2017). *Aplikasi pendekatan metabolomik untuk tanaman*. Bandung: Institut Teknologi Bandung.
2. Dewick, P. M. (2021). *Medicinal natural products: A biosynthetic approach* (4th ed.). Hoboken, NJ: Wiley-Blackwell.
3. Sarker, S. D., & Nahar, L. (2020). *Natural products chemistry: Sources, separations and structures* (2nd ed.). Cambridge: Royal Society of Chemistry.
4. Osbourn, A., & Goss, R. J. M. (Eds.). (2020). *Natural products: Discourse, diversity, and design*. Hoboken, NJ: Wiley.
5. Kumar, A., & Luthra, P. M. (2018). *Biotransformations and bioprocesses for natural product development*. Boca Raton, FL: CRC Press.

FST6095214 Mammalogy

Module Name	Mammalogy
Module level, if applicable	Basic
Module Identification Code	FST6095214
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class

Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

1. Students are able to explain the definition of mammology, scope, history and its relationship to other fields of science.
2. Students are able to identify types of mammals in Java
3. Students are able to identify types of mammal groups
4. Students get to know the various types of natural habitats of mammals.
5. Students are able to analyze mammal ecology problems with their expertise in the field of biology to develop their commitment to mammal conservation in an effort to create an independent, honest and tough character.
6. Students are able to communicate the results of mammal ecology research effectively both orally and in writing
7. Able to make decisions based on mammal ecological data as a form of responsibility in carrying out tasks

Module content

1. Introduction to Mammology
2. Classification and Distribution of Mammals
3. Evolution and Biogeography of Mammals
4. Mammalian Morphology and Movement Systems
6. Reproduction and Growth
7. Mammal Social Groups
8. Habitats
9. Communication and Spatial Relationships of Mammals
10. Social Behavior
11. Feeding Ecology
12. Reproductive Strategy
13. Mammal Community
14. Mammal Research Methods
5. Mammal Conservation

Recommended Literatures

1. Feldhamer, G. A., Drickamer, L. C., Vessey, S. H., Merritt, J. F., & Krajewski, C. (2020). *Mammalogy: Adaptation, diversity, ecology* (5th ed.). Baltimore: Johns Hopkins University Press.
2. Kelt, D. A., & Van Vuren, D. H. (Eds.). (2023). *Mammalogy: Concepts and applications*. Baltimore: Johns Hopkins University Press.
3. Reichman, O. J., & Sechrest, W. (2018). *The biology of mammals: From the lab to the field*. Cambridge: Cambridge University Press.
4. Macdonald, D. W., & Feber, R. E. (Eds.). (2015). *Key topics in conservation biology 2* (includes mammalian ecology chapters). Chichester: Wiley-Blackwell.
5. Nowak, R. M. (2020). *Walker's mammals of the world* (8th ed.). Baltimore: Johns Hopkins University Press.

FST6095215 Palynology

Module Name	Palynology
Module level, if applicable	Basic
Module Identification Code	FST6095215
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. Priyanti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74

Credit points	2 Credit Hours (2-3) ≈ 2.44 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome
Students are able to explain biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to apply biological concepts and their applications with relevant knowledge. Students are able to interpret research data. Students are able to demonstrate the results of conceptual, analytical, logical and innovative thinking in oral and written form.
Module content
1. Pollen and spores and their uses 2. Pollen as fossil evidence 3. Morphological characters of pollen: units and shape 4. Aperture class and type 5. Number and position of apertures 6. Pollen size and symmetry 7. Pollen polarity and exine ornamentation 8. Pollen sample collection techniques 9. Pollen preservation preparation method 10. The link between pollen and health 11. Pollen as evidence of plant systematics 12. Pollen and pollinators 13. Paleoecology 14. Pollen diversity of ornamental plants around campus.
Recommended Literatures 1. Agashe, S.N. 2019. Pollen and Spores: Application with special emphasis on Aerobiology and allergy. England, CRC Press. 2. Bhattacarya, K., Majundar, R.M., & Bhattacarya, S.W. 2021. A Text Book of Palynology. NCBA Exports Pvt Ltd. New Delhi, India 3. Kumar, T.T. & Sharma, T. 2024. Analyzing Botanical Evidence in Crime Scenes: The Role of Forensic Palynology in Investigations. *YMER,* 23(10): 22-46 4. Nurcahyani, E. & Zulkifli. 2021. Palinologi dan Aplikasinya. Plantaxia Press. Yogyakarta, Indonesia

FST6095216 Population Genetics

Module Name	Population Genetics
Module level, if applicable	Basic
Module Identification Code	FST6095216
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Dr. Dasumiati, M.Si.,.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The learning methods used are problem-based, flipped and case studies. Material is discussed in groups. The topics discussed are in accordance with the learning material.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course students are able to analyze genetics and changes in populations based on the concept of population genetics which can be used to write observation reports and other practice-oriented case study research.	
Module content	

1. The concept of population genetics: understanding and scope of population genetics
2. Implications of Mendel's laws of inheritance in populations
3. Hardy-Weinberg law and the concept of gene frequency, genotype in populations
4. Random mating in the population
5. Natural selection
7. Mutation
8. Migration
9. Inbred
10. Population size is limited
11. Genetic drift and other evolutionary forces
12. Double linked genes
13. Quantitative Character
14. Polygenic characters in natural populations
15. Molecular genetic analysis of populations

Recommended Literatures

1. John H.Gillespie. 1998. Population Genetics. The Johns Hopkins University Press
2. Joachim Hermisson. 2024. Introduction of Population Genetics. University of Vienna Mathematics Department Oskar-Morgenstern-Platz, Austria
3. Joseph Felsenstein. 2019. Theoretical Evolutionary Genetics. Department of Genome Sciences and Department of Biology University of Washington International research journals and e-books published less than the last 10 years.
4. Research journals and e-books published less than the last 5 years.

FST6095217 Herpetology

Module Name	Herpetology
Module level, if applicable	Basic
Module Identification Code	FST6095217
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Fahri Fahrudin, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	Learning activities in class focus on assignments, questions and answers, discussions, presentations, or experiments related to the material. The course topics are delivered through discussing the main source of reference which are enriched with relevant examples (discussion of problem-based learning) or experiments related to the material.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74

Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation

Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome

1. Students are able to understand the basic principles of herpetology in the scope of taxonomy, ecology and behavior.
2. Students understand the basic technique to assess taxonomy and ecology of herpetofauna
3. Able to solve problems and apply principles and theories of herpetofauna through mini projects

Module content

1. Introduction to herpetology
2. Physiology and ecology
3. Reproduction system
4. Communication and social behavior
5. Behavioral ecology
6. Taxonomy of amphibian class
7. Taxonomy of reptile class
8. Mid-term examination
9. 9-15. Mini project implementation
16. Mini Project Results Presentation

Recommended Literatures

- AmphibiaWeb. (2018). **https://amphibiaweb.org/search/index.html.**
- Iskandar, D. T., & Erdelen, W. R. (2022). *Amfibi Jawa dan Bali* (Edisi Revisi). Bogor: LIPI Press.
- Hickman, C. P., Keen, S. L., Larson, A., Eisenhour, D. J., Ober, W. C., & Garrison, C. (2023). *Integrated principles of zoology* (18th ed.). New York: McGraw-Hill Education.
- Das, I. (2021). *A field guide to the reptiles of South-East Asia* (2nd ed.). London: Bloomsbury Wildlife.
- Vitt, L. J., & Caldwell, J. P. (2023). *Herpetology* (5th ed.). Academic Press.
- Uetz, P., Freed, P., & Hošek, J. (Eds.). (2025). *The reptile database*. Retrieved from https://reptile-database.reptarium.cz
- http://www.reptile-database.org
- All journals of herpetofauna from Indonesia. Please see them from the herpetologist of Indonesia; Djoko Iskandar, Amir Hamidy, Helen Kurniati, Irvan Sidik, Awal Riyanto, Umilaela Arifin and others

FST6095218 Ecotourism

Module Name	Ecotourism
Module level, if applicable	Applied
Module Identification Code	FST6095218
Semester(s) in which the module is taught	5
Person(s) responsible for the module	Prof. Dr. Lily Surayya Eka Putri, M.Env.Stud.
Language	Indonesian and English
Relation in Curriculum	Electivecourse for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None

Media employed	Classical teaching tools with white board and PowerPoint presentation

Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome

Students are able to explain biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to apply biological concepts and their applications with relevant knowledge. Students are able to build bio-entrepreneurship skills.

Module content

1. History and development of ecotourism
2. Definition, concept and scope of ecotourism
3. The relationship between ecotourism and the socio-cultural aspects of local communities
4. Economic value of ecotourism
5. Ecotourism policy
6. The effect of ecotourism on the environment
7. Prospects and partnerships in ecotourism
8. Development of sustainable ecotourism

Recommended Literatures

1. Huan T.C., Leong A.M.W. & Ma T. 2025. Ecotourism essentials: Principles, Challenges & Practices for a Sustainable Development. Routledge, New York.
2. Huan T.C., Leong A.M.W. & Ma T. 2025.Ecotourism Horizon. Routledge, New York.
3. Novelli M, et.al. 2022. Handbook of Niche Tourism. Edward Elgar Publishing.
4. Spenceley A. 2021. Handbook for Sustainable Tourism Practitioners. Edward Elgar Publishing.
5. International research journals and e-books published less than the last 10 years.
6. Articles published in the mass media

FST6095219 Food Microbiology

Module Name	Food Microbiology
Module level, if applicable	Applied
Module Identification Code	FST6095219
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Nani Radiastuti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	Group discussions are divided into ten groups. Each group was assigned to work on a topic related to the syllabus and presented in the class. Each group makes mini project learning and presented in the class as final exam

Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation, video
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to explain the role of microbes in food processing. Students are able to explain the properties of microbes that play a role in food spoilage. Students are able to explain the role of microbes in the food industry. Students are able to trace the food halal from microbiological elements	
Module content	

1. Introduction, classification and characteristics of microbes
2. Microbial growth and ecology
3. Characteristics of microbes that play a role in food spoilage: Bacteria
4. Characteristics of microbes that play a role in food spoilage: Mold and yeast
5. Mechanisms of microbial resistance to processing processes
6. Quantitative microbiological analysis of food ingredients
7. Microbiological indicators of food quality and safety
8. Principles and effects of preservation in food processing on microbes
9. The role of microbial culture in food processing and food halal
10. Microbiological control in the food service industry
11. Genetic engineering in the food industry
12. Types of traditional fermented foods and drinks
13. Presentation of mini project result
14. Presentation of mini project result
15. Presentation of mini project result

Recommended Literatures

1. Ray, B., & Bhunia, A. K. (2022). *Fundamental food microbiology* (6th ed.). Boca Raton, FL: CRC Press.
2. Montville, T. J., Matthews, K. R., Kniel, K. E., & Cooke, P. H. (2021). *Food microbiology: An introduction* (4th ed.). Washington, DC: ASM Press.
3. Jay, J. M., Loessner, M. J., & Golden, D. A. (2018). *Modern food microbiology* (8th ed.). New York, NY: Springer.
4. Doyle, M. P., Diez-Gonzalez, F., & Hill, C. (2019). *Food microbiology: Fundamentals and frontiers* (5th ed.). Washington, DC: ASM Press.
5. Forsythe, S. J. (2020). *The microbiology of safe food* (3rd ed.). Hoboken, NJ: Wiley-Blackwell.

FST6095220 Parasitology

Module Name	Parasitology
Module level, if applicable	Applied
Module Identification Code	FST6095220
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. drh. Raden Rara Bhintarti Suryohastari, M. Biomed.
Language	Indonesian and English
Relation in Curriculum	Electivecourse for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome
After completing the course, students are expected to be able to: 1. Explain the biology, life cycles, and host–parasite relationships of major protozoan, helminth, and arthropod parasites affecting humans and animals. 2. Identify parasitic species through microscopic, serological, and molecular diagnostic techniques.

3. Analyze epidemiological patterns of parasitic infections and their public health and veterinary significance.
4. Evaluate appropriate control, prevention, and treatment strategies for parasitic diseases based on scientific evidence.
5. Communicate findings of parasitological investigations effectively, both orally and in written form.

Module content

1. Lecture Contract
2. Definition, history, and scope of parasitology
3. Classification and characteristics of protozoan, helminth, and arthropod parasites
4. Parasitic amebas and flagellates
5. Parasitic apicomplexans
6. Parasitic nematodes
7. Parasitic trematodes
8. Parasitic cestodes
9. Disease vectors: mosquitoes (Anopheles, Aedes, Culex), flies, and ticks
10. Parasite-host interactions and parasite virulence factors
11. Microscopic, serological, and molecular methods in parasite identification
12. Antiparasitic drugs, vaccines, and parasitic disease prevention
13. Zoonotic parasites, parasites in food and water
14. Discussion of scientific articles on parasitic infections in Indonesia

Recommended Literatures

1. Altun, S. K., Aydemir, M. E., Alkan, S., & İrehan, B. (2023). Trends in paragonimiasis global research: bibliometric analysis of a neglected Food-Borne parasite. Iranian Journal of Parasitology, 18(3), 369.
2. Cook, T. J. (2023). Big science at small institutions: Parasitology research at primarily undergraduate institutions. The Journal of Parasitology, 109(6), 646-652.
3. ElShewy, K. (2024). Medical Parasitology: A Body System Approach. Springer
4. Gardner, S. L. (2024). Concepts in Animal Parasitology, Chapter 16: Introduction to Cestodes (Class Cestoda)[Platyhelminthes, Cestoda].Nature.
5. Iqbal, U. (2024). Infectious Disease Epidemiology: History, Transmission and Prevention. Parasitology, 36(3), 235-238.
6. Loker, E. S., & Hofkin, B. V. (2022). Parasitology: a conceptual approach. CRC Press.
7. Matushkina, N., Kuzmina, T., Trokhymets, V., & Khoperia, V. (2023). Basic Information and Tutorial Exercises for Medical Parasitology. Cambridge Scholars Publishing.
8. Rizwan, H. M., & Sajid, M. S. (Eds.). (2023). Parasitism and Parasitic Control in Animals: Strategies for the Developing World. Cabi.
9. Stothard, R., & Rollinson, D. (2023). Advances in parasitology (Vol. 119). Elsevier.

FST6095221 Plant Ecophysiology

Module Name	Plant Ecophysiology
Module level, if applicable	Applied
Module Identification Code	FST6095221
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Dasumiati, M.Si., Ardian Khairiah, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology

Teaching methods, Contact hours	The learning methods used are problem-based, flipped and case studies. Material is discussed in groups. The topics discussed are in accordance with the learning material.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to analyse cases related to plant ecophysiology based on the concept of plant ecophysiology.	
Module content	

1. Basic concepts, history and development, as well as practical aspects of Plant Ecophysiology
2. Environmental factors that influence plant growth
3. Physiological adaptation of plants to face water stress
4. Physiological adaptation of plants to face salt or salinity stress
5. Physiological adaptation of plants to face temperature stress
6. Physiological adaptation of plants to face light stress
7. Physiological adaptation of plants to face stress of CO2
8. Physiological adaptation of plants to face pH stress and allelochemical compounds
9. Physiological adaptation of plants to face soil/nutrient stress
10. Physiological adaptations of plants to face excess inorganic fertilizers and pesticides
11. Physiological adaptation of plants to face biotic stress (beneficial)
12. Physiological adaptation of plants to face biotic (adverse) stress
13. Case study of plant ecophysiology in the environment (2 Meetings)

Recommended Literatures

1. Bhatla, S.C. & Lal, M.A. 2023. *Plant Physiology, Development and Metabolism.* Springer Nature Singapore Pte Ltd. Singapore.
2. Lambers,H., Chapin, F.S.&Pons, T.L, R. E. (2008). Plant Phisiology Ecology. Springer Science Business Media, LLC, 233 Spring Street, New York, USA
3. International research journals and e-books published less than 10 years ago.
4. Articles published in mass media

FST6095222 Landscape Ecology

Module Name	Landscape Ecology
Module level, if applicable	Basic
Module Identification Code	FST6095222
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Etyn Yunita, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Students understand the mutual relationship between architecture, humans and the environment, and understand the concept of environmentally sound landscapes, so as to be able to provide solutions to environmental changes for landscape preservation
Module content

1. The meaning and limitations of Ecology Landscape
2. Components and interactions that occur in ecosystem
3. Ecosystem type
4. Analysis vegetation analysis on an area land
5. Components shaping and preservation efforts landscape
6. Ecological processes at landscapes
7. Biota landscape at spatial scale
8. Structure, function, and change landscape
9. Ecological principles landscape
10. Landscape elements
11. Diversity landscape
12. Balance and disturbance landscape ecology

Recommended Literatures

1. Wiersma, Yolanda F., 2022, *Experimental Landscape Ecology*, Cham, Springer.
2. Urban, Dean L., 2024, *Landscape Ecology: A Task-Oriented Perspective*, Cham, Springer.
3. Urban, Dean L., 2023, *Agents and Implications of Landscape Pattern: Working Models for Landscape Ecology*, Cham, Springer.
4. Hesselbarth, M. H. K.; Nowosad, J.; de Flamingh, A.; Simpkins, C. E.; Jung, M.; Gerber, G.; Bosch, M., 2024, *Computational Methods in Landscape Ecology*, *Current Landscape Ecology Reports*, vol. 10, artikel 2 (2025). DOI: 10.1007/s40823-024-00104-6. *(catatan: asal DOI memang 2024)*
5. Wiersma, Y. F., 2022, *A review of landscape ecology experiments to understand ecological processes*, *Ecological Processes*, vol. 11, artikel 57. DOI: 10.1186/s13717-022-00401-0.
6. Hersperger, A. M.; Grădinaru, S. R.; Pierri Daunt, A. B.; dkk, 2021, *Landscape ecological concepts in planning: review of recent developments*, *Landscape Ecology*, vol. 36, pp. 2329–2345. DOI: 10.1007/s10980-021-01193-y.
7. Lópezosa, P.; Berdugo, M.; Soliveres, S., 2023, *On the relative importance of land use, landscape characteristics, bird and plant assemblages as drivers of Mediterranean ecosystem functioning*, *Landscape Ecology*, vol. 38, pp. 3605–3619. DOI: 10.1007/s10980-023-01739-2.

FST6095223 Ethnobotany

Module Name	Ethnobotany
Module level, if applicable	Basic
Module Identification Code	FST6095223
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Priyanti, M.Si., Ardian Khairiah, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology

Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course students are able to analyse plants used by certain communities/ethnic groups for various purposes.	
Module content	

1. The concept of ethnobotany and economic botany
2. Ethnoecology concept
3. Ethnobotanical sampling method
4. Analysis of ethnobotanical data quantitatively and qualitatively
5. Ethnomedicine
6. Ethnobotany of traditional rituals
7. Ethnobotany of food plants
8. Ethnobotany of garden plants
9. Valuation of medicinal plants
10. Valuation of food crops
11. Valuation of building materials plants
12. Valuation of insect repellent plants.
13. Ethnotaxonomy
14. Community knowledge about landscape ecology

Recommended Literatures

1. Bussmann, R.W. & Paniagua-Zambrana, N.Y. 2021. Ethnobotany of the Mountain Regions of Southeast Asia. Springer Nature Switzerland AG
2. Martinez, J. L., Acevedo, A. M., & Rai, M. 2019. Ethnobotany: aplication of medicinal plants. CRC Press. France
3. Nurjanah, E. 2022. Booklet Etnobotani Tumbuhan Obat. Program Studi Tadris Biologi. Jurusan Ilmu Pengetahuan Alam. Fakultas Ilmu Tarbiyah dan Keguruan. Universitas islam Negeri Syarif Hidayatullah. Jakarta, Indonesia
4. Soukand, R. & Kalle, R. Historical Ethnobotany: Interpreting of the Old Records. MDPI. Switzerland
5. Syamsiah, Karim, H., Arsal, A.F., & Sondok, S. 2021. Kajian Etnobotani dalam Pemanfaatan Tumbuhan Obat Tradisional di Kecamatan Pana Kabupaten Mamasa, Sulawesi Barat. *Bionature,* 22(2): 1-12

FST6095224 Embryology

Module Name	Embryology
Module level, if applicable	Basic
Module Identification Code	FST6095224
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. drh. Raden Rara Bhintarti Suryohastari, M. Biomed. Fahri Fahrudin, M.Si.
Language	Indonesian and English
Relation in Curriculum	Electives course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through discussing the main source of reference. Learning activities in class focus on assignments, questions and answers, discussions, presentations, or experiments related to the material. The students can ask questions about things that are unclear so as not to cause misunderstandings about the material they have studied.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to explain biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to apply biological concepts and their applications with relevant knowledge. Students are	

able to explain the basic concepts of embryology including the principles of development and growth of animal cells. Students are able to reveal the mechanisms and processes of organogenesis and metamorphosis in animals. Students are able to analyze the factors that regulate organogenesis and their clinical relevance

Module content

1. Development and scope of embryology
2. Basic concepts and principles of development
3. Gametogenesis (Spermatogenesis and Oogenesis)
4. Fertilization and cleavage
5. Gastrulation and Neurulation
6. Placenta formation, implantation, and formation of extra embryonic layers
7. Ectoderm-derived organogenesis and development of the nervous system.
8. Ectoderm-derived organogenesis and development of the eye and ear.
9. Mesoderm-derived organogenesis and development of the urogenital system.
10. Endoderm-derived organogenesis and development of the digestive system
11. Endoderm-derived organogenesis and development of the respiratory system.
12. Regulatory factors of organogenesis (genetic and epigenetic)
13. Teratology.
14. Metamorphosis (perfect and imperfect as well as regressive and repressive).

Recommended Literatures

1. Amarin, Z. O., & Wu, B. (2024). New Perspectives in Human Embryology. BoD–Books on Demand.
2. Cochard, L. R., & Dueñas, A. N. (2023). Netter's Atlas of Human Embryology-E-BOOK: Netter's Atlas of Human Embryology-E-BOOK. Elsevier Health Sciences.
3. Fehrenbach, M. J., & Popowics, T. (2024). Illustrated Dental Embryology, Histology, and Anatomy E-Book: Illustrated Dental Embryology, Histology, and Anatomy E-Book. Elsevier Health Sciences.
4. Mafruchati, M. (2024). Embryology In The Qur'an: Study on Human Creation Process as a Basis for Studies on Animal Embryos. Zifatama Jawara.
5. Nerland, A., Bhagia, A., & Travers, H. (2023). The Human Embryo: A Brief Biological and Philosophical Biography. South Dakota Medicine: the Journal of the South Dakota State Medical Association, 76(6), 272-281.
6. Singh, V. (2022). Textbook of clinical embryology, -E-Book. Elsevier Health Sciences.
7. Rewane, A., & Munakomi, S. (2023). Embryology, central nervous system, malformations. In StatPearls [Internet]. StatPearls Publishing.
8. Turgut, M., Tubbs, R. S., Turgut, A. T., & Bui, C. C. (Eds.). (2023). The Corpus Callosum: Embryology, Neuroanatomy, Neurophysiology, Neuropathology, and Surgery. Springer.

FST6095225 Waste Management

Module Name	Waste Management
Module level, if applicable	Applied
Module Identification Code	FST6095225
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Prof. Dr. Lily Surayya Eka Putri, M.Env.Stud., Etyn Yunita, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology

Teaching methods, Contact hours	The course topics are delivered in 4 activities: 1. Provide material to students along with several examples for discussion in class 2. Conducting field trip 3. Students present the results of their trip in groups in front of the class, followed by discussion in class then the lecturer will carry out an evaluation. 4. Students make a video of their trip and upload in social media.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

After completing this course, students are able to analyse cases related to waste management based on the concept of waste management that can be used for writing observation reports and other practice-oriented case study research. observation and other practice-oriented case study research.

Module content

1. The concept of waste and its management
2. Global environmental problems
3. Solid waste
4. Solid waste processing
5. Hazardous wastes and its management
6. Case study
7. Infected waste
8. Liquid waste management
9. Drinking water treatment
10. Measurement of environmental parameters
11. Case study
12. Presentation

Recommended Literatures

1. Godfrey, L. 2023. Waste Management Practices in Developing Countries. MDPI.
2. Yada, D.K, Khumar, P., Singh, P. 2022. Hazardous Waste Management: An Overview of Advanced & Cost Effective Solution. Elsevier.
3. Chandrappa R. & Das D.B. 2024. Solid Waste Management: Principles & Practice, 2nd edition. Springer Nature, Switzerland.
4. Shareefdeen. 2022. Hazardous Waste Management. Advances in Chemical & Industrial Waste Treatment & Technology. Springer Nature, Switzerland.
5. Oil guide to algae-based wastewater treatment. www. Clixoo.com
6. Ministerial Decree and Ministerial Regulation on Waste and the Environment
7. International research journals and e-books published less than the last 10 years.
8. Articles published in mass media

FST6095226 Environmental Biotechnology

Module Name	Environmental Biotechnology
Module level, if applicable	Applied
Module Identification Code	FST6095226
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Prof. Dr. Megga Ratnasari Pikoli, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	Lecture topics enriched with relevant examples are presented by class groups and followed by class discussions. Students were divided into small discussion groups. Each group is assigned to work on a certain topic retrieved from the updated reputable international journals.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation

Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able analyse the principles and/or applications of biology in improving and maintaining environmental quality, preventing environmental contamination, as well as its role in producing clean products.	
Module content	

1. Introduction (scope, history, development of environmental biotechnology)
2. Management of solid organic waste
3. Management of liquid organic waste
4. Bioremediation of crude oil pollutants
5. Bioremediation of xenobiotic pollutants
6. Biodegradation of plastic waste
7. Biosorption of heavy metals
8. Biofertilization
9. Pest biocontrol
10. Biogrout
11. Biomass production from waste
12. Bioenergy production
13. Biotechnology to prevent environmental contamination
14. Omics in environmental biotechnology

Recommended Literatures

1. Bhat, R. A., Dervash, M. A., Hakeem, K. R., & Masoodi, K. Z. (Eds.). (2022). *Environmental biotechnology: Sustainable remediation of contamination in different environs*. CRC Press.
2. Mondal, S., Singh, S. P., & Lahir, Y. K. (Eds.). (2022). Emerging Trends in Environmental Biotechnology. CRC Press.
3. Reineke, W., & Schlömann, M. (2023). *Environmental microbiology* (pp. 551-587). Berlin, Germany:: Springer.
4. Sibi, G. (2022). *Environmental Biotechnology: Fundamentals to Modern Techniques*. CRC Press.
5. Verma, P. (Ed.). (2025). *Biotechnology for Environmental Sustainability*. Springer.
6. Supporting materials: the latest international journal articles.

FST6095227 Plant Biotechnology

Module Name	Plant Biotechnology
Module level, if applicable	Applied
Module Identification Code	FST6095227
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Dasumiati, M.Si.
Language	Indonesian and English
Relation in Curriculum	Electives course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.

Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to analyze the process of gene transformation and plant genetic engineering, as well as their use in the fields of agriculture, health, environment and industry.	
Module content	

1. The concept and scope of plant biotechnology, the history of the development of plant biotechnology
2. Problems and issues: trends and developments in plant biotechnology in developing and developed countries, as well as the pros and cons of plant biotechnology
3. Genes, genomes and plant genomics as the basis of plant biotechnology
4. Plant transformation, Gene isolation; primary; amplification; gene cloning: vector selection; marker genes (antibiotic resistance), reporter genes (GUS, GFP)
5. Plant transformation II. Gene transfer using vectors (Agrobacterium, viruses) and physical chemical methods (microinjection; particle bombardment)
6. Plant transformation III. Post-Transformation Gene Verification: Hybridization, blotting, sequencing, immunoassay
7. Plant genetic engineering techniques, overexpression, gene knockout, antisense, RNAi
8. Genetic engineering of plants I. Resistance to biotic stress (herbicides, insects, diseases, viruses); immunology
9. Plant genetic engineering II. Resistance to abiotic stress (temperature, drought, salinity)
10. Plant genetic engineering III. Golden rice, secondary metabolites
12. Applications of plant genetic engineering: case examples and applications in the fields of agriculture (food) and health
13. Applications of plant genetic engineering: case examples and applications in industry and the environment
14. Biotechnology in the framework of molecular markers: Techniques, types and their use in plant biotechnology products.
11. Bioethics and Regulation of plant biotechnology products: Regulation and safety of biotechnology products, Biotechnology research ethics law in Indonesia

Recommended Literatures

1. Chawla, H.S. 2009. Introduction to Plant Biotechnology. Science Publishers, Enfield, NH, USA.
2. N.Steward Jr (Ed.). 2008. Plant Biotechnology and Genetics: Principles, Techniques, and Applications. Wiley and Sons, Inc.
3. Kumar, A., Dinkar, D., & Dwivedi, N. 2023. Plant Genetic Resources Consevation and Utilization. Elite Publishing House New Delhi.
4. International research journals and e-books published less than the last 10 years.
5. Articles published in maas media

FST6095228 Introduction to Environmental impact analysis

Module Name	Introduction to Environmental impact analysis
Module level, if applicable	Applied
Module Identification Code	FST6095228
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Prof. Dr.Agus Salim, S.Ag,M.Si., Ir. Etyn Yunita, M.Si
Language	Indonesian and English
Relation in Curriculum	Compulsory course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS

Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Students are able to explain biological concepts supported by other relevant knowledge to understand developing problems and issues and their applications. Students are able to explain the meaning, process and benefits of Environment Impact Analysis for development activities. Students are able to apply the process of preparing and evaluating Environment Impact Analysis documents according to the regulations applicable in Indonesia. Students are able to interpret whether or not a business plan and/or activity is required to have an Environment Impact Analysis document. Students are able to make the right decisions based on data and information collected in the preparation and assessment of Environment Impact Analysis documents.

Module content

1. Introduction and Basic Concepts of Environment Impact Analysis
2. Legislation related to Environment Impact Analysis in Indonesia
3. Environment Impact Analysis Procedures include Screening of Business Plans and/or Mandatory Environment Impact Analysis Activities
4. Initial Environmental Baseline and Description of Business Plans and/or Activities
5. Scoping Process in Environment Impact Analysis
6. Preparation of Environment Impact Analysis Documents
7. Procedure for Evaluating Environment Impact Analysis Documents

Recommended Literatures

1. Suprapto. (2023). Environmental impact assessment (EIA) in Indonesian law: Implementation and effectiveness. *Journal of Advanced Research in Social Sciences and Humanities, 8*(2), 50–58.
2. Kurniawan, A. R. (2020). A qualitative content analysis of environmental impact assessment in Indonesia: A case study of nickel smelter processing. *Impact Assessment and Project Appraisal, 38*(5), 399–410. https://doi.org/10.1080/14615517.2019.1672452
3. Romianingsih, N. P. W. (n.d.). Comparative review of Indonesia EIA and IFC ESIA. *Journal of Environmental Science for Sustainable Development, 6*(1), 47–60. https://scholarhub.ui.ac.id/jessd/vol6/iss1/5
4. Sucofindo. (2023). AMDAL as evidence of environmental sustainability. Retrieved from https://www.sucofindo.co.id/en/articles/amdal-as-evidence-of-environmental-sustainability/
5. Centre for Research on Energy and Clean Air. (2019). *Jambi-1 power plant AMDAL assessment (Indonesia)*. https://energyandcleanair.org/wp/wp-content/uploads/2022/07/Jambi-1_AMDAL-Assessment_English-July-edit.pdf
6. Netherlands Commission for Environmental Assessment. (2023). *Indonesia: Legislation at project level – EIA (AMDAL)*. https://www.eia.nl/en/countries/indonesia/legislation-at-project-level
7. Kementerian Lingkungan Hidup dan Kehutanan. 2016. Himpunan Peraturan tentang Lingkungan Hidup.

FST6095229 Immunology

Module Name	Immunology
Module level, if applicable	Applied
Module Identification Code	FST6095229
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. drh. Raden Rara Bhintarti Suryohastari, M. Biomed.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology

Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students will be able to: 1. Critically evaluate the mechanisms of innate and adaptive immune responses across different physiological and pathological contexts. 2. Integrate immunological principles to explain the pathogenesis and prevention of infectious, autoimmune, allergic, and neoplastic diseases. 3. Design and execute basic immunological assays, and interpret the resulting data	

with scientific accuracy.

Module content

1. Lecture Contract
2. History of immunology and Basic Concepts of immunology
3. Components of Immunity I: Immune Organs and Tissues
4. Components of Immunity II: Immune Molecules
5. Innate Immunity
6. Adaptive Immunity
7. Immunity against Infection
8. Hypersensitivity
9. Immunodeficiency & Immunotherapy
10. The Effect of Gender on Immunity
11. The Effect of Aging on Immunity
12. Vaccination
13. Recent Developments in Immunology Research
14. Case Studies

Recommended Literatures

1. Abbas, A. K., Lichtman, A. H., & Pillai, S. (2023). Basic Immunology E-Book: Basic Immunology E-Book. Elsevier Health Sciences.
2. Actor, J. K. (2023). Introductory immunology: basic concepts for interdisciplinary applications. Elsevier.
3. Delves, P. J., Martin, S. J., Burton, D. R., & Roitt, I. M. (2017). Roitt's essential iGalant-Swafford, J., & Dutmer, C. M. (Eds.). (2025). Update on Immune Deficiencies, An Issue of Immunology and Allergy Clinics of North America: Update on Immune Deficiencies, An Issue of Immunology and Allergy Clinics of North America, E-Book (Vol. 45, No. 2). Elsevier Health Sciences.mmunology. John Wiley & Sons.
4. Mellman, I., Chen, D. S., Powles, T., & Turley, S. J. (2023). The cancer-immunity cycle: Indication, genotype, and immunotype. Immunity, 56(10), 2188-2205.
5. Murphy, K., & Weaver, C. (2019). Inmunología de JANEWAY. Editorial El Manual Moderno.
6. Parija, S. C. (2023). Textbook of microbiology and immunology (Vol. 1579). Berlin, Heidelberg, Germany: Springer.
7. Rezaei, N. (Ed.). (2022). Clinical Immunology. Academic Press.

FST6095230 Halal Food

Module Name	Halal Food
Module level, if applicable	Applied
Module Identification Code	FST 6095230
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Sandra Hermanto, M.Si
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None

Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

1. Students are able to construct their knowledge and re-explain concepts related to the philosophy, legal basis and halal analysis of food products, halal product guarantee systems and halal food regulations at the industry and community levels.
2. Students are able to apply material knowledge in identifying critical points of halalness of a food product.
3. Students understand the principles, criteria and implementation of the Halal Guarantee System and its relation to the Halal Food Regulation Act

Module content

1. Essence, Philosophy and Legal Basis of Halal Food
2. Controversy of Halal Food Products
3. Knowledge of ingredients & Identification of Critical Points (Animal, Vegetable, Microbial and Synthetic)
4. General guidelines for abattoir production
5. Food Regulation Law & JPH Law
6. Implementation of Halal Regulation Law
7. Halal Product Guarantee System (SJPH)
8. Halal Certification Guidelines & Implementation of SJPH

Recommended Literatures

- Amid, A., Elgharbawy, A. A. M. & Abualsunun, W. A. (Eds.) (2023). Solving halal industry issues through research in halal sciences. Springer Nature Singapore.
- Malode, K. (2022). The halal food handbook. Delve Publishing.
- Nugroho, A. A., Sumiyati, S., & Hamsani, H. (2025). Integrity and legitimacy of halal products: The urgency of halal supply chain management technology adoption in halal product authentication traceability—Evidence from Indonesia. *Journal of Environmental Science for Sustainable Development, 18*(1).
- Nafi', et al. (2025). E-nose for halal food authentication: A review. *Food Research, 9*(3), 235–244.
- Ng, P. C. (2022). Recent advances in halal food authentication: Challenges and opportunities. *Journal of Food Science*.
- KNEKS. (2020). Daftar referensi bahan-bahan yang memiliki titik kritis halal dan substitusi bahan non-halal. Komite Nasional Ekonomi dan Keuangan Syariah.
- Rahman, N. A. A. (Ed.). (2023). *Emerging technology and crisis management in the halal industry*. Springer.
- Bujang, A. (Ed.). (2022). *Innovation of food products in the halal supply chain worldwide*. Elsevier.
- Standards and Metrology Institute for Islamic Countries. (2025, May 16). World Halal Standards Day 2025 webinar highlights: Innovating halal—embracing food tech and sustainability with OIC/SMIIC standards. https://smiic.org/en/content/851
- Zafar, M. B. (2025). Mapping the research on halal industry: A retrospective analysis. *Journal of Islamic Marketing, 16*(6), 1770–1792.
- Legal Brief. (2025, March 19). Halal certificate becomes mandatory for domestically produced items beyond F&B in Indonesia (GR 42/2024). https://www.noandt.com/en/publications/publication20250319-1/

8. Mazlan, F. A. (2025). Halal considerations that signpost a cellular agriculture future. *Journal of Food Quality and Safety*.

FST6095231 Malacology

Module Name	Malacology
Module level, if applicable	Basic
Module Identification Code	FST6095231

Semester(s) in which the module is taught	6
Person(s) responsible for the module	Narti Fitriana, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56.00 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students master the theoretical concepts of the fundamentals of Malacology and its application	
Module content	

- History, Definition and Classification, Mollusca Diversity, Mollusca Biology, Potential, Geography.
- Malacology and its environment (Mollusca and its characteristics, Habit and Habitat, Distribution of Marine Mollusca, Terrestrial Mollusca Distribution, Abnormalities of Marine Mollusca.
- Class Amphineura & Class Monoplacophora (Class Amphineura, Class Monoplacophora, Morphology & Anatomy of Amphineura & Monoplacophora classes (Growth, shell structure, shell shape, shell ornamentation, colour and pattern), Physiology & Reproduction of Amphineura & Monoplacophora classes, Ecology, Potential and Conservation.
- Class Scaphopoda, Morphology & Anatomy of class Scaphopoda (Growth, shell structure, shell shape, shell ornamentation, colour and pattern), Physiology & Reproduction of class Scaphopoda, Ecology, Potential and Conservation. Sample collection methods
- Bivalve Class and Application of modelling: (Field Biology) (Bivalve Classes (Classification), Morphology & Anatomy of the Bivalve class (Growth, shell structure, shell shape, shell ornamentation, colour and pattern), Physiology & Reproduction of the Bivalve class, Ecology, Potential and Conservation, Sample collection methods, application of field biological modelling, Cultivation and Application of freshwater, estuary and marine Bivalves.
- Gastropod Classes (Terrestrial & Aquatic Gastropod Classes, Morphology & Anatomy of the Gastropod class (Growth, shell structure, shell shape, shell ornamentation, colours and patterns), Physiology & Reproduction of the Gastropod class Gastropods, Ecology, Potential and Conservation, Terrestrial Gastropods that are pests and their control, Predatory aquatic gastropods and their application.
- Class Cephalopods (Class Cephalopods, Morphology & Anatomy, Physiology & Reproduction of the Gastropod class, Ecology and Conservation, Potential and applications.
- Sampling Methods and Research Applications of Mollusca (Gastropoda &
- Cephalopods) , Mollusca (Gastropoda & Cephalopod) culture development concept

Recommended Literatures

- Li, Y.-N., et al. (2024). Molluscan systematics: Historical perspectives and the way ahead. *Biological Reviews*.
- Chen, Z., et al. (2025). A genome-based phylogeny for Mollusca is concordant with morphological and fossil evidence. *Science*. https://doi.org/10.1126/science.ads0215
- Stringer, C. A. (2023). Freshwater mollusc sclerochronology: Trends, challenges, and opportunities. *Earth-Science Reviews, 245*, 104751. https://doi.org/10.1016/j.earscirev.2023.104751
- Grijalba, C. C. B., et al. (2025). Molluscan shells, spicules, and gladii are evolutionarily conserved biomineralized structures. *Proceedings of the National Academy of Sciences*. https://doi.org/10.1073/pnas.2409873121
- Rudraraju, S., Moulton, D. E., Chirat, R., Goriely, A., & Garikipati, K. (2019). A computational framework for the morpho-elastic development of molluskan shells by surface and volume growth. *arXiv*. https://arxiv.org/abs/1901.00497
- Almeida, M. N., de Oliveira, R. A., et al. (2021). HELIX: Data-driven characterization of Brazilian land snails. *arXiv*. https://arxiv.org/abs/2109.04903
- Sierwald, P. (2018). Mobilizing mollusks: Status update on mollusk collections in the United States and Canada. *American Malacological Bulletin, 36*(2), 145–155.

https://doi.org/10.4003/006.036.0202

FST6095232 Primatology

Module Name	Primatology
Module level, if applicable	Applied
Module Identification Code	FST 6095232
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Fahma Wijayanti, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology

Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

After completing this course:

- Students are able to explain the relationship and role of Primatology with the discipline of Biology
- Students are able to distinguish, identify and classify primate
- Students are able to explain Living Primates as a product evolution of genetics, morphology, and behaviour
- Students are able to explain primates proportionally and scientifically
- Students are able to explain the comparison between human being with primate animals from the point of view of biology and evolution.
- Students are able to find problems and design appropriate primatology research methods.

Module content

1. Introduction to Primatology
2. Primate Classification and Distribution
3. Primate Biogeography
4. Teeth, food and digestion
5. Growth and development
6. Primate Social Groups
7. Social behaviour
9. Social relationships
10. Feeding ecology
11. Reproductive strategies
12. Primate communities
13. Primate research methods
14. Primate conservation
15. Primate research trends (topic of interest)

Recommended Literatures

1. Zhang S, Xu N, Fu L, Yang X, Li Y, Yang Z, Feng Y, Ma K, Jiang X,Han J, (2024).Comparative Genomics of Macaques and IntegratedInsights Into Genetic Variation and Population History. ⟨10.1101/2024.04.07.588379⟩
2. Yoo D, Rhie A, Hebbar P, Antonacci F, Logsdon GA, Solar SJ,Antipov D, Pickett BD, Safonova Y, Montinaro F (2024).: Complete Sequencing of Ape Genomes. doi:⟨10.1101/2024.07.31.605654⟩
3. He J, Phan BN, Kerkhoff WG, Alikaya A, Brull OR, Fredericks JM,
4. Hong T, Sedorovitz M, Srinivasan C, Leone MJ, (2024).: Cell type specific enhancers for dorsolateral prefrontal cortex. bioRxiv 2024, https://doi.org/10.1101/2024.12.01.626253

FTK6017150 Strategies and Learning Biology

Module Name	Strategies and Learning Biology
Module level, if applicable	Basic
Module Identification Code	FTK6017150
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Prof. Dr. Zulfiani, M.Pd
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74

Credit points	2 Credit Hours (2-3) ≈ 2,44 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

● Explains the concepts, principles and benefits of teaching and learning ● Analyzes the concept of high school learning in the independent curriculum ● Developing learning and assessment designs ● Analyzing RPP Plus/Teaching Modules and Learning Objective Flow (ATP) ● Identify teaching materials such as LKPD, modules and handouts. ● Analyzing Computer Information Technology (ICT) based media in learning and assessment ● Analyzing Criteria for Completion of Learning Objectives (KKTP) and development of Annual Programs and Semester Programs
Module content
● Learning and Teaching, ● Learning Materials ● Learning Concepts, Literacy Issues, SDGs, technology in the Independent Curriculum, ● Competency Based Learning Design ● Development of Teaching Modules and ATP, ● Management and development of teaching materials: E LKPD and E Module, ● Development of IT learning media ● Assessment ● Prota and Prosem.
Recommended Literatures ● Allott, A. (2024). Oxford Resources for IB DP Biology: Study Guide. Oxford University Press-Children. ● Primrose, D. M. (2025). Oxford Resources for IB Diploma Programme: IB Prepared: Biology 2023 Edition eBook. Oxford University Press-Children.

FTK6017153 Media and Technology Learning Biology

Module Name	Media and Technology Learning Biology
Module level, if applicable	Basic
Module Identification Code	FTK6017153
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Baiq Hana Susanti,M.Sc
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Designing biology learning media by applying the latest technology associated with the basis of technology in Islam and the role of Muslim scientists in initiating the formation of the role of Muslim scientists in initiating the formation of technology	
Module content	

1. Definition and characteristics of learning media in general
2. Specific definitions and characteristics of Biology learning media
3. Characteristics of each type of Biology learning media
4. Biology learning media based on the characteristics of the material
5. General function of Biology learning media
7. Special function of Biology learning media
8. Aspects needed in choosing biology learning media based on student needs with multiple intelligence based.
9. How to analyze Biology material to the needs of teaching media and learning media
10. Practice of analyzing Biology material to the needs of teaching media and biological learning media
11. Theory of designing Biology learning media (based on principles, functions, and implementation).
12. Effective Biology learning media

Recommended Literatures

- Bewersdorff, A., Hartmann, C., Hornberger, M., Seßler, K., Bannert, M., Kasneci, E., Kasneci, G., Zhai, X., & Nerdel, C. (2024). Taking the next step with generative artificial intelligence: The transformative role of multimodal large language models in science education.
- Byukusenge, C., Nsanganwimana, F., & Tarmo, A. P. (2023). Enhancing students' understanding of nerve cells' structures and their symbiotic functioning by using technology-enhanced instruction incorporating virtual labs and animations. Journal of Science Education and Technology, 32(1), 13-25.
- Cai, Y., van Joolingen, W., & Veermans, K. (Eds.). (2021). Virtual and augmented reality, simulation and serious games for education. New York, NY, USA: Springer.
- Triyanto, S. A., Bilbina, K., & Putri, R. S. (2025). The potential of 3D augmented reality book-based cell learning media to support educational transformation. Biosfer: Jurnal Pendidikan Biologi, 18(1), 61–68.

FTK6017155 Evaluation of Biology Learning

Module Name	Evaluation of Biology Learning
Module level, if applicable	Basic
Module Identification Code	FTK6017155
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Dr. Ahmad Sofyan, M.Pd.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74

Credit points	2 Credit Hours (2-3) ≈ 2,44 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
● Integrating knowledge of the concept of learning evaluation with Islamic values in the application of TPACIK ● Analyse learning evaluation problems in schools/madrasas ● Communicate alternative solutions to learning evaluation problems based on analysis	
Module content	

- Basic concepts of learning evaluation and regulations related to educational assessment standards
- Authentic Assessment: Aspects of Assessment in the Cognitive, Affective and Psychomotor Domains
- Learning Outcome Test Preparation and Implementation Techniques
- Techniques for Preparing Grids and Test Instruments: High Cognitive Questions
- Learning Process Evaluation Tools: Self Assessment, Peer Assessment, Observation/Journal, Portfolio
- Problem Item Analysis Technique
- Benchmark Assessment and Normative Assessment
- Test Result Correction and Scoring Techniques
- Mastery Learning
- National Assessments (character Survey and Learning Environment Survey)

Recommended Literatures

- Alonzo, D. (2024). Assessment to support learning and teaching: Problems and solutions. Routledge.
- Furtak, E. M. (2023). Formative assessment for 3D science learning: Supporting ambitious and equitable instruction. Teachers College Press.
- Yan, Z., & Yang, L. (Eds.). (2022). Assessment as learning: Maximising opportunities for student learning and achievement. Routledge

FTK6017158 Planning Learning Biology

Module Name	Planning Learning Biology
Module level, if applicable	Basic
Module Identification Code	FTK6017158
Semester(s) in which the module is taught	6
Person(s) responsible for the module	Prof. Dr. Zulfiani, M.Pd
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS

Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

- Able to explain the significance of the role and competence of teachers in managing learning
- in accordance with the 2013 Curriculum.
- Able to analyze biology material according to the characteristics, teaching procedures at the high school level
- independently and appropriately.
- Able to design biology learning activities based on science process skills independently and with quality.
- independently and with quality
- Able to present analyses of methods, approaches, and models of learning
- learning models based on constructivism by utilizing information technology independently and responsibly.
- independently and responsibly.
- Able to design classroom and laboratory management that supports active learning independently and with quality.

Module content

- The role and competence of biology teachers in managing learning in accordance with the 2013 curriculum
- Analyze biological material according to the characteristics of the types of factual, conceptual, procedural, metacognitive knowledge and cognitive development of students at the high school level independently and appropriately.
- Organize of biological material independently and appropriately
- Design biology learning activities based on science process skills independently and with quality
- Analysis of methods, approaches by utilizing information technology independently and responsibly
- Able to present analysis of constructivism-based biology learning models by utilizing information technology independently and responsibly.
- Able to design classroom and laboratory management that supports active learning independently and with quality.

Recommended Literatures

- Behling, F., Weidenhiller, P., Förtsch, C., & Neuhaus, B. J. (2025). Improving pre-service biology teachers' lesson-planning skills, with a focus on academic and science language in biology on the basis of the refined consensus model of PCK. International Journal of Science Education, 1-32.
- Hariyatmi, D., Agustina, P., & Kusumadani, A. I. (2021). Perencanaan pembelajaran biologi. UMS Press.
- Koberstein-Schwarz, M., & Meisert, A. (2023). Facilitating preservice biology teacher development through material-based lesson planning. Education Sciences, 14(1), 42.
- Lee, G. G., & Zhai, X. (2024). Using ChatGPT for science learning: A study on pre-service teachers' lesson planning. IEEE Transactions on Learning Technologies, 17, 1643-1660.
- Siburian, J., & Sadikin, A. (2022). Biology microteaching book: A practical approach from various countries. Biosfer: Jurnal Pendidikan Biologi, 15(1), 123-133.

FST6095233 Industrial Microbiology

Module Name	Industrial Microbiology
Module level, if applicable	Applied
Module Identification Code	FST6095233
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Prof. Dr. Megga Ratnasari Pikoli, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	Lecture topics enriched with relevant examples are presented by class groups and followed by discussions. Students were divided into small discussion groups. Each group is assigned to work on a certain topic retrieved from the updated reputable international journals. Students experience on the real industry is provided by visiting and witnessing the processes inside factories employing industrial microbes.

Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 30%, Final exam 30%, Formative 40%
Intended Learning Outcome	

Students are able to explain biological concepts supported by other relevant knowledge to understand developing problems, issues, and their applications. Students are able to use standard methodologies to solve problems related to biology and their implementation. Students are able to demonstrate the results of conceptual, analytical, logical and innovative thinking in oral and written form. Students are able to build bioentrepreneur skills. Students are able to analyze the principles and/or applications of microbiology in using microorganisms to produce commercialized products.
Module content
● Introduction (scope and development of industrial microbiology) ● Industrial microorganisms ● Isolation of industrial microorganisms ● Preservation of isolates ● Fermentation media and inocula ● Selection of microorganisms and their products ● Development of strains and products ● Fermentation models and kinetics ● Metabolite production using immobilized cell technique ● Scale-up ● Downstream processes ● Examples of industrial microbiology application
Recommended Literatures ● Agrawal, R. (2024). *Textbook of industrial microbiology*. Springer. ● Verma, P. (Ed.). (2024). I*ndustrial microbiology and biotechnology: A new horizon of the microbial world.* Singapore: Springer. ● Verma, P. (Ed.). (2024). *Industrial microbiology and biotechnology: An insight into current trends*. Springer Nature. ● Supporting materials: the latest international journal articles.

FST6095235 Phytopathology

Module Name	Phytopathology
Module level, if applicable	Applied
Module Identification Code	FST6095235
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Dr. Priyanti, M.Si., Junaidi, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
Students are able to apply biological concepts and their applications with relevant knowledge. Students are able to demonstrate the results of conceptual, analytical, logical and innovative thinking in oral and written form. Students are able to analyze the symptoms and control of plant diseases	
Module content	

1. Understanding Phytopathology and its relationship to relevant science
2. Types of diseases that attack plant organs
3. Development of disease in plants
4. Symptoms of plant disease
6. Plant resistance to disease
7. Plant diseases in seeds and their control
8. Plant diseases in seedlings and their control
9. Root plant diseases and their control
10. Plant diseases of stems and their control
11. Leaf plant diseases and their control
12. Plant diseases of flowers and their control
13. Plant diseases of fruit and their control
14. Observation of sick plants in plantations and yards
15. Presentation of the variety of cultivated plants

Recommended Literatures

1. Partasharathy, S. 2024. Fundamental of Plant Pathology. Elite Publishing House. New Delhi, India
2. Rahmisari, H. et. al. 2024. Dasar-dasar Ilmu Hama dan Penyakit Tanaman. Azzia Karya Bersama. Padang, Indonesia
3. Qisthi, R.T. et. al. 2021. Pengendalian Hama dan Penyakit Tanaman Pangan dan Hortikultura. Penerbit Jurusan Biologi FMIPA UNM. Makassar, Indonesia
4. Sharma, S., Arsia, S.K., Kaur, A., Poorvasandhya, R. & Dhaka, S. 2023. Modern Approaches in Plant Pathology. Elite Publishing House. New Delhi, India

FST6095236 Plant Breeding

Module Name	Plant Breeding
Module level, if applicable	Applied
Module Identification Code	FST6095236
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Dr. Dasumiati, M.Si., Ir. Junaidi, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The learning methods used are mini projects and flipped. Material is discussed in groups. The topics discussed are in accordance with the learning material.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture

Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to analyse the genetic diversity of plants as a source or result of plant breeding based on plant breeding methods that can be used for writing observation reports and other practice-oriented case study research.	
Module content	

1. Concept and scope of plant breeding: concept, scope and contribution of plant breeding
2. Plant reproduction: plant sex determination, sexual and asexual reproduction
3. The basis of genetics in plant breeding
4. Diversity and sources of genetic diversity: Breeding methods (introduction, collection, hybridization, mutation, polyploid), type of cultivar/variety
5. Heritability: Understanding genotypic, phenotypic, environmental variance; Heritability, narrow and broad sense of heritability, use of heritability for breeding
6. Methods of selection and breeding of self-pollinated plants: Genetic characters in self-pollinated plants, Homozygosity, Introduction, mass selection, line selection
7. Methods of selection and breeding of self-pollinated plants: Hybridization/crossing, Selection methods for hybridization results (pedigree selection, bulk, backcross, SSD)
8. Selection and Breeding methods for cross-pollinated plants: Genetic characters of cross-pollinated plants, Hardy-Weinberg Law, Introduction, mass selection, cob row selection
9. Methods of selection and breeding of cross-pollinated plants: Repeated selection, phenotypic repeated selection, repeated selection for combining ability, reciprocal repeated selection
10. Vegetative plant breeding methods: Reasons for vegetative propagation, breeding procedures, development of cloned cultivars/varieties, apomixis, potato and sugarcane plant breeding
11. Hybrid plant assembly: definition of hybrid plants, plant breeding methods in hybrid plant assembly, heterosis
12. Conventional and unconventional breeding technologies: Conventional (Crossing, clonal), Unconventional (Genetic engineering, mutation)
13. Biotechnology for breeding: Biotechnology for genetic diversity, biotechnology for selection, biotechnology in in vitro culture
14. Release of varieties: Sources of genetic diversity, Crossing/genetic engineering, Selection, Testing of breeding results (yield test, genetic progress), Procedures for releasing varieties

Recommended Literatures

1. Fehr, WR. & Suza, WP. 2024. Plant Breeding Methods. Iowa State University Digital Press
4. Jameel M. Al-Khayri, Shri Mohan Jain, Dennis V. Johnson. 2015. Advances in Plant Breeding Strategies: Breeding, Biotechnology and Molecular Tools. Springer Cham Heidelberg New York Dordrecht London
5. Pawar, N.S. & Jain, D.S. 2019. A Text Book of Genetics Plant Breeding and Evolution. Harshwardhan Publication Pvt.Ltd.
6. International research journals and e-books published less than the last 10 years.
7. Articles published in mass media

FST6095237 Environmental Toxicology

Module Name	Environmental Toxicology
Module level, if applicable	Applied
Module Identification Code	FST6095237
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Prof. Dr. Lily Surayya Eka Putri, M.Env.Stud.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered in 3 activities: 1. Provide material to students along with several examples for discussion in class 2. Conducting field trip 3. Students present the results of their trip in groups in front of the class, followed by discussion in class then the lecturer will carry out an evaluation.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

After completing this course, students are able to explain the concept of toxicology, types of toxins, and the effects of toxic substances on the environment, both land, water and air, as well as their effects on the environment, and the effects of toxic substances on the environment, both land, water and air, as well as their effects on human health, and express it in a research theme.

Module content

1. Basic concepts of environmental toxicology
2. Xenobiotics: microbes
3. Xenobiotics: plants and animals
4. The process of entering chemical substances into the body
5. Ecokinenetics of toxic substances
6. Dose-response concept
7. Presentation of group assignments/field trips
8. Pesticide toxicology
9. The fate of pesticides in the environment
10. Heavy metal toxicology
11. Toxicity testing methods
12. Pollution and quality of the aquatic environment
13. Group assignment presentation
14. Group assignment presentation

Recommended Literatures

1. Amdur M.O, J, Doull & C.D. Klaassen. 2019. Casarett and Doull's Toxicology: The Basic Science of Poisons. Mc Graw-Hill, Inc. United States of America.
2. Soemirat, J. 2021. Toksikologi Lingkungan. UGM Press
3. Apriyani, Musdalifah, Murdani A.P., et.al. 2025. Toksikologi Lingkungan. Sada Kurnia Pustaka.
4. Masdianto & Rahaju S.M.N. 2024. Toksikologi Lingkungan. Penerbit Litnus.
5. Landis, W.G & Ming H,Y. 2017. Introduction of Environmental Toxicology. CRC Press.
6. International research journals and e-books published less than the last 10 years.
7. Articles published in mass media

FST6095238 Biomaterials and Nanotechnology

Module Name	Biomaterials and Nanotechnology
Module level, if applicable	Applied
Module Identification Code	FST6095238
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Prof. Dr. Lily Surayya Eka Putri, M.Env.Stud., Prof. Dr. Agus Salim, S.Ag., M.Si.
Language	Indonesian and English and English
Relation in Curriculum	Elective course for undergraduate program in Biology

Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course students are able to design biomaterial and nanomaterial synthesis procedures that can be applied in the health sector, then report the results of the design and write articles related to nanotechnology in online media.	
Module content	

1. History of biomaterials
2. Definition and principles of biomaterials
3. Natural biomaterials
4. Synthetic biomaterials
5. Biomaterial applications in the health sector
6. Basic principles of nanotechnology
7. Properties of nanomaterials
8. A quantum nano approach
9. Types of nanomaterials
10. Nanomaterial synthesis techniques, bottom up and top down
11. Characterization of nanomaterials
12. Nanomaterial applications in several fields
13. Nanotechnology applications in biomaterials

Recommended Literatures

1. Park, J., & Lakes, R. S. (2015). *Biomaterials: An introduction* (3rd ed.). Springer.
2. Motelica, L., Oprea, O., Ficai, D., & Ficai, A. (2023). *Biomaterials and tissue engineering*. Springer.
3. Uludağ, H., Wang, Y., Vrana, N. E., Tamerler, C., Kothapalli, C., & Vasudev, M. C. (Eds.). (2024). Insights in biomaterials 2022/2023—Novel developments, current challenges and future perspectives. *Frontiers in Bioengineering and Biotechnology*.
4. Mortazavi, S., Neshatian, M., Bozec, L., Zarrin, H., & Kalani, M. (2025). Functional amyloid fibrils as versatile tools for novel biomaterials. *arXiv*. https://arxiv.org/abs/2504.15532
5. Supporting materials: the latest international journal articles.

FST6095239 Genetics Engineering

Module Name	Genetics Engineering
Module level, if applicable	Applied
Module Identification Code	FST6095239
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Dr. Dasumiati, M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%

Intended Learning Outcome
After completing this course, students are able to explain the techniques and procedures of genetic engineering and DNA cloning, and assess their safety and bioethics in their application and products in several fields.
Module content
1. Concept and scope of genetic engineering 2. DNA isolation and purification 3. Vectors and their characteristics 4. Enzymes in genetic engineering: restriction and ligation 4. 5. Genetic engineering techniques: electrophoresis and PCR 5. 6. Genetic engineering techniques: DNA sequencing and hybridisation 7. DNA library 8. Recombinant DNA: transformation 9. Recombinant selection and expression 10. Cloning applications 11. Genetic engineering in animals and plants 12. Genetically Modified Organism (GMO) 13. Transgenic products: pros and cons and bioethics 14. Genetic engineering of plants
Recommended Literatures ● Nicholl, D. S. (2023). An introduction to genetic engineering. Cambridge University Press. ● Lodish, H., et al. (2021). Molecular Cell Biology (9th ed.). W.H. Freeman. ● Supporting materials: the latest international journal articles.

FST6095242 Ichthyology

Module Name	Ichthyology
Module level, if applicable	Applied
Module Identification Code	FST6095242
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Fahri Fahrudin, M.Si.
Language	Indonesian and English

Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through discussing the main source of reference. Learning activities in class focus on assignments, questions and answers, discussions, presentations, or experiments related to the material (discussion of problem-based learning).
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

- Able to explain the basic concepts of ichthyology including the history of the emergence and extinction of several types of fish, the development of fisheries science and ichthyological figures
- Able to explain the concept of communication and interrelationships between systems in the fish body and the environment/habitat
- Able to describe the occurrence of diversity in fish and fish socio-ethology
- Able to identify types of fish based on various fish characteristics

Module content

1. Basic concepts of ichthyology and its scope
2. History, classification and general characteristics of fish
3. Fish morphology
4. Integumentary system and light organs
5. Fish identification techniques (meristic, morphometric, molecular)
6. Skeletal System, muscles and electrical organs
7. Circulation and respiratory systems
8. Excretory and osmoregulatory systems
9. Digestive organs and system
10. Sexual and reproductive
11. Thyroid gland, hormones and internal tissues
12. Nervous system, senses and stimulation mechanisms
13. Fish diversity
14. Socio-ethology of fish

Recommended Literatures

1. Nelson, J. S., Grande, T. C., & Wilson, M. V. H. (2016). *Fishes of the world* (5th ed.). Wiley.
2. Priede, I. G. (2017). *Deep-sea fishes: Biology, diversity, ecology and fisheries*. Cambridge University Press.
3. Froese, R., & Pauly, D. (Eds.). (2025). *FishBase* (April 2025 version). http://www.fishbase.us
4. Helfman, G. S., Collette, B. B., Facey, D. E., & Bowen, B. W. (2019). *The diversity of fishes: Biology, evolution, and ecology* (3rd ed.). Wiley-Blackwell.
5. Heino, M., Diaz Pauli, B., & Dieckmann, U. (2015). Fisheries-induced evolution. *Annual Review of Ecology, Evolution, and Systematics, 46*, 461-480.
6. Hughes, R. M., Infante, D. M., Wang, L., Chen, K., Terra, B. F., & Cormier, S. M. (2016). Standardized fish sampling and analysis methods for assessing biotic integrity of rivers and streams. *Fisheries, 41*(1), 26-39.

FST6095244 Marine Biology

Module Name	Marine Biology
Module level, if applicable	Applied
Module Identification Code	FST6095244
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Prof. Dr. Lily Surayya Eka Putri, M.Env.Stud., Prof. Dr. Agus Salim, S.Ag., M.Si.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0.00 Total ECTS : 2.74

Credit points	2 Credit Hours ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	

Students are able to explain biological concepts supported by other relevant sciences to explain problems and issues that develop and their applications. Students are able to apply biological concepts and their applications with relevant sciences. Students are able to analyse environmental problems. Students are able to master the concepts of marine biology, various ecosystems included in the coastal zone and biological principles that regulate the organization and survival of organisms and their associations, as well as understand marine biology research methodologies related to minimizing pollution in marine ecosystems.

Module content

1. Marine biology concept
2. Marine environmental problems and marine biological resources
3. Plankton, benthos and nekton biota
4. Marine plants and animals: algae, crustaceans, molluscs
5. Biogeochemical cycles and primary productivity
6. Mangrove Forest Ecosystem
7. Seagrass Ecosystem
8. Coral Reef Ecosystem
9. The impact of human activities on the sea

Recommended Literatures

1. Nybakken, J. W., & Bertness, M. D. (2020). *Marine biology: An ecological approach* (8th ed.). Pearson.
2. Romimohtarto, K., & Juwana, S. (2017). *Biologi laut: Ilmu pengetahuan tentang biota laut* (Edisi Revisi). Pusat Penelitian Oseanografi LIPI.
3. Bengen, D. G. (2022). *Pengenalan dan pengelolaan ekosistem mangrove* (Edisi Revisi). Bogor: Pusat Kajian Sumberdaya Pesisir dan Lautan, IPB University.
4. Dahuri, R., Rais, J., Ginting, S. P., & Sitepu, M. J. (2020). *Pengelolaan sumber daya wilayah pesisir dan lautan secara terpadu* (Edisi Revisi). Bogor: Pradnya Paramita & PKSPL IPB.
5. Kadi, A., & Atmadja, W. S. (2019). *Rumput laut: Jenis, reproduksi, produksi, budidaya, dan pasca panen* (Edisi Revisi). Jakarta: LIPI Press.
6. Sulistijo, A., Soegiarto, W. S., & Mubarak, H. (2018). *Rumput laut (Alga): Manfaat, potensi, dan usaha budidayanya*. Jakarta: LIPI Press.
7. Supriyono, D. (2021). *Terumbu karang Indonesia: Ekologi, ancaman, dan upaya konservasi*. Semarang: Alprin.
8. Suharsono. (2020). *Jenis-jenis karang di Indonesia* (Edisi Revisi). Jakarta: LIPI Press.
9. English, S. C., Wilkinson, C., & Baker, V. (2021). *Survey manual for tropical marine resources* (4th ed.). Townsville: Australian Institute of Marine Science.
10. Hartog, C. Den. (2015). *Seagrasses of the world: Revised edition*. Amsterdam: North-Holland Publishing Co.
11. Richards, H., et al. (2018). *The corals: Biology, diversity, and conservation*. Guam: University of Guam Press

FST6095240 Virology

Module Name	Virology
Module level, if applicable	Applied
Module Identification Code	FST6095240
Semester(s) in which the module is taught	7
Person(s) responsible for the module	Dr. drh. Raden Rara Bhintarti Suryohastari, M.Biomed.
Language	Indonesian and English
Relation in Curriculum	Elective course for undergraduate program in Biology
Teaching methods, Contact hours	The course topics are delivered through lectures which are enriched with relevant examples and followed by short discussion. Students are divided into ten groups of discussion. Each group was assigned to work on a specific topic relevant to the lecture and presented in the class.
Workload	Lecture (Face to Face) (SCU) : 2 Number of lecture per Semester : 14 Practical (at Laboratory or filed) (SCU) : Number of Practical Per Semester : Total Hours Lecture (Face to Face) Per Semester : 23.33 Hours of Midterm And Final Exam Per Semester : 3.00 Total Hours Practical : 0.00 Total Hours of Structure and Self Study Per semester : 56 Lecture (ECTS) : 2.74 Practical (ECTS) : 0,00 Total ECTS : 2.74
Credit points	2 Credit Hours (2-3) ≈ 2.74 ECTS
Admission and examination requirements	Enrolled in this course • Minimum 80% attendance in lecture
Recommended prerequisites	None
Media employed	Classical teaching tools with white board and PowerPoint presentation
Forms of assessment	Midterm exam 40%, Final exam 40%, Quiz 10%, Structured assignment 10%
Intended Learning Outcome	
After completing this course, students are able to identify viruses including properties, pathogenesis and laboratory diagnostics properly and correctly	
Module content	

● Virus structure ● The steps of virus replication ● Viral pathogenesis and disease symptoms ● Identify methods of diagnosis and treatment of viral diseases ● Prevention and control of viral diseases including vaccines ● Laboratory diagnostics
Recommended Literatures ● Richardson, C. D., & Acheson, N. H. (Eds.). (2025). Fundamentals of molecular virology. John Wiley & Sons. ● Hewlett, M. J., Camerini, D., & Bloom, D. C. (2021). Basic Virology (4th ed.). Wiley-Blackwell. ● Supporting materials: the latest international journal articles.