



MODULE HANDBOOK



2022



+62 331 334293



biologi.fmipa@unej.ac.id



Jalan Kalimantan No.37 Kampus Tegalboto, Jember
68121 Jawa Timur, Indonesia

Table of content

| | |
|--|-----------|
| TABLE OF CONTENT | 1 |
| COMPULSORY COURSE | 4 |
| Fundamental Biology | 4 |
| Calculus | 6 |
| General Physics | 8 |
| Basic Chemistry | 10 |
| Religion Education: | 12 |
| Islamic | 12 |
| Catholic | 14 |
| Christian | 16 |
| Hinduism | 18 |
| Buddhism | 20 |
| English | 22 |
| Indonesian | 24 |
| Civic Education | 26 |
| Pancasila Education | 28 |
| Introduction to Environmental Science | 30 |
| Introduction to Entrepreneurship | 32 |
| Occupational Safety and Health | 33 |
| Community Services Training | 35 |
| Microbiology | 37 |
| Plant Structure | 39 |
| Animal Structure | 41 |
| Cell Biology | 43 |
| Biochemistry | 45 |
| Plant Development | 47 |
| Animal Development | 49 |
| Terrestrial Ecology | 51 |



| | |
|--|-----------|
| Genetics | 53 |
| Biostatistics | 55 |
| Bioethics | 57 |
| Molecular Biology | 59 |
| Animal Systematic | 61 |
| Plant Systematic | 63 |
| Aquatic Ecology | 65 |
| Microbial Physiology..... | 67 |
| Animal Physiology | 69 |
| Plant Physiology | 71 |
| Bioinformatics | 73 |
| Evolution | 75 |
| Microtechnique..... | 77 |
| Biology Conservation..... | 79 |
| Environmental Science..... | 81 |
| Tissue Culture | 83 |
| Research Methodology | 85 |
| Final Project | 87 |
| ELECTIVE COURSE..... | 89 |
| Food Microbiology | 89 |
| Enzymology..... | 94 |
| Industrial Microbiology | 95 |
| Virology..... | 98 |
| Microbiological Analysis Techniques..... | 100 |
| Bioconversion | 102 |
| Mycology..... | 104 |
| Ethnobotany | 106 |
| Ornamental Plant..... | 108 |



| | |
|-------------------------------------|-----|
| Natural Medicine..... | 110 |
| Bryology..... | 112 |
| Phytohormone..... | 114 |
| Plant Ecophysiology..... | 116 |
| Orchidology..... | 118 |
| Animal Reproduction..... | 120 |
| Parasitology..... | 121 |
| Animal Behaviour..... | 123 |
| Entomology..... | 125 |
| Endocrinology..... | 127 |
| Immunology..... | 129 |
| Human Physiology..... | 131 |
| Ecotourism..... | 132 |
| Valuation of Natural Resources..... | 133 |
| Environmental Biomonitoring..... | 135 |
| Biogeography..... | 137 |
| Wildlife Management..... | 139 |
| Bio-invasion Ecology..... | 141 |
| Phytoremediation..... | 143 |
| Coastal Area Management..... | 145 |
| Mangrove Ecology..... | 147 |
| Tropical Forest Ecology..... | 149 |
| Forensic Biology..... | 151 |
| Industrial Biotechnology..... | 152 |
| Plant Biotechnology..... | 154 |
| Health Biotechnology..... | 155 |
| Molecular Genetics..... | 156 |
| Population Genetics..... | 157 |



Compulsory course

Fundamental Biology

| | |
|---|--|
| Module designation | : Fundamental Biology |
| Semester(s) in which the module is taught | : odd/I |
| Person responsible for the module | 1. Dr.Rike Oktarianti, MSi. 2. Dr.rer.nat. Kartika Senjarini, M.Si 3. Dr.rer.nat. Fuad Bahrul Ulum, S.Si. M.Sc 4. Purwatiningsih, S.Si., M.Si., Ph.D. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181.32hr a. lecture-Discussion: 107.67hr b. Laboratory work: 68 hr c. Case Project: 5.67 hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | - |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | This course describes concepts of fundamental biology: Describe the principal concept of cell structure and function, metabolite, DNA and mutation, genetic, evolution, Virus and Organism (structure and development), and Ecology. |
| Examination forms | a. Essay test (25%) b. Quiz (20%) c. Assignment case study (20%) d. Laboratory Work (35%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| | |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none">1. Cole, L.A., 2016. Biology of life: biochemistry, physiology and philosophy. Academic Press.2. Keeton and Gould. 1993. Study Guide Biological Science, Fifth Edition. W.W. Norton & Company, Inc. New York3. Reece, Jane B. & Meyers, Noel. & Urry, Lisa A. & Cain, Michael L. & Wasserman, Steven A. & Minorsky, Peter V. & Jackson, Robert B. & Cooke, Bernard J. & Campbell, Neil A. (2017). Campbell biology Eleventh Edition. Frenchs Forest, NSW Pearson4. Starr, C. 1994. Biology Concept and Applications. Wadsworth. California5. Wallace, R.A., G.P Sanders and R.J Ferl. 1997. Biology The Science of Life. Harper Collins College Publishers. New York.6. Solomon, E.P, L.R. Berg and D.W Martin. 2008. Biology Eighth Edition. Thomson Brooks/Cole. Canada |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Calculus

| | |
|---|--|
| Module designation | : Calculus |
| Semester(s) in which the module is taught | : odd/I |
| Person responsible for the module | : Dr. Firdaus Ubaidillah, M.Si. and team |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Project, Presentation, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181.32hr a. Lecture-Discussion: 45.32 hr b. Laboratory work 68 hr c. Case-method 68 hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO 2) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | This course describes concepts of calculus: including basic concepts of the real number system, absolute values, inequalities, functions and graphs, introduction of special functions (absolute functions, signum functions, and largest integer functions), limit functions, function continuity, derivatives (definitions, rules derivative search, composition function derivative, higher order derivative, implicit function derivative), derivative use (maximum and problems) minimum, maximum and relative minimum, draw advanced graphs, Mean Value Theorem), and define integrals. There are also implementation scientific methods for calculus research through a case-based Method by analyzing the research data presentation from updated references. |
| Examination forms | 1. Essay test (30%) 2. Practical course: Pre-test (5%); Final practical test (15%); Activity observation (10%); Equipment software/observation (5%); Progress report (10%); Final Report (15%); Report Presentation (10%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Varberg, D., Purcell, E., and Rigdon, S., 2015, Calculus, 9th, Wiley Publishing |



- | | |
|--|--|
| | <ol style="list-style-type: none">2. Stewart, J., 2016, Calculus: Early Transcendentals, 8th, Belmont: Thomson Higher Education3. Firdaus Ubaidillah, Ika Hesti Agustin, 2019, Kalkulus Fungsi Satu Peubah, Jember: UPT Percetakan dan Penerbitan Universitas Jember4. Book of Practical Guide |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



General Physics

| | |
|---|--|
| Module designation | : General Physics |
| Semester(s) in which the module is taught | : odd/I |
| Person responsible for the module | : Physics lecturers |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181.32hr a. Lecture-Discussion: 45.32 hr b. Laboratory work 68 hr c. Case-method 68 hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | |
| Module objectives/intended learning outcomes | Knowledge: able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | This course describes concepts of general physics: including quantities and measurements, simple error theory, presentation of measurement results, dimensional analysis, mechanics, oscillations and waves, thermodynamics, electricity and magnetism, light and optics, Electromagnetic Waves, and Ionizing Radiation. There are also implementation scientific methods for general physics research through a case-based Method by analyzing the research data presentation from updated references. |
| Examination forms | a. Essay test (25%) b. Per chapter quiz (35%) c. Project report (15%) d. Practical course (25%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Bauer, W. dan Westfall, G. D. (2011). University Physics with Modern Physics. New York (US): McGraw -Hill Companies, Inc. 2. Bloomfield, L. A. (2013). How Things Work, The Physics of Everyday Life; 5th Edition. New Jersey (US): John Wiley & Sons, Inc. 3. Cutnell, J. D. & Johnson. K. W. (2012). Physics; 9th Edition. New Jersey (US): John Wiley & Sons, Inc. |



| | |
|--|---|
| | <ol style="list-style-type: none">4. Giancoli, D. H. (2014). <i>Physics Principles with Applications</i>; 7th Edition. Boston: Pearson Education, Inc.5. Giambattista, A., Richardson, B. M., dan Richardson, R. C. (2010). <i>Physics</i>. New York: McGraw -Hill.7. Glencoe Science. (2005). <i>Physics; Principles and Problems</i>. Columbus: Glencoe/McGraw -Hill.8. Serway, R. A. & Vuille, C. (2017). <i>College Physics</i>; 12th Edition. Boston: Cengage Learning.9. Sudarti & Singgih Bektiarso, 2020, <i>Fisika Radiasi</i>, Jember University Press.10. Walker, J., Halliday, D., dan Resnick, R. (2014). <i>Fundamentals of Physics</i>; 10th Edition. New York: John Wiley & Sons Inc.11. <i>Book of Practical Guide</i> |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Basic Chemistry

| | |
|---|---|
| Module designation | : Basic Chemistry |
| Semester(s) in which the module is taught | : odd/I |
| Person responsible for the module | : Chemistry lecturer |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation, Practical course |
| Workload (incl. contact hours, self-study hours) | Estimated) Total workload: 181.32hr a. lecture-Discussion: 40hr b. Practical course: 45.3 hr c. Project: 28.8hr d. Presentation: 19.2hr e. Private study: 48hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | This course describes concepts of fundamental chemistry: including the principal concept of material and energy, stoichiometry, atom structure and molecule, form of substance, chemistry kinetics, chemical equilibrium, solution chemistry, electrochemistry, nuclear chemistry and radioactivity, and environmental chemistry. There are also implementation scientific methods for basic chemistry research through a case-based Method by analyzing the research data presentation from updated references. |
| Examination forms | a. Essay test (25%) b. Per chapter quiz (35%) c. Project report (15%) d. Practical course (25%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none">1. Sastrohamidjojo, H., 2018. Kimia dasar. UGM PRESS. Brady, James E. 2014. Chemistry 7th Edition. New York: Wiley and Sons2. Chang, Raymond. 2015. General Chemistry 12th Edition. New York: Mc Graw Hill3. Silberbeg M. 2012. Principles of General Chemistry. New York (US): McGraw-Hill Education4. Sumardjo, D., 2009. Pengantar Kimia Buku Panduan Kuliah Mahasiswa Kedokteran. EGC. |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Religion Education: Islamic

| | |
|---|---|
| Module designation | : Islamic education |
| Semester(s) in which the module is taught | : even/I |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr lecture-Discussion: 56.66hr Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | To improve the students' skills and competences in Islamic education, this course covers the principal of Islamic pillars and the principal of faith pillars. This course encourages the students to internalize the Islamic principle for their faith and their daily activities as students and as part of society. The course also explains the history of Islam and the application of Islamic religion in society manners. |
| Examination forms | a. Mid test (25%) b. Final test (25%) c. Observation evaluation (30%) d. Presentation evaluation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Qurah, Husein Sulaiman, 1977, al-Ushûl al-Tarbawiyah fi Binâ al-Manâhij, Cairo: Dar al-Maarif 2. Sabiq, Sayid. (1990), Akidah Islam, (terjemahan), Bandung: Diponegoro. Cetakan kesepuluh. 3. Sabiq, Sayid, 2006, Fiqh al-Sunnah, Beirut: Dar al-fikr, juz III 4. Al-Nahlawi, Abdurrahman. (1989). Prinsip-prinsip dan Metoda Pendidikan Islam. terjemahan Herry Noer Ali. Bandung: CV Diponegoro. 5. Ohan Sudjana, (1994) , Fenomena Akidah Islam Berdasarkan Qur'an dan sunnah, Jakarta: Meida Dakwah 6. Ansari, Ali, (2003). Tasawuf dalam Sorotan Sains Modern, Bandung: Pustaka Hidayah. 7. Din Syamsudin, (2002), Etika Agama dalam Membangun Masyarakat Madani, Logos, Jakarta. 8. Husien, Machsun. (1985). Pendidikan Islam dalam Lintasan Sejarah. Yogyakarta: Nur Cahya. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
 = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Catholic

| | |
|---|---|
| Module designation | : Catholic Religion |
| Semester(s) in which the module is taught | : even/I |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialization |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 56.66hr Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | In order to improve understanding of the basic concepts of Catholic religion and students' competences in building cooperation with people of the others religions, this course covers: the definition and terminology Catholic religion, basic human problems and human as God' image, human dignity, religious pluralism and inter-religious harmony, the Bible: A source for knowing the life and work of Jesus Christ, overview of the universal Church and Indonesian Church (local) |
| Examination forms | a. Mid test (25%) b. Final test (25%) c. Observation evaluation (30%) Presentation evaluation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Crossway Bibles. 2011.The Holy Bible, English Standard Version.Crossway Publisher. 2. Dixon, Thomas M. 2009.Science and Religion: A very short Introduction.Oxford University Press: International Society for Science and Religion. 3. Wayne Grudem. 2014.Bible Doctrine: Essensial Teaching of the Christian Faith.Zondervan Publisher. |



- | | |
|--|---|
| | <ol style="list-style-type: none">4. John. F.A. Sawyer.2006. The Bible and Culture. Wiley-Blackwell Publisher5. Alfra Siauwarjaya, Th. Huber SJ. Mengena Iman Katolik. Jakarta, Obor, 1987 <p>Franz Magnis Suseno, SJ. Gereja Katolik Indonesia Menjelang Tahun 2000. Tantangan dan Harapan, dalam Spektrum XXVIII: 2 (2000)</p> |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Christian

| | |
|---|---|
| Module designation | : Christianity |
| Semester(s) in which the module is taught | : even/I |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr lecture-Discussion: 56.66hr Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | In order to improve understanding of the basic concepts of Christian faith and students competences in caring for the others, this course covers: teaching the Bible about God (God's existence Trinity of God, God's Providence), Christ's work of salvation in life (Man as a created person, the fall into sin, Christ's saving work, application in life), biblical self-image (factors supporting self-image, criteria and causes of self-image unhealthy, healthy and biblical self-image), proper Christian ethics on various moral issues (definition of Christian ethics, ethical decision making, Christian moral attitudes towards various moral issues), the relationship between Christian faith and science and technology, culture, politics, and law (Relation of Christian faith with science and technology, relationship of Christian faith with culture, politics, and law), religious harmony in society (factors driving pluralism, three models of theological views of religions, religious pluralism according to the Bible), and attitudes and actions as Christians who are involved in the community (service to the community) |
| Examination forms | a. Mid test (25%) b. Final test (25%) c. Observation evaluation (30%) Presentation evaluation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Wayne Grudem. 2014. Bible Doctrine: Essential Teaching of the Christian Faith. Zondervan Publisher 2. William Lande Craig. 2008. Reasonable Faith: Christian Truth and Apologetics. Crossway Books Publisher. 3. Philip Graham Ryken & James Montgomery Boice. 1973. Is Jesus the Only Way?. Crossway Publisher 4. James Montgomery Boice. 1993. Amazing Grace The Meaning of God's Grace — And How It Can Change Your Life. Tyndale House Pub Publisher. 5. Lase, Jason (ed.). Pendidikan Agama Kristen. Bandung: Bina Media Informasi, 2005.. <p>Hadiwijono, Harun. 1973. Iman Kristen. Jakarta BPK Gunung Mulia.</p> |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
 = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Hinduism

| | |
|---|--|
| Module designation | : Hinduism education |
| Semester(s) in which the module is taught | : even/I |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 56.66hr b. Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | The Hindu Religious Education course discusses and explores materials with the substance of human relations with Hyang Widhi (God who is God). Maha Esa) for increasing faith and piety (Sraddha and bhakti); human relations with fellow humans in building a civilization that humanist; as well as human relations with their environment in realizing prosperity (jagadhita), so as to be able to form Hindu and spiritual people Indonesian human beings who are independent, final practical testble and caring. |
| Examination forms | a. Mid test (25%) b. Final test (25%) c. Observation evaluation (30%) d. Presentation evaluation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Singer, Wayan, 2012. Tattwa (Ajaran Ketuhanan Agama Hindu, Surabaya, Paramita 2. Tim Penyusun, 1997, Pendidikan Agama Hindu Untuk Perguruan Tinggi, Hanuman Sakti 3. Wiana, 1994, Bagaimana Hindu Menghayati Tuhan, Manik Geni. 4. Wiana, 1982, Niti Sastra, Ditjen Hindu dan Budha. 5. Titib, 1996, Veda Sabda Suci Pedoman Praktis Kehidupan, Paramita. 6. Pudja, 1997, Teologi Hindu, Mayasari |



Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Buddhism

| | |
|---|---|
| Module designation | : Buddhism education |
| Semester(s) in which the module is taught | : even/I |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 56.66hr b. Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | : Buddhist education is an effort to produce Indonesian people who are able to understand, live, and practice/apply the Dharma in accordance with the Teachings The Buddha contained in the Tipitaka/Tripitaka Scriptures so that he becomes a human who is final practical testble (according to Dharma principles) in daily life. |
| Examination forms | a. Mid test (25%) b. Final test (25%) c. Observation evaluation (30%) d. Presentation evaluation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|---------------------|---|
| <p>Reading list</p> | <ol style="list-style-type: none"> 1. Pokok-Pokok Dasar Agama Buddha Mulyadi Wahyono,SH. Jakarta Tahun 2002. 2. Tim Penyusun. 2003. Materi Kuliah Sejarah Perkembangan Agama Buddha CV.Dewi Kayana Abadi Jakarta. 3. Abhidhammattha Sangaha ,Penyusun Pandit Jinaratana Kaharudin. Cetakan Pertama Tahun 2005. 4. Dhammapada Sabda-Sabda Buddha Gotama, Kemenag Bimas Buddha Jabar Tahun 2011 5. Dhammapada Atthakatha, Pustaka Narada Jakarta 2007 3. Itivuttaka, Kitab Suci Agama Buddha, diterbitkan oleh Lembaga Anagarini Indonesia Tahun 2007 6. Riwayat Buddha Gotama, Penerbit Lembaga Pengkajian Dan Pengembangan Keagamaan Buddha Indonesia, Tahun 2010 7. Kapita selekta Agama Buddha, Tim Penyusun Penerbit CV.Dewi Kayana Abadi Jakarta 2003 8. Agama Buddha dan Ilmu Pengetahuan, DR.Buddhadasa P. Kirthisinghe, Tahun 2004 |
|---------------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
 = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



English

| | |
|---|---|
| Module designation | : English |
| Semester(s) in which the module is taught | : odd/I |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 56.66hr b. Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | This course covers the ability to write and communicate scientifically, especially about biology using English. There are four basic English skills that are included, namely reading, listening, speaking, and writing. The materials are include to understand the meaning of speech, to deliver ideas/ideas, to speak, to distinguish nouns, verbs, adjectives, and adverbs, to use basic grammar, to recognize various kinds of paragraphs in English, and to write paragraphs in English with good grammar. The grammar covers conceptual knowledge of present and past tense, progressive and perfect; future tenses; passive voice; reading comprehensions; adjective clauses; noun closes; gerunds and infinitives; quoted and direct speeches. |
| Examination forms | a. Mid test (30%) b. Final test (40%) c. Observation evaluation (30%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none">1. Yuliani, Marta. 2008. Let's Study Passive and Active Sentences. Bandung: Pakar Raya2. Dwi, Elan W. 2009. Modern English Grammar. Yogyakarta: Pustaka Pelajar3. Hartono, John Surjadi. 2008. Tata Bahasa Bahasa Inggris (English Grammar). Surabaya: Penerbit Indah4. Aziz, E. Aminudin. 2003. Cultured Based English For College Students. Grasindo: Jakarta5. Ann Cook. 2000. American Accent Training: A Guide to Speaking and Pronouncing Colloquial American English, Barrons.6. Harry Collins. 1987. 101 American English Idioms: Understanding and Speaking English Like an American , Passport Books. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Indonesian

| | |
|---|---|
| Module designation | : Indonesian |
| Semester(s) in which the module is taught | : odd/II |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 56.66hr b. Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | In order to improve the students' skills and competences in Indonesian scientific written and oral communication, this course covers a variety of standard written communication based on standard Indonesian grammar and Indonesian spelling. It includes understanding the position and function of the Indonesian language; words and word formation, sentence concept, paragraph formation, characteristics of academic texts and non-academic texts so students are able to build academic texts independently; and book review text. This course encourages the students to apply direct quotations and indirect quotations in writing scientific papers, writing a bibliography from various references, understanding types of scientific work and systematics of scientific work, writing research reports based on observations, and editing language errors in writing scientific papers. Each theory and applying the Indonesian language material in an integrated manner, so that it has a positive impact on the formation of attitudes and behavior as an educated society; writing various standard written communications, especially in writing scientific papers. |
| Examination forms | Mid test (25%), Final test (25%), Observation evaluation (30%), Presentation evaluation (20%) |
| Study examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. Alwasilah C. dan Yahya, S. 2015. Dasar-dasar Teori Linguistik. Bandung: CV Tunas Putra Bandung. 2. Badan Pengembangan Bahasa Indonesia. 2015. Pedoman Umum Ejaan Bahasa Indonesia. Jakarta: Badan Pengembangan dan Pembinaan Bahasa. 3. Chaer, Abdul. 2012. Seputar Tata Bahasa Baku Bahasa Indonesia. Jakarta: Rineka Cipta. 4. Chaer, Abdul. 2012. Linguistik Umum. Jakarta: Rineka Cipta. 5. Chaer, Abdul. 2013. Pembinaan Bahasa Indonesia. Jakarta: Rineka Cipta. 6. Chaer, Abdul. 2013. Pengantar Semantik Bahasa Indonesia. Jakarta: Rineka Cipta. 7. Chaer, Abdul. 2015. Filsafat Bahasa. Jakarta: Rineka Cipta. 8. Badan Pengembangan dan Pembinaan Bahasa kementerian Pendidikan dan Kebudayaan. 2016. Pedoman Umum Ejaan Bahasa Indonesia (PUEBI). Jakarta: Badan Pengembangan dan Pembinaan. 78pp 9. Junaiyah H. Matangi & E. Zaenal Arifin. 2014. Analisis Kesalahan Berbahasa Indonesia. Tangerang: Pustaka Mandiri. 10. Nurwardani P, dkk. 2016. Bahasa Indonesia untuk Perguruan Tinggi. Jakarta: Direktorat Jenderal Pembelajaran dan Kemahasiswaan Kementerian Riset Teknologi dan Pendidikan Tinggi. |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
 = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Civic Education

| | |
|---|---|
| Module designation | : Civic Education |
| Semester(s) in which the module is taught | : even/II |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 56.66hr b. Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | This course discusses some of the mandatory basic materials regarding the concepts in citizenship education and is able to identify problems that are developing, and can work together as an effort to change behavior in accordance with the personality of the Indonesian nation and norms in accordance with the 1945 Constitution and Pancasila, and show it directly in everyday life |
| Examination forms | a. Mid test (25%) b. Final test (25%) c. Observation evaluation (30%) d. Presentation evaluation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. UUD 1945 pasca amandemen 2. Ismatullah (2012). Pendidikan Pancasila dan Kewarganegaraan. Bandung. CV. Pustaka Setia 3. Kaelan dan Zubaidi (2010), Pendidikan Kewarganegaraan, Yogyakarta: Paradigma 4. Winarno (2013), Paradigma Baru Pendidikan Kewarganegaraan, Jakarta: PT. Bumi Aksara 5. Tim Nasional Dosen Pendidikan Kewarganegaraan (2010). Pendidikan Kewarganegaraan Paradigma Baru untuk Mahasiswa, Bandung: Alfabeta 6. Sholihudin dkk, Merevitalisasi Pendidikan Pancasila Sebagai Pemandu Reformasi, Surabaya: IAIN Sunan Ampel Press 7. Syahri (2013), Paradigma Kewarganegaraan, Malang: UMM Press 8. Ridwantono (2007), Pendidikan Kewarganegaraan Republik Indonesia, Malang: Bayumedia 9. Rozak dan Ubaedillah (2013), Pancasila, Demokrasi, HAM dan Masyarakat Madani, Jakarta: ICCE UIN 10. 10.Bakry (2010), Pendidikan Pancasila, Yogyakarta: Pustaka Pelajar |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Pancasila Education

| | |
|---|--|
| Module designation | : Pancasila Education |
| Semester(s) in which the module is taught | : odd/II |
| Person responsible for the module | : Team Teaching General Courses |
| Language | : Indonesian |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture-Discussion: 56,66 hr b. Presentation: 19.2hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Competence: Able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | This course describes concepts of Pancasila in the perspective of the History of the Indonesian Nation; Pancasila as the State Foundation of the Republic of Indonesia; Pancasila as the Ideology of the Republic of Indonesia; Pancasila as a system of ethics, and Pancasila as the basis for the development of science. This course applies the Pancasila knowledge in an integrated manner, so that it has a positive impact on the formation of attitudes and behavior as an educated society. |
| Examination forms | a. Mid test (25%) b. Final test (25%) c. Observation evaluation (30%) d. Presentation evaluation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Armaidly Armawi, Geostrategi Indonesia, Jakarta, Direktorat jenderal Pendidikan Tinggi, 2006 2. Azyumardi Azra, paradigma Baru Pendidikan Nasional dan Rekonstruksi dan Demokratisasi, Penerbit Kompas, Jakarta, 2002 3. Bahar, Dr. Saefudin, Konteks Kenegaraan, Hak Asasi Manusia, Pustaka Sinar Harapan, Jakarta, 2000. 4. Ir. Sukarno, editor H Amin Arjoso, SH Tjamkan Pancasila Dasar Falsafah Negara”, Jakarta, Penerbit Panitia Nasional Peringatan Lahirnya Pancasila 1 Juni 1945 – 1 Juni 1964 |



| | |
|--|--|
| | <ol style="list-style-type: none">5. Slamet Soemiarno, Geopolitik Indonesia, Jakarta, Direktorat Jenderal Pendidikan Tinggi, 20066. Magnis-Suseno, Etika Politik: Prinsip-prinsip Moral Dasar Kenegaraan Modern, Jakarta, Penerbit Gramedia Pustaka Utama |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Introduction to Environmental Science

| | |
|---|---|
| Module designation | Introduction to Environmental Science |
| Semester(s) in which the module is taught | odd/III/V |
| Person responsible for the module | <ol style="list-style-type: none"> 1. Dra. Hari Sulistiyowati, M.Sc, Ph.D 2. Dr. Dra. Retno Wimbaningrum, M.Si. 3. Rendy Setiawan, S.Si, M.Si. 4. Arif Mohammad Siddiq, S.Si., M.Si. 5. Dr. Sattya Arimurti, SP, M.Si 6. Drs. Rudju Winarsa, MKes. 7. Drs Siswanto, M.Si. |
| Language | English |
| Relation to curriculum | Compulsory / elective / specialisation |
| Teaching methods | lecture - Discussion, Case-Based Methods, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr lecture- Discussion: 39.67 hr Case study Report (Case study, Presentation, and Poster): 51.00 hr |
| Credit points | 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | - |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2)</p> <p>Competence:</p> <ul style="list-style-type: none"> ● Able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) ● Able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach (LO5) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO7) |
| Content | <p>This course discusses the components of Environmental Introduction including abiotic, biotic, and social factors, the type of environmental health, water, air, soil, sanitation, food processing industries, principal of environmental ethics, environmental changes by time, growth population of human and consumption Lifestyle. This course also implementation scientific methods for the introduction of environmental sciences through Case-Based Method by reviewing the article and video of global environmental problem, a regional environmental problem, the pressure on natural sciences, and pollution which related to World attention to environmental problems, Environmental Management, and MDgs-SDGs</p> |
| Examination forms | a. Essay test and Discussion interactive participation (30%) |



| | |
|------------------------------------|--|
| | b. Case study : Report (30%), Presentation (20%), Poster (20%) |
| Study and examination requirements | Passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Cunningham, W.P. 1999. Environmental science: a global concern. Fifth Ed. The McGraw-Hill Company, Inc. California. 2. Johnsen I, Jorgensen SE. 1989. Principles of Environmental and Science Technology. Amsterdam (ND): Elsevier Science 3. Miller, G.T.J. 1998. Living in the environment, principles, connections, and solutions. Tenth Ed. Wadsworth Publishing Company. New York. 4. Zulkifli, A. 2014. Dasar-dasar ilmu lingkungan. Salemba Teknika. Jakarta. 5. Government Regulation on the Environment and other supporting sources |

Credits to ECTS conversion formula $2 \text{ SKS TM} = 50\text{min T} + 60\text{min TS} + 60\text{min M}$ (170 minutes) x 16 weeks = 90.67 Hours. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Introduction to Entrepreneurship

| | |
|---|--|
| Module designation | : Introduction to Entrepreneurship |
| Semester(s) in which the module is taught | : odd/IV |
| Person responsible for the module | 1. Dr. Hidayat Teguh Wiyono, M.Pd. 2. Dr. Esti Utarti, M.Si. |
| Language | : Indonesian |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 56.66hr b. Presentation: 34.00hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : - |
| Module objectives/intended learning outcomes | Competence: <ul style="list-style-type: none"> • Able to internalize norms and ethics based on Pancasila in working independently or in groups (LO 1) • Integrate knowledge, skills and social and methodological capacities in working or learning situation to Entrepreneurship for sustainable resources (LO 4) |
| Content | This course studies and discusses Entrepreneurship and Entrepreneurship, Building Dreams and Pursuing Dreams, Motivating Yourself, Identifying and Selecting New Business Opportunities, Business Communication, Creativity and Innovation, Establishing Superior Products and Innovation Management, Personal Finance Management, Business Finance Management, Performance Evaluation, Measuring Potential Entrepreneurship, New Business Plan. |
| Examination forms | a. Mid test (25%) b. Final test (25%) c. Observation evaluation (30%) d. Presentation evaluation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Dedy Takdir, Mahmudin AS, Sudirman Zaid, 2015, Penerbit Wijana Mahasi Karya Yogyakarta 2. Rusdiana, 2018. Kewirausahaan, Teori dan Praktek. CV Pustaka Setia. Bandung |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Occupational Safety and Health

| | |
|---|--|
| Module designation | : Occupational Safety and Health |
| Semester(s) in which the module is taught | : even/IV |
| Person responsible for the module | : 1. Dra. Hari Sulistiyowati, MSc., PhD. 2. Dr. Drs. Sutoyo, MSi. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Laboratory/Field Work , Case study |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66 hr a. lecture- Discussion: 34.00hr b. Case study: 28.33 hr c. Presentation: 28.33 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental biology, basic chemistry, general physic |
| Module objectives/intended learning outcomes | <p>Knowledge: able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2)</p> <p>Competence:</p> <ul style="list-style-type: none"> • able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) • able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach (LO5) |
| Content | This course describe and analyze principles of occupational safety and health (OSH) including: Scope of OSH (OSH and OHS Management System, OHS Audit, Accident, Hazard, Risk Management, Ergonomics); Environmental Conditions and Pollution Limits; Hazardous Materials; Personal Protective Equipment and Clothing; Occupational health and disease; Fires, emergency conditions and their mitigation; Estimation of the dangers of the condition of a building; Safety of Equipment Operations and Installations |
| Examination forms | a. Observation evaluation of teamwork (25%) b. Essay test (25%) c. Case study report (30%) d. Presentation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none">1. Redjeki. S. 2016. Kesehatan dan Keselamatan Kerja. Jakarta: Pusdik SDM Kesehatan. 235pp2. Friend, M. A. and J. P. Kohn. 2007. Fundamentals of occupational safety and health 4th ed. Maryland: Government Institutes. 506pp3. Schneid, Thomas D. and L. Collins. 2001. Disaster management and preparedness. USA: CRC Press LLC. 264pp ISBN-13: 978-0-86587-171-74. Roughton, J. and N. Crutchfield. 2016. Job Hazard Analysis A Guide For Voluntary Compliance and Beyond. USA: Elsevier Inc. 480pp5. Arezes, P. M. ,M. P. Barroso, P. Cordeiro, R. B. Melo, J. S. Baptista, P. Carneiro, N. Costa, A. S. Miguel, and G. Perestrelo (Editors). 2019. Occupational and Environmental Safety and Health. Switzerland: Springer Nature. 765pp6. Related Scientific Article Journals or Webscience |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Community Services Training

| | |
|---|--|
| Module designation | : Community Service Training |
| Semester(s) in which the module is taught | : odd/VI-VII |
| Person responsible for the module | Dr. Esti Utarti, S.P., M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Project/ Laboratory /Field Work, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136 hr Honesty: 25.5 hr; Work plan preparation: 17 hr; Realisation of activities: 45.33 hr; Discipline: 11.33 hr; Attitude: 25.5 hr; Article: 11.33 hr |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Total credit has taken \geq 110 |
| Module objectives/intended learning outcomes | <p>Skills: Able to implement biological concepts in laboratory work and/or field studies independently and/or in groups (LO 6)</p> <p>Competence:</p> <ul style="list-style-type: none"> ● Able to internalize norms and ethics based on Pancasila in working independently or in groups (LO 1) ● Able to integrate knowledge, skills and social and methodological capacities in working or learning situation for the biological resources management and commercial products development in tropics (LO 4) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course offers students to determine their own program to be carried out with a choice of thematic options for the Community Service Program as follows: 1. Covid-19 Prevention Humanitarian Program; 2. Community Entrepreneurial Empowerment Program/MSMEs Affected by Covid-19; 3. Technology/Information Innovation Activity Program in Handling Covid-19; 4. BUMDES/Village Government Empowerment Program in Strengthening Village Social Safety Networks During the Covid-19 Pandemic; and 5. Learning Innovation Programs, Especially Elementary and Middle School Children Affected by Covid-19. This course offers a scientific method that covers discussion of a problem or topic that is presented systematically and comprehensively equipped with a literature study, and contains elements of analysis and synthesis under the guidance of Advisor. It continues to gather data collection for research or internships; work on data analysis, processing, and interpretation; analyze |



| | |
|------------------------------------|--|
| | the result and make a report and give a seminar; and then write a draft final report and defend the report in the final exam. At the end of the course, the student has to make a final report and scientific article to be published. |
| Examination forms | Program planning (25%); Field activities (30%) ;Report (30%); Presentation (15%); Proposal document and seminar: 30%; Result Report and Seminar: 20%;Draft Final Report and Oral Exam: 50% |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Back To Village KKN Guidelines 2. Covid-19 Volunteer Community Service Guidelines |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Microbiology

| | |
|---|---|
| Module designation | : Microbiology |
| Semester(s) in which the module is taught | : Even/II |
| Person responsible for the module | 1. Dr. Drs. Sutoyo, M.Si., 2. Dr. Esti Utarti, S.P., M.Si., 3. Dr. Sattya Arimurti, S.P., M.Si., 4. Drs. Rudju Winarsa, M.Kes., 5. Drs. Siswanto, M.Si., 6. Dr. Kahar Muzakhar, S.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory/ elective /specialization |
| Teaching methods | : Lecture- Discussion, Practice-lab works, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136 hr a. Lecture-Discussion: 22.67 hr b. Case study: 68 hr c. Laboratory work: 45.33 hr |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) Competence: Able to internalize norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | This course describes microbial diversity: Describe microbial cell structure, diversity of microorganisms both prokaryote or eukaryote, and utilization of microbial diversity in various fields. |
| Examination forms | a. Essay test (15%) b. Assignment or quiz (5%) c. Case study (60%) d. Practical work (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none">1. Cappuccino, J.G. and Welsh, C. 2020. Microbiology: A Laboratory Manual. Pearson.2. Kim, B.H and G.M. Gadd. 2008. Bacterial Physiology and Metabolism. Cambridge University Press. Cambridge3. Madigan, M.T, J.M Martinko and J. Parker. 2019. Biology of Microorganisms. Prentice-Hall.4. Brenner, D.J., N. R. Krieg and J.T. Staley. Bergey's Manual of Systematic Bacteriology 2nd edition part A. Springer.5. Brenner, D.J., N. R. Krieg and J.T. Staley. Bergey's Manual of Systematic Bacteriology 2nd edition part B. Springer. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Plant Structure

| | |
|---|---|
| Module designation | : Plant Structure |
| Semester(s) in which the module is taught | : odd/II |
| Person responsible for the module | 1. Dra. Dwi Setyati, MSi., 2. M. Su'udi, PhD. 3. Dr.rer.nat. Fuad Bahrul Ulum, S,Si. M.Sc |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181.32hr a. lecture-Discussion: 90.66 hr b. Practical course: 45.3 hr c. Project (Booklet): 45.33 hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental of Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) |
| Content | This course describes concepts of plant structure of morphology: vegetative organs (root, stem, leaf) and generative organs (flower, fruit and seed) and anatomy: Cytology, Histology, Organology of non-vascular and vascular plants: Vegetative organology (root, stem and leaf), and Generative organology (flower, fruit and seed). 3.Secondary growth and stem annual ring. There are also implementation scientific methods for Plant structure through a Project-based Method by observing the morphological characteristics of plants around campus then the result will be made as a booklet. Laboratory works cover: equipment handling for examining the vegetative and generative organs, plant collection technique for morphological examination, making plant semi-permanent microscope slides, observing and examining the anatomical structure Using optilab and Microsoft excel for to measure the distribution and density of stomata per unit area |
| Examination forms | Essay test (35%), Quiz (15%), Project report (25%), Practical course (25%) |
| Study and examination requirements | : <i>passing grade 70% Requirements for successfully passing the module</i> |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none">1. Bell, D.A. and A. Bryan.1991. Plant Form An Illustrated Guide to Flowering Plant Morphology. Oxford University Press. New York.2. Dickison, W.G. 2000. Integrative Plant Anatomy. Academic Press. London3. Fahn,A. 1992. Anatomi Tumbuhan (Terjemahan) Gadjah Mada University Press. Yogyakarta.4. Pandey, B.P. 1982. Plant Anatomy. Third Edition. S. Chand dan Co. Ltd. London.5. Tjitrosoepomo, G. 1994. Morfologi Tumbuhan. Gadjah Mada University Press. Yogyakarta. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Animal Structure

| | |
|--|--|
| Module designation | : Animal Structure |
| Semester(s) in which the module is taught | : even/II |
| Person responsible for the module | 1. Dra. Susantin Fajariyah, M.Si 2. Eva Tyas Utami, S.Si. M.Si 3. Husnatun Nihayah, S.Si, M.Biomed |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Practical course, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181.4 hr a. lecture-discussion: 93.5hr b. Laboratory work: 45.3 hr c. Case Study: 42.5hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) |
| Content | This course describes principal concepts of animal structure: animal cell structure and basic tissue (epithelium, connective, muscle, nerve), digestive system (digestive tract and glands), reproductive system, endocrine system, respiratory system, circulation system, integumentary system, urinary system, muscular and skeletal system, and nervous system. |
| Examination forms | a. Essay test (40%) b. Quiz (5%) c. Presentation base on Case Study: (20%) d. Laboratory work (35%): |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Eroschenko, V. P. 2008. diFiore's Atlas of Histology With Functional Correlations. 11th ed. Lipincott William & Wilkin, Philadelphia. 2. Hickman CP, Roberts LS, Keen SL., Larson A. 2008. Integrated Principles of Zoology. 14th edition. The Mc. Graw Hill education. New York 3. Linzey, D.W. 2012. Vertebrate Biology. 2nd edition. The John Hopkins University Press. Baltimore. 4. Mescher A.L. 2016. Junquiera's Basic Histology. 14th edition. Mc. Graw Hill ed. Lange. New York |



| | |
|--|---|
| | 5. Treuting, P. M., S.M. Dintzis dan K.S. Montine. 2012. Comparative Anatomy and Histology Mouse, Rat and Human Atlas. 2nd ed. Amerika: Academic Press. |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Cell Biology

| | |
|---|--|
| Module designation | : Cell Biology |
| Semester(s) in which the module is taught | : Even/II |
| Person responsible for the module | 1. Dr. Esti Utarti, S.P., M.Si., 2. Dra. Mahriani, M.Si., 3. Syubbanul Wathon, S.Si., M.Si., 4. Dr. Drs. Sutoyo, M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90,67 hr a. lecture-Discussion: 45,33 hr b. Practical-course (case method): 45.33 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Competence: able to internalise norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | This course describes the structure of prokaryotic cells and eukaryotic cells and the characteristics of the organelles that make up the cell which include structure and function of cell membrane, cytoskeleton, ribosome, endoplasmic reticulum. golgi apparatus, lysosome, peroxisome, mitochondria, chloroplast and nucleus, cell cycle and cell division, and cell communication There is also presentation of structure and function of the cell organelles, in groups or teamwork |
| Examination forms | a. Essay test (30%) b. Assignment or quiz (20%) c. Presentation (50%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Albert, B., A. Johnson, J. Lewis, M. Raff, K. Roberts and P. Walter. 2008. Molecular Biology of The Cell. Fifth Edition. Garland Science. New York. 2. Cooper, G.M. 2019. The Cell, A Molecular Approach. Eighth Edition. Sinauer Associates. New York. 3. Campbel, N.A, J.B Reece And L.G Mitchell. 1999. Biology Fifth Edition,.An Imprint of Addison Wesley Longman Inc. California. |



| | |
|--|--|
| | <ol style="list-style-type: none">4. Fitzpatrick, B. 2011. Cell, the Building Block of Life. Yurchak Printing. Lansville.5. Pollard, T.D, W.C. Earnshaw, J.L. Schwartz, and G.T. Johnson. 2017. Cell Biology. third edition. Elsevier. Philadelphia |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Biochemistry

| | |
|---|--|
| Module designation | : Biochemistry |
| Semester(s) in which the module is taught | : Even/II |
| Person responsible for the module | 1. Prof. Dr. Ir. Bambang Sugiharto, DagrSc., M.Agr. 2. Dr. Kahar Muzakhar, S.Si., 3. Dr. Sattya Arimurti, S.P., M.Si., 4. Dr. Esti Utarti, S.P., M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Practice-lab works |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136 hr a. lecture-Discussion: 90.67 hr b. Practical-course (case method): 45.33 hr |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Basic Chemistry and Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) |
| Content | This course is describe water and its interactions in solution and the biological environment of organisms; structure and functions of carbohydrates, amino acids, peptides, protein, vitamins and nucleotides; enzymes and their kinetics, bioenergetics and types of biochemical reactions, glycolysis, gluconeogenesis, and the pentose phosphate pathway, citric acid cycle, oxidative phosphorylation and photophosphorylation, the flow of genetic information within biological system (genetic dogma), genetic expression and its regulation, basic principles of DNA recombination. This course is also supported by practical activities in the Biotechnology laboratory There is also implementation of biological concepts in laboratory work and/or field studies independently and/or in groups through practical works laboratories . It assigned in individual or teamwork covering 1) glucose assay using dinitrosalicylic colorimetric method, 2) sucrose assay using resorcinol method, 3) lipid total assay using Bligh-Dyer Method, 4) Protein assay using Bradford method, 5) protein separation and analysis using SDS-PAGE, 6) invertase and nitrate reductase assay, 7) DNA quantification using spectrophotometry method, 8) DNA electrophoresis |



| | |
|------------------------------------|---|
| | analysis, Data analysis using Microsoft Excel and Primer Software for examination concentration of glucose, sucrose, protein, lipid , and enzyme activity, 8) Results and Discussion of practical laboratory activities. |
| Examination forms | <ul style="list-style-type: none"> a. Essay test (40%) b. Assignment or quiz (10%) c. Scientific Article of the project including data analysis (software application) (20%) d. Practical work (30%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Ahern K. 2019. Biochemistry and Molecular Biology. The Great Courses. USA. 2. Berg, J.M., J. L. Tymoczko, & L. Stryer. 2002. Biochemistry 5th ed. W.H Freeman & Company. 3. Nelson, D.L. & M.M., Cox. 2017. Lehninger Principles of Biochemistry. 7th ed. W.H Freeman & Co. New York 4. Snyder, L., J.E. Peters, T.M. Henkin, & W. Champness. 2013. Molecular Genetics of Bacteria 4th edition. ASM Press. Washington DC. 5. Watson, J.D., A. Gann, T.A. Baker, M. Levine, S. P. Bell, and R. Losick. 2013. Molecular Biology of The Gene. Pearson. London. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Plant Development

| | |
|---|---|
| Module designation | : Plant Development |
| Semester(s) in which the module is taught | : odd/III |
| Person responsible for the module | 1. Dr.rer.nat. Fuad Bahrul Ulum, S.Si. M.Sc 2. Dra. Dwi Setyati, MSi., 3. M. Su'udi, PhD. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136 hr a. lecture-Discussion: 34 hr b. Project with practical course: 34 hr c. Case method: 34 hr |
| Credit points | : 3 credits or 4.53ECTS |
| Required and recommended prerequisites for joining the module | : Plant Structure |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | The course covers the developmental process in the plant, i.e., Plant life cycle, the development of gametophytes and sporophytes of Bryophytes, Pteridophytes, Gymnosperms, and Angiosperms, also asexual reproduction (Apomixis) in Angiosperms. The course implements scientific methods with project-based learning by observing the phenology of plants in the Campus area and the stages of germination, growth and development of Bryophytes, Pteridophytes, Monocots, and Dicots. It also applies Case-based methods where the students write a resume from a selected scientific article with topics on Embryo sac variations in Angiosperms and the application of Biotechnology in Plant development research. Then Student presented the resume in the form of PowerPoints presentation in Class. |
| Examination forms | Essay test (10%); Quiz (10%); Project-based methods with practical work (60%); Case methods (20%) |
| Study and examination requirements | : passing grade 70% |
| Reading list | 1. Beck, C.B., 2010. An introduction to plant structure and development: plant anatomy for the twenty-first century. Cambridge University Press. |



| | |
|--|---|
| | <ol style="list-style-type: none">2. Leyser, O., & Day, S. 2009. Mechanisms in plant development. John Wiley & Sons.3. Pandey, B.P. 1995. Embryology of Angiosperms (for Degree, Honors and Posgraduate Student). S.Chand& Company LTD: New Delhi.4. Srivastava, K.C., B.S. Dattatreya, A.B. Raizada. 1977. Vikas Handbook of Botany. Vikas Publishing House PVI LTD, New Delhi.5. Vashista, B.R. 1976. BRYOPHYTA. Fourth Edition. S.Chand& Company Ltd. Ram Nagar, New Delhi. |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Animal Development

| | |
|---|---|
| Module designation | : Animal Development |
| Semester(s) in which the module is taught | : odd/III |
| Person responsible for the module | :1. Dra. Susantin Fajariyah, M.Si 2. Eva Tyas Utami, S.Si. M.Si 3. Husnatun Nihayah, S.Si, M.Biomed |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, laboratory work, Project based learning |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136.00 hr a. Lecture-Discussion: 90.67 hr b. Laboratory work: 11.33 hr c. Project based learning : 34.00 hr |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Animal Structure |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | This course describes concepts and analyze animal development concepts: gametogenesis, fertilization, cleavage, blastulation, gastrulation, extraembryonic membranes and placentation, regeneration and metamorphosis, organogenesis and application of animal development. This course also practices based on project methods covering chick development, mouse development and planarian regeneration. |
| Examination forms | a. Essay test (25 %) b. video resume (5%) c. Quiz (5%) d. Poster Presentation : (10%) e. Project based method : (55%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Balinsky, B.I. 1981. An Introduction to Embryology. 5th Ed. Holt-Saunders Internasional. Philadelphia 2. Carlson, B.M. 1988. Pattern's Foundations Embryology. 5th Ed. Mc Graw-Hill Co. New York. 3. Gilbert, S.F. 2016. Developmental Biology. 11th Ed. Sinauer Associates Inc. Publishers Sunderland. Massachusetts. |



| | |
|--|---|
| | <ol style="list-style-type: none">4. Sadler, T.W. 2015. Langman's Medical Embryology. 13 Ed. Wolters Kluwer Health, Tokyo5. Slack, J.M.W. 2006. Essential Developmental Biology. 2 -Ed. Blackweel Publishing, Oxford, UK |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Terrestrial Ecology

| | |
|---|--|
| Module designation | : Terrestrial Ecology |
| Semester(s) in which the module is taught | : odd/III |
| Person responsible for the module | 1. Dra. Hari Sulistiyowati, MSc., PhD. 2. Dr. Dra. Retno Wimbaningrum, MSi 3. Rendy Setiawan, SSi., MSi. 4. Arif Mohammad Siddiq, SSi., MSi. |
| Language | : English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project/Laboratory/Field Work, Presentation. |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136 hr a. lecture- Discussion: 22.67 hr b. Case Study Method: 68.00 hr c. Laboratory/Field Works: 45.33 hr |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) Competences: <i>Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO1)</i> |
| Content | This course covers observation an honest attitude and final practical testability during the terrestrial ecology discussion, practical and reporting practical work. It also describes the principles of ecological hierarchies including individual, population, community, and ecosystem concept. Laboratory works cover:: Equipment's handling of terrestrial ecology, Adaptation of organisms, Distribution Patterns of Plant and Animals, Sampling technique and ecological data analysis of animals (invertebrates and vertebrates), Sampling technique and ecological data analysis of plants (herbs, shrubs, and trees) by Using Geographic Information System (GIS), Microsoft Excel, and Primer Software for ecological analysis related to plant and animal ecology , and Field work to Baluran National Park (Savannah, Tropical Rainforest, Seasonal Forest, Tropical Dry Forest) |
| Examination forms | a. Essay test and Discussion interactive participation (20%) b. Case Study Evaluation (50%), c. Laboratory Work (30%) |



| | |
|------------------------------------|---|
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Archibold, O.W. 1995. Ecology of World Vegetation. London: Chapman & Hall. 2. Barbour, MG., Burk, SH, and Pitt, WD. 1987. Terrestrial Plant Ecology. Menlo Park: The Benyamin Cummings Publishing Company, Inc. 3. Fachrul, M.F. 2007. Metode sampling Bioekologi. Jakarta: Bumi Aksara. 4. Hunter, M.L. 1990. Wildlife, Forests and Forestry. New Jersey: Regents/Prentice Hall. 5. Krebs, C.J. 1978. Ecology The Experimental Analysis of Distribution and Abundance. Harper Collins Publisher. London. 6. Magguran, A. 1998. Ecological Diversity and its Measurement. rinceton, NJ: Princeton University Press. 7. Odum, E.P. 1983. Basic Ecology. Philadelphia: Holt-Saunders International Edition. 8. Odum, E.P. 1998. Dasar-dasar Ekologi. Cetaka Ketiga. 9. Kumar, P. and U. Mina. 2021 Fundamentals of Ecology and Environment 3rd Edition. India: PATHFINDER PUBLICATION, 107pp. ISBN: 9788193465509 10. Related Scientific Article Journals or Webscience |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Genetics

| | |
|---|---|
| Module designation | : Genetics |
| Semester(s) in which the module is taught | : Odd/III |
| Person responsible for the module | 5. Dr.Rike Oktarianti, MSi. 6. Dr. rer. nat. Kartika Senjarini, M.Si 7. Syubbanul Wathon, S.Si, M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project-lab works, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181.4 hr a. lecture-discussion: 93.5hr b. Practical course: 45.3 hr c. Presentation: 42.5hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) Competences: <i>Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO1)</i> |
| Content | This course discusses the basic principles of Mendel's laws I and II, gene interactions and modification of the 9:3:3:1 phenotypic ratio, probability theory, sex determination, sex linked, linkage and crossing over, multiple alleles, multiple gene inheritance, inbreeding. and genetics population (principle of Hardy-Weiberg), inherited metabolism disorders, molecular basic of genetics, chromosomal structure and function, epigenetics, gene mutations (point mutation) and chromosome mutation (changes in the number and structure of chromosomes). Laboratory work cover observation of normal and mutant morphology, sex differentiation of <i>Drosophila melanogaster</i> as animal model in genetics, monohybrid and dihybrid mating experiments, sex linkage and non-disjunction experiments as well as linkage and crossing over using <i>Drosophila melanogaster</i> , genetic equilibrium testing of Hardy-Weinberg and DNA extraction |
| Examination forms | a. Essay test (30%) |



| | |
|--------------------------------|--|
| | <ul style="list-style-type: none"> b. Quiz (20%) c. Assignment (individual/team work observation (20%)) d. Practical course (30%). |
| Study examination requirements | <p>and : passing grade 70%</p> <p>Requirements for successfully passing the module</p> |
| Reading list | <ol style="list-style-type: none"> 1. Snustad DP and MJ. Simmons, 2012. Principles of Genetics. 6th edition. John Wiley and Sons, New York. 2. Benjamin AP, 2020. Genetics Conceptual Approach 7th edition. Macmillan Learning. USA. 3. Griffiths AJF, SR, Wessler, SB, Carrol, J, Doebley, 2015. An Introduction to Genetic Analysis. 11 edition. WH Freeman & Co Ltd 4. R. Brooker. 2021. Genetics Analysis and Principle. Mc-Graw Hill eBook. 5. Hartl DL and AG, Clark. 2007. Principle of Population Genetics. Sinauer Associates. 6. Rasmus N and M, Slatkin. 2013. An Introduction to Population Genetics: Theory and Applications. Sinauer Associates 7. Jack J. Pasternak, 2005. An Introduction to Human Molecular Genetics: Mechanisms of Inherited Diseases, Second Edition. John Wiley & Sons, Inc 8. Suryo. Genetika Strata 1.2013. Gadjah Mada University Press, Yogyakarta. 9. Suryo. Genetika Manuisa. .2016. Gadjah Mada University Press, Yogyakarta. 10. Anders, M. DNA, Genes and Chromosomes. 2018. Capstone Global Library Limited. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Biostatistics

| | |
|---|---|
| Module designation | : Bostatistic |
| Semester(s) in which the module is taught | : odd/III/V |
| Person responsible for the module | 1. Dr. Esti Utarti, S.P., M.Si 2. Dr.rer.nat. Fuad Bahrul Ulum, S.Si. M.Sc |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.7 hr a. lecture-Discussion: 4.53 hr b. Practical course: 31.8 hr c. Project based Methods: 54.42 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Calculus |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO2) Skills: Able to implement biological concepts in laboratory work and/or field studies independently and/or in groups (L06) |
| Content | This course discusses the scope of biostatistics, sampling techniques and preparing experimental designs, data processing, data analysis including normality test, homogeneity test, Parametric test: t-significant difference test and ANOVA, regression analysis and Pearson correlation, cluster analysis, and nonparametric test with Mann Whitney, Wilcoxon, Spearman correlation, and Chi Square, interpretation of statistical analysis results and drawing conclusions. The course also examines the application of scientific methods in the implementation of biostatistics through project-based methods with mini-team projects in the form of data collection and data analysis activities. |
| Examination forms | a. Essay test (5%) b. Group project report (60%) c. Practical course (35%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Crawley, M.J., 2012. The R book. John Wiley & Sons. 2. Faraway, J.J., 2004. Linear models with R. Chapman and Hall/CRC. 3. McCullagh, P. and Nelder, J.A., 2019. Generalized linear models. Routledge. |



| | |
|--|---|
| | <ol style="list-style-type: none">4. Wickham, H. and Grolemund, G., 2016. R for data science: import, tidy, transform, visualize, and model data. " O'Reilly Media, Inc." online version: https://r4ds.had.co.nz5. Zar, J.H. 1996. Biostatistical analysis. Third Ed. Prentice-Hall International, Inc., New Jersey |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Bioethics

| | |
|---|--|
| Module designation | : Bioethics |
| Semester(s) in which the module is taught | : Odd/III |
| Person responsible for the module | 1. Dr. Rike Oktarianti, M.Si., 2. Purwatiningsih, S.Si, M.Si, Ph.D |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory/elective/specialization |
| Teaching methods | : lecture- Discussion, case methods, presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90,6 hr a. Lecture-Discussion: 39,66 hr b. Case methods: 28,33 hr c. Presentation 22.61 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach (LO5) |
| Content | This course discusses the principles of bioethics and the development of bioethics in Indonesia and in the world, ethics in the writing of scientific papers, discusses the ethics of using animals and humans in biological research, including biomedical and biotechnology fields, discusses ethics in genetic manipulation and the use of genetically engineered products in the food, agriculture, health as well as discussing environmental ethics, ethics in the use of Stored Biological Materials (BBT). |
| Examination forms | a. Essay test (30%) b. Quiz (15%) c. Presentation /individual & team work observation (20%) d. Assignment based on cased methods (35%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Beauchamp, T.L. 1994. Principle of Biomedical Ethics. 2. Bryant et al. 2002. Bioethics for Scientists. John Wiley and Sons. England. 3. Keraf, A. S. 2006. Etika Lingkungan. Penerbit. Kompas. 4. Hau, J & Hoosier Jr., G.L. (2003) Handbook of Laboratory Animal Science Second Edition. Boca Raton: CRC Press. |



| | |
|--|--|
| | 5. Ridwan, E. 2013. Etika Pemanfaatan Hewan Percobaan dalam penelitian kesehatan. www.Indonesia.digitaljournals.org/index.php/idnmed/article |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Molecular Biology

| | |
|---|--|
| Module designation | : Molecular Biology |
| Semester(s) in which the module is taught | : Even/IV |
| Person responsible for the module | 1. Prof. Bambang Sugiharto 2. Dr. rer. nat. Kartika Senjarini, M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion-assignment, Project-lab work |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181.4 hr 1. lecture-discussion-assignment: 136 hr 2. Practical course: 45.3 hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | This course discusses the basic molecular basis of inheritance related to genetic material, namely DNA and genes, their universality in all cells that allows for inter-organismal engineering, gene expression and regulation, biosynthesis of these materials, and molecular repair mechanisms that affect the slow rate of evolution of living things. This concept is then continued with its application to modern biotechnology based on genetic engineering and molecular engineering as well as its basic methods which will be explained at the end of the lecture. Laboratory work cover Introduction to molecular analysis-based laboratory techniques, Sample preparation for working with molecular techniques, Isolation of DNA from various living samples Quantitative and qualitative DNA analysis, Plasmid isolation and transformation, DNA cloning and restriction, In vitro DNA amplification (Polymerase Chain Reaction) and Recombinant protein production and analysis |
| Examination forms | a. Essay test (35%) b. Quiz (20%) c. Assignment (individual/team work observation) (15%) d. Practical work (30%). |



| | |
|--------------------------------|--|
| Study examination requirements | and : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Snustad DP and MJ. Simmons, 2012. Principles of Genetics. 6th edition. John Wiley and Sons, New York. 2. Benjamin AP, 2020. Genetics Conceptual Approach 7th edition. Macmillan Learning. USA. 3. Griffiths AJF, SR, Wessler, SB, Carrol, J, Doebley, 2015. An Introduction to Genetic Analysis. 11 edition. WH Freeman & Co Ltd 4. R. Brooker. 2021. Genetics Analysis and Principle. Mc-Graw Hill eBook. 5. Hartl DL and AG, Clark. 2007. Principle of Population Genetics. Sinauer Associates. 6. Rasmus N and M, Slatkin. 2013. An Introduction to Population Genetics: Theory and Applications. Sinauer Associates 7. Jack J. Pasternak, 2005. An Introduction to Human Molecular Genetics: Mechanisms of Inherited Diseases, Second Edition. John Wiley & Sons, Inc 7. Suryo. Genetika Strata 1.2013. Gadjah Mada University Press, Yogyakarta. 8. Suryo. Genetika Manuisa. .2016. Gadjah Mada University Press, Yogyakarta. 9. Anders, M. DNA, Genes and Chromosomes. 2018. Capstone Global Library Limited. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Animal Systematic

| | |
|---|--|
| Module designation | : Animal Systematic |
| Semester(s) in which the module is taught | : even/IV |
| Person responsible for the module | 1. Purwatiningsih, Ph.D. 2. Dra. Susantin Fajariyah, M.Si 3. Dr. Asmoro Lelono, M.Si 4. Eva Tyas Utami, S.Si. M.Si 5. Husnatun Nihayah, S.Si., M.Biomed |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Practical course, Field Trip, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181.3 hr a. Lecture-discussion: 85hr b. Case study: 51hr c. Laboratory work: 36.83 hr d. Field work: 8.5hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | : Animal Structure |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) Competences: Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | This course describing and analyze the principles of animal systematic concept of Classification, Porifera, Cnidaria, Platyhelminthes, Nematodes, Annelida, Mollusca, Arthropoda, Echinodermata, Chordata, Superclass Pisces, Reptile Class, Aves Class, and Mammal Class. |
| Examination forms | a. Essay test and Quiz (35%) b. Presentation base on Case Study and performance: (25%) c. Laboratory work: (25%) d. Field work (15%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Brusca, R.C and Brusca G.J. 2003. Invertebrates, 2 nd . Sinauer Associates, Inc. Publishers. Sunderland. |



| | |
|--|--|
| | <ol style="list-style-type: none">2. Jr. Cleveland Hickman, Susan Keen, Allan Larson, David Eisenhour. 2011. Integrated Principles of Zoology. McGraw-Hill Science/Engineering/Math.3. Kardong, K.V. 2009. Vertebrates, Comparative Anatomy, Function and Evolution. 6th edition. McGraw Hill Company. New York. |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Plant Systematic

| | |
|---|---|
| Module designation | : Plant Systematic |
| Semester(s) in which the module is taught | : odd/IV |
| Person responsible for the module | 1. Dra. Dwi Setyati, MSi., 2. M. Su'udi, PhD. 3. Dr.rer.nat. Fuad Bahrul Ulum, S,Si. M.Sc |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Project, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload:181.32hr a. Lecture-Discussion: 54.4 hr b. Laboratory work: 36.26 hr c. Project (Field work, herbarium, video): 90.66 hr |
| Credit points | : 4 credits or 6.04 ECTS |
| Required and recommended prerequisites for joining the module | : Plant Structure |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) Competences: <i>Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO1)</i> |
| Content | This course describes concepts of Plant systematic: Describe the principal concept of plant taxonomy, herbarium and its curation, evolution and phylogeny. There are also implementation scientific methods for Plant systematic through a Project-based Method by observing the plant collection of the botanical garden then the result will be presented as a video presentation. The second task is submitting a complete and correct specimen of herbarium. |
| Examination forms | a. Essay test (30%) b. Project based method (50%): Herbarium (15%), Field work (15%), Video (20%) c. Laboratory work (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none">1. Cronquist, Arthur. 1981. An Integrated System of Classification of Flowering Plants. Columbia University Press. New York.2. Simpson, M.G., 2019. Plant systematics. Academic press.3. Stuessy, T.F., 2009. Plant taxonomy: the systematic evaluation of comparative data. Columbia University Press.4. Holttum, R. E. 1967. A Revised Flora of Malaya Volume II. Ferns of Malaya. Government Printing Office. Singapore.5. Levetin & McMahon. 2008. Plants and Society, Fifth Edition Introduction to Plant Life: Botanical Principles Plant Systematics and Evolution. The Mc Graw Hill Companies6. de Winter, W. P. and V. B. Amoroso. 2003. Plant Resources of South-East Asia Cryptogams: Fern and Fern Allies. Bogor: Prosea Foundation. |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Aquatic Ecology

| | |
|---|---|
| Module designation | : Aquatic Ecology |
| Semester(s) in which the module is taught | : Even/IV |
| Person responsible for the module | 1. Dr. Dra. Retno Wimbaningrum, M.Si. 2. Dra. Hari Sulistiyowati, M.Sc., Ph.D. 3. Rendy Setiawan, S.Si., M.Si. 4. Arif Mohammad Siddiq, S.Si., M.Si. |
| Language | : English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project/Laboratory/Field Work, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136 hr a. Lecture- Discussion: 45.33 hr b. Case Based Method: 45.33 hr c. Laboratory/Field Works: 45.33 hr |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) Competences: <i>Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO1)</i> |
| Content | This course covers observation, an honest attitude and final practical testability during the aquatic ecology discussion, practical and reporting practical work. It also describes the principles of freshwater ecosystem (lotic and lentic) concept, estuarine ecosystem concept, and marine ecosystem (intertidal, subtidal, and deep sea) concept. Laboratory works cover: Equipment handling of aquatic ecology, Sampling technique and ecological data analysis of physics, chemical, and biological characteristics by Using Microsoft Excel and Primer Software for ecological analysis related to plant and animal ecology, and Field work to Bedadung River (lotic ecosystem), RanuKlakah Lake (lentic ecosystem), and Baluran National Park (Intertidal ecosystem) |
| Examination forms | a. Essay test and Discussion interactive participation (30%) b. Case Study Evaluation (35%) c. Laboratory Work (35%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Allan, J.D. & Castillo, M.M. 2007. Stream ecology: structure and function of running water. 2nd Ed. Springer. Netherlands. 2. Barnes, R.S.K. and Mann, K.H. 1991. Fundamental of aquatic ecology. Blackwell Scientific Publications. London. 3. Brönmark, C. And Hansson, L-A. 2005. The biology of lakes and ponds. 2nd Ed. Oxford University Press. Oxford. 4. Clesceri, L. S., Greenberg, A. E. & Eaton, A.D. 1998. Standard methods for the examination of water and wastewater. 20th Ed. American Public Health Association, American Water Works Association, and Water Environment Federation. Washington. 5. Closs, G., Downes, B., and Boulton, A. 2004. A scientific introduction to freshwater ecology. Blackwell Scientific Ltd. Oxford. 6. Edmondson, W.T. 1959. Freshwater biology. Second Ed. John Wiley and Sons Inc. New York. 7. Goldsmith, F.B. and Duffey, E. 1997. Conservation management of freshwater habitats. Chapman & Hall. London. 8. Hauer, F.R. & Lamberti, G.A. 1996. Methods in stream ecology. Academic Press. California. 9. Hemminga and Duarte, C.M. 2000. Seagrass ecology. Cambridge University Press. Cambridge. 10. Odum, T.E. 1993. Fundamental ecology. Gadjah Mada University Press. Yogyakarta. 11. Related Scientific Article Journals or Webscience |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Microbial Physiology

| | |
|---|--|
| Module designation | : Microbial Physiology |
| Semester(s) in which the module is taught | : Odd/III |
| Person responsible for the module | 1. Dr. Esti Utarti, S.P., M.Si., 2. Dr. Drs. Sutoyo, M.Si., 3. Dr. Sattya Arimurti, S.P., M.Si., 4. Drs. Siswanto, M.Si., 5. Drs. Rudju Winarsa, M.Kes., 6. Dr. Kahar Muzakhar, S.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture Discussion, Practical laboratory works, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136 hr a. Lecture-Discussion: 45.33 hr b. Case Study: 45.33 hr c. Laboratory Work: 42.5 hr d. Field Trip: 2.83 |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Microbiology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO6) Competences: Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO1) |
| Content | This course describes microbial physiology diversity: Describe microbial cellular structure function, microbial metabolism, protein processing, secretion and targeting, microbial genetic, microbial growth and control, microbial metabolism diversity and microbial physiology activities in various fields. This activity is supported by a field trip to the factory. |
| Examination forms | Lecture discussion: (a) Essay test (20%), (b) Assignment or quiz (5%), (c) Case study (45%) Laboratory work: (a) Practical work (25%), (b) Field trip case study (5%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Cappuccino, J.G. and Welsh, C. 2020. Microbiology: A Laboratory Manual. Pearson. 2. Madigan, M.T, J.M Martinko and J. Parker. 2019. Biology of Microorganisms. Prentice Hall. |



- | | |
|--|--|
| | <ol style="list-style-type: none">3. Moat, A.G., J.W. Foster and M.P. Spector. 2002. <i>Microbial Physiology</i>. John Wiley & Sons. Canada.4. Brenner, D.J., N. R. Krieg and J.T. Staley. <i>Bergey's Manual of Systematic Bacteriology</i> 2nd edition part A. Springer.5. Brenner, D.J., N. R. Krieg and J.T. Staley. <i>Bergey's Manual of Systematic Bacteriology</i> 2nd edition part B. Springer. |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Animal Physiology

| | |
|---|---|
| Module designation | : Animal Physiology |
| Semester(s) in which the module is taught | : even/IV |
| Person responsible for the module | 1. Dr. Hidayat Teguh W, M.Pd 2. Dr. Asmoro Lelono, M.Si 3. Eva Tyas Utami, S.Si. M.Si 4. Dra. Susantin Fajariyah, M.Si 5. Purwatiningsih, Ph.D 6. Husnatun Nihayah, S.Si., M.Biomed |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Practical course, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181,3 hr a. Lecture-discussion: 93.5 hr b. Lecturer-case method): 42.5 hr c. PBL: 42.5 hr d. Instrument observation: 2.83 hr |
| Credit points | : 4 credits or 6,04 ECTS |
| Required and recommended prerequisites for joining the module | : Animal Structure |
| Module objectives/intended learning outcomes | Knowledge: <ul style="list-style-type: none"> • Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO 2) • Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skills: Able to practice laboratory work in groups to demonstrate the principles of animal physiology concepts (LO 6) Competence: Able to internalize norms and ethics based on Pancasila in working independently or in groups (LO 1) |
| Content | This course correlating the basic concepts of physics with the principles of circulatory system dynamic, describes basic concepts of animal physiology (membrane, channel, transport molecule), homeostasis, thermoregulation, nervous system, defense, locomotion, reproduction, digestive, respiration, and osmoregulation physiology. Laboratory work was done by project base method . |
| Examination forms | a. Essay test: 15% b. Presentation base on Case Study: 5% c. Laboratory work-PBL: 70% d. Equipment observation: 10% |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Ghai C.L, 2013. A Textbook of Practical Physiology. Eight Edition. Jaype Brothers Medical Publisher: New Delhi. |



| | |
|--|---|
| | 2. Hill R.W, Wyse A.G, Anderson, M. 2012. Animal Physiology. Massachusetts Sinauer Associates, Inc. Publishers. |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks
= 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Plant Physiology

| | |
|---|---|
| Module designation | : Plant Physiology |
| Semester(s) in which the module is taught | : odd/V |
| Person responsible for the module | 1. Prof. Bambang Sugiharto, D.AgrSc 2. Dra. Dwi Setyati, M.Si 3. Mukhamad Su'udi, Ph.D |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Practical course, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 181,3 hr a. Lecture-Discussion: 68.1 hr b. Project method with practical work 90.66 hr c. Case based method: 22.65 hr |
| Credit points | : 4 credits or 6,04 ECTS |
| Required and recommended prerequisites for joining the module | : Plant Structure, Biochemistry |
| Module objectives/intended learning outcomes | <p>Knowledge:</p> <ul style="list-style-type: none"> • Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO 2) • Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) <p>Skills: Able to practise laboratory work in groups to demonstrate the principles of animal physiology concepts (LO 6)</p> <p>Competence: Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO 1)</p> |
| Content | This course correlates biophysics with plant physiological processes of: Water in plant cells and their transport, Transport of nutrients. Correlating biochemistry with the physiological process of: Secondary metabolites and plant defence. Describing concepts of plant physiology and its role , water in plant cells and their transport , secondary metabolites and plant defence, plant nutrition and their transport, assimilation of mineral elements, photosynthesis, secondary metabolites and plant defence, response and adaptation to abiotic stress, growth, development and morphogenesis, plant hormones (Phytohormones), and flowering control. In this course, the students also practising laboratory work for plant physiology that cover: water potential measurement, evaporation, transpiration and evapotranspiration, nutrient transport, effect of temperature on aerobic |



| | |
|------------------------------------|--|
| | respiration, photosynthesis, plant sigmoid curve, nitrate reductase activity, location of growing area, and the effect of the hormone kinetin on the sprout growth. Students also carry out Project-based approaches for several topics such as: plant nutrition, sprout growth in dark and light, seed dormancy and phototropism (individually or teamwork). This course uses basic instruments for Excel & R -statistics for data analysis in Plant physiology Project/laboratory work (e.g. counting chlorophyll content). |
| Examination forms | <ul style="list-style-type: none"> a. Essay test (35%) b. Project based (50%): Attitude (5%), Activity observation (10%), Progress report (15%), Final report (10%), Presentation (10%) c. Case study (15%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Taiz L, Zeiger E. 2010. Plant Physiology. fifth edition. Massachussets: Sinauer Associates. 2. Davies, P.J. 1995. Plant Hormones, Physiology, Biochemistry and Molecular Biology. Kluwer Academic Publishers The Netherlands. 3. Fosket, D.E. 1994. Plant Growth and Development: A Molecular Approach. Academic Press A Division of Harcourt Brace and Company. San Diego, California. 4. Hopkins, W.G. 1995. Introduction To Plant Physiology. John Wiley & Sons, Inc., Canada. 5. Salisbury, F.B., C.W. Ross. 1992. Plant Physiology. Wadsworth Publ.Co.Inc. Belmont, C.A 6. Srivastava, L.M. 2002. Plant Growth and Development, Hormones and Environment. Academic Press Elsevier Science, USA. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Bioinformatics

| | |
|---|--|
| Module designation | : Bioinformatics |
| Semester(s) in which the module is taught | : even/IV |
| Person responsible for the module | 1. Dr. Kahar Muzakhar, S.Si 2. Syubbanul Wathon, S.Si., M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Project, Presentation, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.7 hr a. Lecture-Discussion: 29.3 hr b. Practical course: 45.3 hr c. Project: 9.6hr d. Presentation: 6.4 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Calculus, Biochemistry |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the principles of biology, mathematics, and other relevant natural sciences (LO 2) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO 6) |
| Content | This course describes concepts of bioinformatics for data processing and analysis in the Biology field: examining websites provided bioinformatics, using selected software for bioinformatic analysis, running DNA sequence data in data processing, primer designing, phylogenetic tree development, protein structure analysis, identifying secondary metabolite data and the metabolic pathway. |
| Examination forms | a. Individual/ teamwork observation (20%) b. Fill in the blank (20%) c. Essay (20%) d. Equipment/ essay observation (40%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. Polanski A. & Kimmel M. 1998. Bioinformatic. Springer Berlin Hiedelberg, New York. 2. Baxevanis A.D. & Ouellette B. F. F. 2001. BioinformaticA practical Guide to Analysis of Gene and Proteins, Second Edition. Wiley-Interscience, New York. 3. Baldi, P and Brunak, S.. 2001. Bioinformatics: The Machine Learning Approach 2nd ed., MIT Press. 4. Xiong, J. 2006. Essensial Bioinformatics. Cambridge University Press. Cambridge. 5. Aluru, Srinivas, ed. 2006. Handbook of Computational Molecular Biology. Chapman & Hall/Crc. 6. Pan Y. & Hu X. 2007. Knowledge discovery in bioinformatic: technique, methods, and applications. Wiley-Interscience, New York. 7. Barnes M.R. 2007. Bioinformatics for Geneticista bioinformatics primer for analysis of genetic data. Second edition. John Wiley & Sons, Ltd |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Evolution

| | |
|---|--|
| Module designation | : Evolution |
| Semester(s) in which the module is taught | : Odd/IV |
| Person responsible for the module | 1. Dr. Rike Oktarianti, M.Si 2. Syubbanul Wathon, S.Si, M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory/ elective /specialization |
| Teaching methods | : lecture- Discussion-assignment, Practice-field study |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136 hr a. lecture-Discussion-assignment: 110,5 hr b. Practical-field study: 25,5 hr |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Genetics |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | This course discusses the concepts, theories, and mechanisms of evolution. The topics are the history and evolutionary development, genetics as the basis of evolution, the origin of genetic variation, population genetics, evidence of evolution, the mechanism of evolution in nature, natural selection, isolation, evolutionary direction, the origin of life and its phylogenetic of prokaryotes, protists, invertebrate, vertebrates, and primates (humans). Field studies were carried out at the UNESCO World Heritage archaeological site in Sangiran, Central Java. Observing the geomorphology of the soil layer where fossils were found and observing the fossils of plants, animals, primates and early humans |
| Examination forms | a. Essay test (35%) b. Quiz (15%) c. Assignment (individual & teamwork observaton (20%) d. Filed study (30%). |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Scheiner SM, <u>DP. Mindell . 2020</u> .The Theory of Evolution: Principles, Concepts, and Assumptions. University of Chicago Press 2. Futuyma, D.J. 1997. Evolutionary Biology. Sinauer Associates Inc |



| | |
|--|---|
| | <ol style="list-style-type: none">3. Pontarotti P, 2019. <i>Evolution, Origin of Life, Concepts and Methods</i>. Springer Nature Switzerland.4. Murray J. 1972. <i>Genetics Diversity and Natural selection</i>. Oliver and Boyd, Edinburgh.5. Fleagle, J. 20213. <i>Primate Adaptation and Evolution</i>. Elsevier.6. Foley RA, 2004. <i>Principle of Human Evolution</i>.7. Djoko T Iskandar. <i>Penuntun Kuliah Evolusi</i>. ITB Bandung |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Microtechnique

| | |
|---|---|
| Module designation | : Microtechnique |
| Semester(s) in which the module is taught | : even/IV |
| Person responsible for the module | 1. Eva Tyas Utami, S,Si. M.Si 2. Dr.rer.nat. Fuad Bahrul Ulum, S.Si, M.Sc |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Practical course, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.7 hr a. lecture-discussion: 36.28 hr b. Project-based method with Laboratory work : 54.42 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO3) Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (LO6) |
| Content | This course describing and analysis: scope of preparation (sampling techniques for whole mount preparation, smear preparation, spread preparation, paraffin method preparation, dyes and staining methods, immunohistochemical method. There are also practicing using project-based methods through laboratory works to produce 7 specimen materials: identify sample material for microtechnique, propose objective and background, propose method, (including: a. spread preparation method, b. smear preparation method, c. mosquito larvae wholemount preparations, d. pollen wholemount preparations, non-embedding plant preparations, f. plant paraffin-embedding preparation, g. animal paraffin-embedding preparations) |
| Examination forms | a. Essay test (35%) b. Quiz (5%) c. Project-based method with Laboratory work: (60%): Posttest (5%), Activity laboratory (5%), Progress report (10%), Report (10%), Final practical test (10%), Presentation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Berly G.P dan Miksche J.P., 1976. Botanical Microtechnic and Cytochemistry. IOWA. St. Univ. Press. 2. Humason G.L. 1966. Animal Tissue Technic. WH. Freeman and Company. San Fransisco |



| | |
|--|--|
| | <ol style="list-style-type: none">3. Handari,S.S. 1983. Metode Pewarnaan. Bharata Karya Aksara Jakarta4. Kiernan.J.A. 1990. Histological and Histochemical Methods. Theory and Practice. 2nd edition. Pergamon Press. Oxford.5. Yeung,E.C.T, Stasolla C, Sumner M.J. , dan Huang B.Q.2015. Plant Microtechniques and Protocols.Springer International Publishing Switzerland.6. Sanderson. JB. 1994. Biological Microtechnique. Royal Microscopical Society Microscopy Handbooks 28. Bios Scientific Publisher. |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Biology Conservation

| | |
|---|--|
| Module designation | Biology Conservation |
| Semester(s) in which the module is taught | odd/v |
| Person responsible for the module | 1. Dra. Hari Sulistiyowati, M.Sc., Ph.D. 2. Rendy Setiawan, S.Si., M.Si. 3. Arif Mohammad Siddiq, S.Si., M.Si. |
| Language | Indonesian and English |
| Relation to curriculum | Compulsory /-elective / specialisation |
| Teaching methods | Lecture - Discussion, field work, case study |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. Lecture- Discussion: 22.67 hr b. Case Study: 68.00 hr |
| Credit points | 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | Terrestrial Ecology and Aquatic Ecology E.g. existing competences in |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: <ul style="list-style-type: none"> ● Able to internalize norms and ethics based on Pancasila in working independently or in groups (LO 1) ● Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) |
| Content | This course describe and analyze definition and terminology of SDH Conservation, history and concept of SDH conservation; SDH value; characteristics of geoparks or Earth Parks as conservation objects and High Conservation Value Areas; SDH threats; SDH conservation strategy and management through formal student activities, namely articles, discussions, seminars, and field studies activities. Case based method on biological resources threats in tropics. It is assigned in teamwork Biological resources threats; Biological resources conservation strategy and management through formal student activities, namely articles, discussions, seminars, and field studies activities. Observation Biological resources conservation management in Protected Area of Meru Betiri national Park by individual or group. |
| Examination forms | a. Essay test and Discussion interactive participation (30%) b. Case Study Evaluation (70) |
| Study and examination requirements | Passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Fornaro A., Fernandes A.M. 2018. Geoparks: from conception to the teaching of Geosciences. <i>Terræ Didatica</i>, 14(3):330- 338. URL: http://www.ige.unicamp.br/terraedidatica/. 2. Consortium for the Revision of the HCV Toolkit Indonesia. 2009. Guidelines for the identification of High Conservation Values in Indonesia (HCV Toolkit Indonesia). Wageningen. ISBN: 978-979-18366-7-8 3. Primack, RB., Jatna S., M. Indrawan, dan P. Kramadibrata. 1997. <i>Biologi Konservasi</i>. Jakarta: Yayasan Obor Indonesia. 4. Sodhi, N.S.and Ehlich, P.R. 2011. <i>Conservation Biology for All</i>. Oxford: Oxford University Press. 5. Štrba,L., J. Kolačková, D. Kudelas , B. Kršák and C. Sidor. 2020. Geoheritage and Geotourism Contribution to Tourism Development in Protected Areas of Slovakia—Theoretical Considerations. <i>Sustainability</i> 2020, 12, 2979; doi:10.3390/su12072979 6. Strategi Pengelolaan Keanekaragaman Hayati Indonesia (IBSAP). IBSAP kurun waktu tahun 2003 – 2020 7. Rawat and Agarwal, 2015. Biodiversity-concept, threats and conservation. <i>Environment Conservation Journal</i> 16(3): 19-28. 8. Indonesia Regulation related to biology conservation 9. Related Scientific Article Journals or Webscience |
|--------------|--|

Credits to ECTS conversion formula 2 SKS TM = 2 (50min T+60min TS+60min M (170 minutes) x 16 weeks) = 90.67 Hours. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Environmental Science

| | |
|---|--|
| Module designation | : Environmental Science |
| Semester(s) in which the module is taught | : odd/V |
| Person responsible for the module | 1. Dra. Hari Sulistiyowati, MSc., PhD. 2. Rendy Setiawan, SSi., MSi. 3. Arif Mohammad Siddiq, SSi., MSi. |
| Language | : English |
| Relation to curriculum | : Compulsory /-elective/ specialisation |
| Teaching methods | : Lecture- Discussion, Laboratory/Field Work, Case study |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. Lecture- Discussion: 14.17 hr b. Case Based Method: 31.17 hr c. Laboratory/Field Works: 45.33 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Introduction of Environmental Science |
| Module objectives/intended learning outcomes | Knowledge: Able to analyze the basic principles of biology, mathematics, and relevant natural sciences (LO 2) Skills: able to implement biological concepts in laboratory work and/or field studies independently and/or in groups (LO 6) Competence: able to internalizing norms and ethics based on Pancasila in working independently and in groups (LO 1) |
| Content | This course describe and analyze principles that are relevant to the environmental pollution issues in tropics: the definition, terminology, and scope of environmental science, environmental quality standards (EQS), pollutants and contaminants (physical chemistry, and biology), toxic hazardous materials, sources and impacts of contamination, air pollution (including smells and sounds), water, and land; It also initiate the logic of critical thinking on case study analysis of environmental quality in physics, chemistry, and biology; and bioscience implementation in the management of Air, Water, Land, Food/beverage, and Cosmetics/medicine pollution. It also employs Laboratory works for quality control including: Equipment's handling for environmental parameters sampling, Water Sampling Technique, Biological Oxygen Demands (BOD) Test and Water Quality Analysis, Chemical Oxygen Demand (COD) Analysis, Total Solids Analysis, Examination of Suspended Materials (Mud Content), Simple Measurement of Air and Gas Particle Content, Noise Intensity Level Measurement, Utilization of biological waste (2 R), such as recycled paper production using double printing frame |



| | |
|------------------------------------|--|
| | technique; Reused Paper and Plastic Waste products, the use of bioindicator for Environment Quality Control, analysis of population oxygen demand, tree biomass calculation to estimate carbon dioxide sequestration, and discussion of Laboratory Work Report. There will be an observation evaluation during the lecture-discussion and laboratory work. |
| Examination forms | a. Essay test Discussion interactive participation (25%) b. Case Study Evaluation (45%) c. Practical Work (40%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Archibold, O.W. 1995. Ecology of World Vegetation. London: Chapman & Hall. 2. Barbour, MG., Burk, SH, and Pitt, WD. 1987. Terrestrial Plant Ecology. Menlo Park: The Benjamin Cummings Publishing Company, Inc. 3. Fachrul, M.F. 2007. Metode sampling Bioekologi. Jakarta: Bumi Aksara. 4. Hunter, M.L. 1990. Wildlife, Forests and Forestry. New Jersey: Regents/Prentice Hall. 5. Krebs, C.J. 1978. Ecology The Experimental Analysis of Distribution and Abundance. Harper Collins Publisher. London. 6. Magguran, A. 1998. Ecological Diversity and its Measurement. Princeton, NJ: Princeton University Press. 7. Odum, E.P. 1983. Basic Ecology. Philadelphia: Holt-Saunders International Edition. 8. Odum, E.P. 1998. Dasar-dasar Ekologi. Cetakan Ketiga. 9. Kumar, P. and U. Mina. 2021 Fundamentals of Ecology and Environment 3rd Edition. India: PATHFINDER PUBLICATION, 107pp. ISBN: 9788193465509 |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Tissue Culture

| | |
|---|---|
| Module designation | : Tissue Culture |
| Semester(s) in which the module is taught | : odd/V |
| Person responsible for the module | 1. Mukhamad Su'udi, PhD 2. Syubbanul Wathon, MSi |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project/Laboratory/Field Work, Presentation. |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. Lecture- Discussion: 28.33 hr b. Laboratory/Field Works: 45.33 hr c. Presentation: 17 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Basic Chemistry, Cell Biology |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3)</p> <p>Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO 6)</p> <p>Competences:</p> <ul style="list-style-type: none"> • Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO 1) • Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course Describe and analysis scope of Tissue culture: definition, terminology, sterilisation and culture media used for tissue culture, the importance of plant tissue culture application, cytotoxicity, viability and cell counting, and cell culture development for animals. It integrates bioscience for proposing/ or giving the recommendation as a solution (Case-based Method) of the problems found during tissue culture processing steps and management (in team work). This course also provides specific skill for each student through practising laboratory works for the basic technique in tissue culture (project-based) including: sterilisation, media preparation, explant selection, and the determination of cytotoxicity, viability and cell counting. |
| Examination forms | Essay test & Quiz (25%); Case study (25%); Project (50%) |



| | |
|------------------------------------|--|
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Bhojwani & Dantu. 2013. Plant Tissue Culture: An Introductory Text. Springer. 2. Smith. 2013. Plant Tissue Culture: Techniques and Experiments. Elsevier. 3. Freshney. 2010. Culture of Animal Cells. Wiley-Blackwel 4. Harrison & Rae. 1997. General Techniques of Cell Culture (Handbooks in Practical Animal Cell Biology). Cambridge University Press. 5. Stacey. 2012. Current Development in Cell Culture Technology. Landes Bioscience & Springer. 6. Verma et al. 2020. Animal Tissue Culture Principles and Applications. Elsevier. 7. Related Scientific Article Journals or Webscience |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Research Methodology

| | |
|---|--|
| Module designation: | Research Methodology |
| Semester(s) in which the module is taught | even/odd/VI/VII |
| Person responsible for the module: | <ol style="list-style-type: none"> 1. Dr. Retno Wimbaningrum, M.Si. 2. Dr. Hidayat Teguh Wiyono, M.Pd. 3. Dr. Rike Oktarianti, M.Si. 4. Mukhamad Su'udi, S.Si., Ph.D 5. Dr. Sutoyo, M.Si. |
| Language | Indonesian and English |
| Relation to curriculum | Compulsory / elective / specialisation |
| Teaching methods | Lecture - Discussion, Case-Based Method |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr <ol style="list-style-type: none"> a. Lecture- Discussion: 39,67 hr b. Case study Report (research proposal draft): 51hr |
| Credit points: | 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | Biostatistics |
| Module objectives/intended learning outcomes | <p>Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO 6)</p> <p>Competences: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7)</p> |
| Content | <p>This course discusses fundamentals of research, research proposal preparation techniques, research methods, preparation of research report, thesis and scientific articles, scientific paper publication and presentation techniques, research ethics, plagiarism and impact of research. This course also guides students in making research proposals with a scope of microbiology, zoology, botany, ecology, and biotechnology with Case-Based Method (scientific method), through namely literature survey and documentation, formulation of research problems, thought frameworks and hypothesis, variables, and research parameters, research object, data collection resources and techniques, research design, data analysis, and Interpretation.</p> |
| Examination forms: | <ol style="list-style-type: none"> a. Essay test (30%) b. Case study Report (research proposal draft) (50%) c. Research proposal draft presentation (presentation video) (20%) |
| Study and examination requirements: | : Passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Pandey, P. & M. M. Pandey. 2015. Research Methodology: Tools and Techniques. Bridge Center. Romania |



| | |
|--|---|
| | <ol style="list-style-type: none">2. Mishra, S.B. & S. Alok. 2017. Handbook of Research Methodology. Education Publishing. New Delhi3. Suharjito, D. 2014. Metodologi penelitian. IPB Press. Bogor.4. Suryana. 2010. Metodologi penelitian. Model praktis penelitian kuantitatif dan kualitatif. UPI. Bandung |
|--|---|

Credits to ECTS conversion formula $2 \text{ SKS TM} = 50\text{min T} + 60\text{min TS} + 60\text{min M}$ (170 minutes) x 16 weeks = 90.67 Hours. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Final Project

| | |
|---|---|
| Module designation | : Final Project |
| Semester(s) in which the module is taught | : odd or even/VII-VIII |
| Person responsible for the module | : Commission of final project |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Discussion, Project/Laboratory/Field Work, Presentation Seminar, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 272hr a. Discussion: 45.33 hr b. proposal draft and seminar; 28.33 hr c. Data Collection; 107.67 hr d. Data Analysis, report and seminar: 45.33 hr e. Draft Final report and seminar article: 45.33 hr |
| Credit points | : 6 credits or 9.06 ECTS |
| Required and recommended prerequisites for joining the module | : Total credit has taken \geq 120, GPA \geq 2 |
| Module objectives/intended learning outcomes | <p>Skills: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implement (LO 6)</p> <p>Competences:</p> <ul style="list-style-type: none"> • Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO 1) • Able to integrate knowledge, skills and social and methodological capacities in working or learning situation for the management of biological resources in tropics (LO 4) • Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course offers a scientific method that covers discussion of a problem or topic that is presented systematically and comprehensively equipped with a literature study, and contains elements of analysis and synthesis under the guidance of Advisor. It continues to gather data collection for research or internships; work on data analysis, processing, and interpretation; analyze the result and make a report and give a seminar; and then write a draft final report and defend the report in the final exam. At the end of the course, the student has to make a final report and scientific article to be published. |



| | |
|------------------------------------|--|
| | The final project can be taken through regular semester or internship, research project, thematic community service, independent study activities of MBKM program as long as to fulfill the requirements |
| Examination forms | a. Proposal document and seminar: 40% b. Final Report : 60% |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Elective Course

Food Microbiology

| | |
|---|--|
| Module designation | : Food Microbiology |
| Semester(s) in which the module is taught | : odd/V/VII |
| The Person responsible for the module | 1. Dr. Sattya Arimurti, SP.,M.Si 2. Drs. Siswanto, M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, laboratory work, Project method |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. Lecture- Discussion: 8.5 hr b. Lecture (Project-based learning): 36.83 hr c. Laboratory Work (Project-based learning): 42.50 hr d. Field Trip 2.83 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Physiology Microbe |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: Able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach (LO 5) |
| Content | This course describes concepts and analysis of Food Microbiology: terminology and development of food microbiology, microbes on food, using indicator microbes to determine total microbes on food, and growth characterization of microbes on the food. This course discusses food safety related to projects and writing HACCP documents that are supported by a field trip to the factory . |
| Examination forms | Lecture discussion: (a) Essay test (10%) and (b) PBL (20%) Laboratory work: (a) PBL (50%) and (b) Field trip PBL (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none">1. Doyle, M.P. and R.L. Buchanan. 2013. Food Microbiology: Fundamental and Frontiers. 4th Edition. ASM Press2. Senan, S., R.K. Malik, and S. Vij. 2019. Food and Industrial Microbiology. ICAR.3. Madigan, M.T, J.M Martinko and J. Parker. 2019. Biology of Microorganisms. Prentice Hall4. Cappuccino, Emeritus, J.G and C. Weish. 2020. Microbiology a Manual Laboratory. Pearson.5. R. L. Buchanan W. Anderson L. Anelich J.-L. Cordier R. Dewanti-Hariyadi T. Ross (Eds). 2018. Microorganisms in Foods 7 Microbiological Testing in Food Safety Management. Second Edition. Springer. |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Health Microbiology

| | |
|---|--|
| Module designation | : Health Microbiology |
| Semester(s) in which the module is taught | : odd/V/VII |
| The Person responsible for the module | 1. Dr. Sutoyo, MSi. 2. Drs. Rudju Winarsa, M.Kes. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, laboratory work, Project method |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. Lecture-Discussion: 34 hr b. Project-Laboratory/Field Works: 45.33 hr c. Presentation: 11.33 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Microbial Physiology |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3)</p> <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence:</p> <ul style="list-style-type: none"> ● Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |



| | |
|---|---|
| <p>Content</p> | <p>This course describe concepts of Health Microbiology: general aspects of health microbiology and history of infectious diseases, infectious microbes, pathogenicity, bacteria as human pathogens, fungi as human pathogens, virus as human pathogens, basic principles of antibiotic therapy, laboratory diagnosis of pathogenic bacteria, laboratory diagnosis of pathogenic fungi, taxonomies and an overview of human pathogen microbes, exploration, and development of chemotherapy agents; there is also implementation Case method based on the management of the incidence of antibiotic resistance in pathogenic bacteria that cause disease caused by bacteria by exploring antibacterial compounds from natural ingredients in the tropics. It assigned in teamwork: Testing of Antibiotic Sensitivity with Agar Diffusion Methods and Radiant Dilution Methods, Interpretation of Test Results of Determination of Minimum Resistance Concentration, Antimicrobial Agent Exploration Techniques, through formal student activities, namely articles, discussions, seminars, and laboratory studies activities proposing the objectives of the project topic, implementation suitable method, data analysis (Using Excel, R Program, T-Test, Duncan, or ANOVA applications for data analysis in small research of Health Microbiology), in results discussion, writing project report as a scientific article draft and presentation in class. This project is done through the laboratory.</p> |
| <p>Examination forms</p> | <ul style="list-style-type: none"> a. Essay test (8%) b. Fill the blank (2%) c. Topic presentation d. case report (10%) e. report presentation (10%) <p>Case method in practical laboratory</p> <ul style="list-style-type: none"> a. case report (10%) b. draft article (10%) c. report presentation (10%) d. Observation of data analysis (10%) e. Case method in the scope of health in groups on the diagnosis of diseases in humans (practical laboratory) with journal review f. report presentation (10%) g. draft article (10%) h. case presentation (10%) <p>Topic Presentation (15%)</p> |
| <p>Study and examination requirements</p> | <p>: passing grade 70% Requirements for successfully passing the module</p> |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Baron, S. 1996. Medical Microbiology, 4th edition. University of Texas Medical Branch at Galveston, Galveston, Texas 2. Brogden, K.A. and J.M. Guthmiller. 2002. Polymicrobial diseases. ASM Press. Washington 3. Brook, G.F., K.C. Carroll, and J.S. Butel. 2013. Mikrobiologi Kedokteran. EGC Emergence 3. Kayser, F.H., Bienz, K.A., Eckert, J. and , Zinkernagel, R.M. 2005. Medical Microbiology. Thieme, Stuttgart, New York 4. Riedel, S., Hobden, J.A., Miller, S., Morse, S.A., Mietzner, T.A., Detrick, B., Mitchell, T.G., . Sakanari,, J.A., Hotez, and P., Mejia, R., 2019., Medical Microbiology. 38th edition. Mc Graw Hill. Toronto. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks =45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Enzymology

| | |
|---|---|
| Module designation | : Enzymology |
| Semester(s) in which the module is taught | : Odd/V or VII |
| Person responsible for the module | 1. Dr. Kahar Muzakhar, S.Si., 2. Dr. Esti Utarti, S.P., M.Si., |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective-/ specialisation |
| Teaching methods | : Lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. Lecture-Discussion: 45.33 hr b. Case study (proposal): 22.67 hr c. Case study (Review and Presentation): 22.67 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Microbial physiology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms, and management of tropical biological resources (LO 3) Competence: Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO 1) |
| Content | This course is describe the perspective, structure and nomenclature of enzymes, thermodynamic and enzyme catalysis mechanisms, enzyme kinetics, repression and inhibition of enzyme, production, purification and immobilisation of enzymes, application of enzymes in food, health, agriculture, and environmental fields. |
| Examination forms | a. Essay test (30%) b. Assignment or quiz (10%) c. Case study: Proposal (25%) d. Case study: review and presentation (35%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Cappuccino, J.G. and Welsh, C. 2020. Microbiology: A Laboratory Manual. Pearson. 2. Copeland, R.A. 2000. Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis. 2nd. Wiley-VCH. New York. 3. Dalbey, R.E., C.M. Koehler & F. Tamanoi. 2007. The Enzymes: Molecular Machines Involved in Protein Transport Across Cellular Membranes. Academic Press. Elsevier. San Diego 4. Guisan, J.M. 2006. Immobilisation of Enzymes and Cells. 2nd ed. Humana Press. New jersey 5. Madigan, M.T, J.M Martinko and J. Parker. 2019. Biology of Microorganisms. Prentice Hall. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Industrial Microbiology

| | |
|---|--|
| Module designation | : Industrial Microbiology |
| Semester(s) in which the module is taught | : even/VI |
| Person responsible for the module | 1. Dr. Esti Utarti, S.P., M.Si. 2. Dr. Drs. Sutoyo, MSi. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Practice-lab works, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90,66 hr a. Lecture-Discussion: 34 hr b. Practical-course (case method): 45.33 hr c. Presentation: 11.33 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Microbial Physiology |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3)</p> <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence:</p> <ul style="list-style-type: none"> • Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) |



| | |
|------------------------------------|--|
| Content | <p>This course is demonstration scientific methods for development of microbial commercial products from the tropical natural resources through characterization of microbes, media and nutrition in industry, potential screening and inoculum preparation of tropical environments microbe, metabolic pathways for biosynthesis of primary and secondary metabolites of tropical environment microbes, overproduction of metabolites in industry, culture collection of tropical environments microbe, fermentation techniques and fermentation kinetics, upstream and downstream processes in industrial microbiology, production of intracellular and extracellular enzymes, production of single cell proteins of yeast, production of antibiotics and probiotics, production of insecticides and biofertilizers.</p> <p>There is also implementation of the logic of critical thinking on biosafety related for applying microbes by using waste in environmentally friendly industries in laboratory work and/or field studies independently and/or in groups through project-based methods on natural resources in tropics through practical works. It assigned in individual or teamwork covering 1) Isolation of microbes (bacteria, yeast and fungi), 2) Purification of microbes, 3) Inoculum preparation, 4) Raw material preparation, 5) Submerged and solid state fermentation, 6) Extracellular enzymes production, 7) Ethanol and biofuel production, 8) Short chain fatty acid production, 9) Explore microbe as biofertilizer agent, 10) Explore microbe as antimicrobial agent, 11) Culture collection, 12) Results and Discussion of Project, and 13) writing project report as an scientific article draft and presentation in class.</p> |
| Examination forms | <ol style="list-style-type: none"> a. Essay test (20%) b. Assignment or quiz (10%) c. Scientific Article of the project including data analysis (software application) (30%) d. Practical work (20%) e. Presentation (10%) |
| Study and examination requirements | <p>: passing grade 70%</p> <p>Requirements for successfully passing the module</p> |
| Reading list | <ol style="list-style-type: none"> 1. Cappuccino, J.G. and Welsh, C. 2020. Microbiology: A Laboratory Manual. Pearson. 2. Baltz, R.H. et al. 2010. Manual of Industrial Microbiology and Biotechnology. 3th ed. ASM Press 3. Desai, M.A. 2000. Downstream Processing of Proteins: Methods and Protocols. Humana Press. Jersey 4. Madigan, M.T, J.M Martinko and J. Parker. 2019. Biology of Microorganisms. Prentice Hall. 5. Okafor, N. 2007. Modern Industrial Microbiology and Biotechnology. Science Publisher. USA 6. Steinkraus. K.H. 2004. Industrialization of Indigenous Fermented Food. 7. Marcel Dekker IncKim, B.H and G.M. Gadd. 2008. Bacterial Physiology and Metabolism. Cambridge University Press. Cambridge 8. Moat,A.G, J.W. Foster and M.P. Spector. 2002. Microbial Physiology. John Wiley & Sons. Canada. |



Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x
16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Virology

| | |
|---|--|
| Module designation | : Virology |
| Semester(s) in which the module is taught | : even/VI/VIII |
| Person final practical testable for the module | 1. Drs. Rudju Winarsa, M.Kes 2. Dr. Sattya Arimurti, SP.,M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, laboratory work, topic Presentation, case study, field work |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 85hr a. Lecture- Discussion: 39.67 hr b. Laboratory Work 11.33 hr c. Field work 22.67 hr d. Case study 11.33 hr e. Topic presentation 5.67 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Microbiology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course describes the nature of viruses (structure, replication, and classification of viruses), recombinant viruses, and virus interactions with the whole organism, These are also implementing scientific methods for virology through Case-Based Methods through practical works in the lab and field. It is assigned an individual or teamwork including observation of infection and detection of viruses on the bacteria, plant, animal, and human by project report and presentation in class. |
| Examination forms | Lecture-Discussion Evaluation a. Fill the blank (10%) b. Essay test (20%) Laboratory Work Evaluation a. Equipment/Software Observation (10%) b. Report (10%) c. Field work d. Final report (10%) e. Report presentation (10%) f. Case Method Evaluation g. Progress Report (10%) h. Final Report (10%) i. Topic Presentation (10%) |



| | |
|------------------------------------|--|
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Acheson, N.H. 2011. Fundamentals of Molecular Virology. John Wiley & Sons, Inc. 2. Dimmock, N.J., A.J. Easton, and K.N. Leppard. 2016. Introduction to Modern Virology. Seventh Edition. Wiley Blackwell. 3. John Carter and Venetia Saunders. 2013. Virology: Principles and Applications. 2nd Edition. Wiley. 4. Korsman S.N.S., Gert U. van Zyl, L. Nutt, M.I. Anderson, and W. Preiser. 2012. Virology: An Illustrated Colour Text. Churchill Livingstone 5. Flint, S.J. , L.W. Enquist, V.R. Racaniello, A.M. Skalka. 2009. Principles of Virology. Third Edition. ASM Press. 6. Wagner E.K., I.M.J. Hewlett, D.C. Bloom, and D. Camerini. 2008. Basic Virology. Third Edition. Blackwell Publishing. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Microbiological Analysis Techniques

| | |
|---|--|
| Module designation | : Microbiological Analysis Technique |
| Semester(s) in which the module is taught | : even/V |
| Person responsible for the module | 1. Dr. Esti Utarti, S.P., M.Si., 2. Dr. Sattya Arimurti, S.P., MSi., 3. Drs. Siswanto, M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Practice-lab works, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture-Discussion: 39.67 hr b. Practical-course (case method): 45.33 hr c. Presentation: 5.67 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Microbial physiology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) |
| Content | This course studies independently and/or in groups through Case Method on natural resources based on laboratory works for microbial activity and identification by using laboratory techniques through practical works . It is assigned in individual or teamwork covering 1) Sterilisation and aseptic techniques, 2) Buffer and growth media of microbes preparation, 3) Microbial isolation and purification techniques, 4) Centrifuge techniques for protein extraction, 5) Spectrophotometry technique for protein and glucose analysis, 6) Dialysis and Chromatography technique for protein separation, 7) Molecular identification of microbe, Data analysis using Microsoft Excel and Primer Software for analyzing of glucose, protein, and enzyme activity assay; using MEGA program to molecular identification of microbes, 8) Results and Discussion of molecular microbes identification, and 9) writing practical work report and presentation in class |
| Examination forms | a. Essay test (20%) b. Assignment or quiz (10%) c. Data analysis (software application) (20%) d. Practical work (25%) e. Presentation (25%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Cappuccino, J.G. and Welsh, C. 2020. Microbiology: A Laboratory Manual. Pearson. 2. Hollas, J.M. 2004. Modern Spectroscopy. 4th ed. John Wiley & Sons. San Francisco. 3. Leung, W. 2007. Centrifugal Separations in Biotechnology. Academic Press. United Kingdom. 4. Lucatorto, L., A. C. Parr and K. Baldwin. 2014. Spectrophotometry: accurate measurement of optical properties of material. Academic Press. Amsterdam. 5. Lundanes, E., L. Reubsaet , and T. Greibrokk. Chromatography. basic Principles, sample preparations and related methods. Wiley=VCH. singapore. 6. Madigan, M.T, J.M Martinko and J. Parker. 2019. Biology of Microorganisms. Prentice Hall. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Bioconversion

| | |
|---|---|
| Module designation | : Bioconversion |
| Semester(s) in which the module is taught | : odd/V or VII |
| Person responsible for the module | 1. Dr. Kahar Muzakhar, S.Si. 2. Drs. Rudju Winarsa, M.Kes. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective- / specialisation |
| Teaching methods | : Lecture- Discussion, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. Lecture-Discussion: 79.33 hr b. Presentation: 11.33 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Microbial Physiology |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3)</p> <p>Competence:</p> <ul style="list-style-type: none"> • Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) • Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | <p>This course is describing the principles of microbial activity that cover dehydrogenation, amination, isomerization, hydroxylation and condensation process</p> <p>There is also implementation of scientific methods through the use of microbial physiology activity in the management of biological resources in tropics that cover 1) Bioconversion of non-edible cellulose to edible cellulose and 2) Bioconversion of raw material resources in tropics independently and/or in groups through Case Method. This course also integrates microbial bioconversion activity in problems solving related to the management of biological resources in tropics that cover: 1) Bioconversion of primary organic waste into ruminant feed, 2) Bioconversion organic waste into biogas, 3) Bioconversion of palm oil waste into biofuel, 4) Bioconversion of molasses becomes bioplastic, 5) Bioconversion of carbonaceous waste into organic acids, 6) Waste bioconversion as a single cell protein production medium, and 7) Writing a report and presentation in class the results of problems solving related to the management of biological resources independently and in groups through microbial bioconversion activity</p> |
| Examination forms | a. Essay test (20%) b. Assignment or quiz (20%) c. Report case (30%) d. Presentation (30%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Babu V., A. Thapliyal, and G.K. Patel. 2014. Biofuels Production. Wiley 2. Cappuccino, J.G. and Welsh, C. 2020. Microbiology: A Laboratory Manual. Pearson. 3. Fang, Z., R. L. Smith, and X. Qi. 2014. Production of Biofuels and Chemicals with Ionic Liquid. Springer. New York. 4. Gupta, R.b. and A. Demirbas. 2010. Gasoline, Diesel, and Ethanol Biofuels from Grasses and Plants. Cambridge University Press. 5. Luque, R., J. Campelo, and J. Clark. 2011. Handbook of Biofuels Production. Woodhead Publishing. 6. Lee, S. and Y.T. Shah. 2013. Bioenergy Processes and Technologies. CRC Press 7. Madigan, M.T, J.M Martinko and J. Parker. 2019. Biology of Microorganisms. Prentice Hall. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Mycology

| | |
|---|---|
| Module designation | : Mycology |
| Semester(s) in which the module is taught | : odd/VI |
| Person responsible for the module | 1. Dr. Drs.Sutoyo, MSi., 2. Drs. Siswanto, M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Project, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. Lecture-Discussion: 45.33 hr b. Project: 45.33 hr c. Presentation: 5.67 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Microbiology |
| Module objectives/intended learning outcomes | <p>Knowledge:</p> <ul style="list-style-type: none"> ● Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence:</p> <ul style="list-style-type: none"> ● Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | <p>This course describe concepts of fungal biology: Describing the development of mycology in aspects of life, the diversity of fungi, anatomical structure and morphology of fungi, nutrition and nutrient transport fungi, primary and secondary metabolism of fungi, differentiation and development of fungi, growth of fungi, the genetics of fungi, identification morphology, physiology, biochemistry and molecular fungi, control of fungal growth, interaction of fungi with other organisms, role of fungi in agriculture, environment, health and industry</p> <p>Practicing laboratory work in groups on the potential exploration techniques of fungi for science, management of biological resources and the environment that covers isolation and purification of mushroom, morphological identification that covers macroscopic and microscopic mushroom and mycorrhizal, screening of amylolytic, lipolytic and cellulolytic activity of fungi, effect of preservatives on the growth of fungi, and analysis of ethanol production by yeast</p> <p>There is also implementation scientific methods with Case Method to demonstrating the activity of protease produced by wild type fungi as a candidate of an insoluble protein hydrolyzing agent in generating valuable protein product that originated from biological resources in tropics (topic of project), proposing the objectives of project topic, implementation suitable method, data analysis (Using excel application software, R Project for Statistical Computing and/or basic instruments for identification of fungal isolates based on grouping</p> |



| | |
|------------------------------------|--|
| | analysis of morphological characteristics), results discussion, writing project report as an scientific article draft and presentation in class |
| Examination forms | a. Essay test (25%) b. Scientific Article of the project (60%), c. Presentation (15%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. DeLucia E. H., J. S. Coleman, T. E. Dawson, and R. B. Jackson. 2001. Plant physiological ecology: linking the organism to scales above and below. <i>New Phytologist</i> 149:12-16. 2. Daubermine, R.F. 1974. <i>Plants and Environment. A textbook of Plant Autecology</i>. Third Edition. John Wiley & Sons, New York. 3. Fitter, A.H. dan R.K.M. Hay. 1994. <i>Fisiologi Lingkungan Tanaman</i> Gadjah mada University Press. Yogyakarta. 4. Larcher, W. 1995. <i>Physiological Plant Physiology</i> third Edition. Berlin: Springer 5. Lambers H, Chapin III, F. S., Pons, T. L. 2008. <i>Plant Physiological Ecology</i> Second Edition. Springer Science & Business Media, LLC, 233 Spring Street, New York 6. Salisbury, F.B. and Ross, C.W. 1999. <i>Plant Physiology</i> 7. Related Article journals or webscience |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Ethnobotany

| | |
|---|---|
| Module designation | : Ethnobotany |
| Semester(s) in which the module is taught | : odd/VI |
| Person responsible for the module | 1. Dra. Dwi Setyati, M.Si 2. Mukhamad Suudi, Ph.D |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Project, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66 hr a. Lecture-Discussion: 33.99 hr b. Project base method : 45,33 hr c. Laboratory work: 11,33 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Plant Systematic |
| Module objectives/intended learning outcomes | <p>Knowledge:</p> <ul style="list-style-type: none"> • Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO 2) • Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence: Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4)</p> |
| Content | <p>This course describe, and analysis: introduction of ethnobotany, methods research and techniques, utilization of plants for traditional ceremonies/rituals, food, clothing, boards, medicine, cosmetics, preservatives, dyes and crafts and their conservation efforts</p> <p>Project Case Method on biological resources threats in tropics through practical/project base. The Project is reported as video and presented in class.</p> |
| Examination forms | Essay test (35%) ; Laboratory work 15% and Project: 50% |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Iis Nur Asyiah dan Sulifah A. Hariani. 2014. Bahan Ajar Etnobotani (Kajian Khusus Masyarakat Osing). 2. Martin, G J. 1995, Ethnobotany: A methods manual. Chapman and Hall, London 3. Ulysses Paulino Albuquerque Washington Soares Ferreira Júnior Marcelo Alves Ramos Patrícia Muniz de Medeiros. 2017. Ethnobotany for Beginners. Springer International Publishing 4. Silalahi, M. Diktat Etnobotani. 2020. Prodi Pendidikan Biologi Fakultas Keguruan Dan Ilmu Pendidikan Universitas Kristen Indonesia. 5. Zikri, M., E Sumartono, Parwito, A Purnomo dan Supriyono. 2018. Ethnobotany of Medical Plants by Rejang Selupu Ethnic Journal of Physics: Conf. Series 1114 (2018) 012130. Page: 1-7 |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS





Ornamental Plant

| | |
|---|---|
| Module designation | : Ornamental Plant |
| Semester(s) in which the module is taught | : <i>odd/V/VII</i> |
| Person responsible for the module | 1. Dra. Dwi Setyati, MSi., 2. Dr.rer.nat. Fuad Bahrul Ulum, M.Sc |
| Language | : <i>Indonesian and English</i> |
| Relation to curriculum | : <i>Compulsory / elective / specialisation</i> |
| Teaching methods | : <i>lecture- Discussion, Presentation, practical course</i> |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66r a. lecture-Discussion: 27.2hr b. Project basemethod: 45,33 hr c. Laboratory work: 18.12 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Plant Systematic |
| Module objectives/intended learning outcomes | <p>Knowledge:</p> <ul style="list-style-type: none"> • Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO 2) • Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence: Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4)</p> |
| Content | <p>This course describe concepts of Ornamental Plant: introduction of ornamental plant(terminology and scope of ornamental plants), types of ornamental plant, propagation and cultivation of ornamental plant, ornamental plant agribusiness /bioentrepreneur ornamental plant. There is also implementation scientific methods for Plant ornamental through Project based Method for cultivation and economy potential improvement, project report as presentation in class</p> <p>Laboratory Works cover: exploring types of ornamental plants around our campus, cut flower, repotting, terrarium, and ornamental plant cultivation.</p> |
| Examination forms | a. Lecture discussion (30%):Essay test 20%, assignment 10% b. Laboratory work (20%): posttest (5%), report (15%) c. Project base method (50%): observation 10%, activity 10%, progress report 10%, final report 20%, |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Agustin, W. 2017. Agribisnis Tanaman Hias.Pusat Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan Pertanian Cianjur. 2. Michael A. Dirr, 1998. Manual of Woody Landscape Plants, Their Identification, Ornamental Characteristics, Culture, Propagation, and Uses., Stipes, Publishing L. L. C., Champaign, Illinois. The Royal Horticultural Society, Encyclopedia of Gardening. Christopher Brickell, 1992, Dorling Kindersley. |



| | |
|--|--|
| | <ol style="list-style-type: none"> 3. Center for Internaional Economics. 1996. The Cut Flower Industry: R&D Issues. ACIAR Technical Reports No. 39, 80p. 4. W. Arthur Whistler. 2000. Tropical Ornamentals: A Giude. Timber Press, Incorporated. 5. M. Silalahi. Bahan Ajar Kultur Jaringan. 2015. Prodi Pendidikan Biologi Fakultas Keguruan Dan Ilmu Pendidikan Universitas Kristen Indonesia. 6. Suwandi. Petunjuk Teknis Perbanyakakan Tanaman Dengan Cara Sambungan (Grafting)..Balai Besar Penelitian Bioteknologi dan Pemuliaan Tanaman Hutan Yogyakarta . Hal: 1-10. https://www.forda-mof.org/files/Suwandi.pdf. 7. T. Widyastuti. 2018. Teknologi Budidaya Tanaman Hias Agribisnis. |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Natural Medicine

| | |
|---|---|
| Module designation | : NATURAL MEDICINE |
| Semester(s) in which the module is taught | : odd/V/VII |
| Person responsible for the module | 1. Mukhamad Su'udi, PhD. 2. Prof. Bambang Sugiharto |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload:90.67 hr a. lecture- Discussion: 27.2 hr b. Project: 45.33 hr c. Presentation: 18.13 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Biochemistry, Plant Systematics |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course Describe and analysis scope of Natural medicine: definition and terminology, medicinal plant (in Indonesia) as source for natural medicine, classification of natural medicine as standardised by government regulation (BPOM), and the update amount of product for each level.It integrating bioscience for proposing/ or giving the recommendation as a solution (Case-based Method)of the problems found in the society regarding to the ingredients used and processing applied for natural medicine production. The course also provides specific skill for each student to practice the basic steps for producing natural medicine in the form of simplisia (or jamu) through Project-based activity starting from selecting the ingredients until product packaging, as well as the prototype name, excellency and recommended pricing, then presenting the results in front of class or as poster or paper/ manuscript. |
| Examination forms | a. Project (50%) b. Case-study (20%) c. Presentation (30%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Heinrich et al. 2012. Fundamentals of Pharmacognosy and Phytotherapy. 2nd edition. Elsevier. 2. Mitra et al. 2007. Medicinal plants of Indonesia. APBN Vol. 11 No.11. 3. Elfahmi et al. 2014. Jamu: Indonesian traditional herbal medicine towards rational phytopharmacological use. Journal of Herbalmedicine. 4. Pedoman Fitofarmaka. 1992. Menteri Kesehatan Republik Indonesia. |



Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x
16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Bryology

| | |
|---|--|
| Module designation | : Bryology |
| Semester(s) in which the module is taught | : odd/V/VII |
| Person responsible for the module | 1. Dra. Dwi Setyati, MSi., 2. Dr.rer.nat. Fuad Bahrul Ulum, S,Si. M.Sc |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload:90.7 hr a. lecture-Discussion: 18.13 hr b. Project method with Practical course: 54.39 hr c. Case method: 18.13 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Plant Systematic |
| Module objectives/intended learning outcomes | <p>Knowledge:</p> <ul style="list-style-type: none"> • Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO 2) • Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7)</p> |
| Content | <p>This course describes concepts of Bryology: Describe the principal concept of Bryophytes diversity, herbarium and its curation, systematic, and conservation.</p> <p>There are also implementation scientific methods for bryophytes identification through a Project-based Method by examining the structural diversity and identification of specimens collected in the natural forests through east java. The second task is analyzing the problem of bryophytes conservation in the tropics based on literature study.</p> |
| Examination forms | Essay test (20%); Project-based method (60%); Case method (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Eddy, A. 1998. A Handbook of Malesian Mosses Volume 1,2,3. London: British Museum (Natural History). 2. Gradstein, Churchill and S. Allen. 2001. Guide to Bryophytes of Tropical America. 3. Goffinet, B., dan Shaw, A. J. 2009. Bryophyte Biology. Cambridge: Cambridge University Press. 4. Gradstein, S. R. 2011. Guide to the Liverworts and Hornworts of Java. Bogor: SEAMEO-BIOTROP 5. Vanderpoorten, A. and Goffinet, B., 2009. Introduction to bryophytes. Cambridge University Press. |



| | |
|--|--|
| | 6. Tuba, Z., Slack, N.G. and Stark, L.R. eds., 2011. Bryophyte ecology and climate change. Cambridge University Press. |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Phytohormone

| | |
|---|---|
| Module designation | : Phytohormone |
| Semester(s) in which the module is taught | : even/VI |
| Person responsible for the module | 1. Prof. Bambang Sugiharto, M.Sc., Ph.D. 2. Dra. Dwi Setyati, MSi., |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr lecture-Discussion: 31.7 hr Laboratory work : 13.62hr Project base method :45.33hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Plant Physiology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course describes concepts of Phytohormone: Describe the principle concept of plant phytohormones, auxin, gibberellins, cytokinin, ethylene, abscisic acid, and another plant hormones concept (Brassinosteroide, Jasmonic acid, steroid) and application of phytohormone in the field of biology and agriculture. Laboratory (Project base) : parthenocarpy, apical dominance, dormancy breaking (seed germination), cut flower preservation, triple response, fruit ripening There are also implementation scientific methods for Phytohormone through Project Base Method by the topic of parthenocarpy for seedless fruit and breaking seed dormancy writing project report as an scientific article draft and presentation in class. |
| Examination forms | a. Lecture discussion (35%) : Essay test (20%), assignment (15%) b. Laboratory works : 15% (activity 5%, report 10%) c. Project base method (50%) : Observation (5%), progress report (10%), final report (15%), presentation (5%), draft article (15%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Davies, P.J. 2004. Plant Hormones Biosynthesis, Signal Transduction, Action. Kluwer Academic Publishers, Dordrecht/Boston/London. 2. Hopkins, W.G. 1999. Introduction to Plant Physiology. Second Edition. John Wiley & Sons, Inc..New York. 3. Krishnamoorthy, H.N. 1981. Plant Growth Substances Including Application in Agriculture. Tata McGraw-Hill Publishing Company Limited. New Delhi. |



| | |
|--|--|
| | <ol style="list-style-type: none">4. Srivastava, L.M.2002. Plant Growth and Development, Hormones and Environment Academic Press Elsevier Science, USA.5. G.A. Wattimena.1988. Zat Pengatur Tumbuh Tanaman. Second University Development Project IBRD LOAN No. 2547-IND. PAU Institut Petanian Bogor Bekerjasama dengan Lembaga Sumberdaya Informasi-IPB6. F. Eyidogan, K.T. Oz, M. Yucel, H.A. Oktem (auth), Nafees A Khan, Rahat Nazar, Noushina Iqbal, Naser A. Anjum. 2012. Phytohormones and Abiotic Stress Tolerance in Plants. Springer-Verlag Berlin Heidelberg |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Plant Ecophysiology

| | |
|---|---|
| Module designation | : Plant Ecophysiology |
| Semester(s) in which the module is taught | : odd/V/VII |
| Person responsible for the module | 1. Dra. Dwi Setyati, MSi., 2. Dr.rer.nat. Fuad Bahrul Ulum, M.Sc |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project-Laboratory/Field Works, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 18,13 hr b. Laboratory Works: 0 hr c. Project base method: 54.39 hr d. Topic Presentation: 18.13 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Terrestrial Ecology and Plant Physiology |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3)</p> <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence:</p> <ul style="list-style-type: none"> • Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) • Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | <p>This course describe concepts of Plant Ecophysiology Describe the principle concept of plant ecophysiology, Response of plants to the physical environment (light, water and temperature), Plant response to chemical environment (salinity, minerals and nutrients), Plant response to biological environment (herbivory, carnivory, pollinator, disseminator, parasite, symbiotic N fixation, allelopathy), Carbon utilization and biomass production (C3, C4 and CAM plants), Stress, hormone on plant growth and development, and Plant Strategy-CSR; There is also implementation Project Based Method through laboratory/by Identifying problem of plant ecophysiology in the tropics (topic of project), proposing the objectives of project topic, implementation suitable method, data analysis (Using Excel, SPSS, or other statistic applications for data analysis in Plant Ecophysiology Project), results discussion, writing project report as an scientific article draft and presentation in class. This project is done through laboratory or field work on the effect of soil field capacity, light intensity, water availability, salinity, and nutrition availability on plant growth, and analysis of plant strategy on environmental conditions through field work.</p> |
| Examination forms | a. Essay test (20 %) b. Case study (20 %) |



| | |
|------------------------------------|--|
| | c. project report and draft article (60%): progress report (10%), final report (10%), draft article (20%), Presentation (10%), Software application (10%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. DeLucia E. H., J. S. Coleman, T. E. Dawson, and R. B. Jackson. 2001. Plant physiological ecology: linking the organism to scales above and below. <i>New Phytologist</i> 149:12-16. 2. Daubermine, R.F. 1974. <i>Plants and Environment. A textbook of Plant Autecology. Third Edition.</i> John Wiley & Sons, New York. 3. Fitter, A.H. dan R.K.M. Hay. 1994. <i>Fisiologi Lingkungan Tanaman</i> Gadjah mada University Press. Yogyakarta. 4. Larcher, W. 1995. <i>Physiological Plant Physiology</i> third Edition. Berlin: Springer 5. Lambers H, Chapin III, F. S., Pons, T. L. 2008. <i>Plant Physiological Ecology</i> Second Edition. Springer Science & Business Media, LLC, 233 Spring Street, New York 6. Salisbury, F.B. and Ross, C.W. 1999. <i>Plant Physiology</i> 7. Related Article journals or webscience |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Orchidology

| | |
|---|--|
| Module designation | : <i>ORCHIDOLOGY</i> |
| Semester(s) in which the module is taught | : <i>even/VI/VIII</i> |
| Person responsible for the module | : <i>1. Mukhamad Su'udi, PhD. 2. Dr.rer.nat Fuad Bahrul Ulum, M.Sc</i> |
| Language | : <i>Indonesian and English</i> |
| Relation to curriculum | : <i>Compulsory</i> / <i>elective</i> / <i>specialisation</i> |
| Teaching methods | : <i>lecture- Discussion, Project, Presentation,</i> |
| Workload (incl. contact hours, self-study hours) | <i>(Estimated) Total workload:90.67 hr a. lecture- Discussion: 27.2 hr b. Project: 45.33 hr c. Presentation: 18.13 hr</i> |
| Credit points | : <i>2 credits or 3.02 ECTS</i> |
| Required and recommended prerequisites for joining the module | : <i>Plant Systematics</i> |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | <i>This course Describe and analysis scope of Orchidology: morphology, systematics, the use of orchids as ornament and others (food, medicine, aphrodisiac, cosmetics), propagation/ cultivation, and product management for agribusiness commodities. It integrates bioscience for proposing/ or giving the recommendation as a solution (Case-based Method)of the problems found in orchid cultivation areas in order to meet predetermined standards for orchid management and conservation issues. The course also provides specific skills for each student to learn orchid propagation/ cultivation through Project-based activity starting from selecting the parental line, crossing, until the emergence of fruit obtained from crossing, then presenting the results in front of class or as a paper/ manuscript.</i> |
| Examination forms | <i>1. Project (50%) 2. Case-study (20%) 3. Presentation (30%)</i> |
| Study and examination requirements | : <i>passing grade 70% Requirements for successfully passing the module</i> |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. E. S. Teoh, <i>Medicinal orchids of Asia</i>. Singapore: SpringerNature, 2016. 2. S. Bottom, <i>Orchid Plant Parts and Why They Matter</i>. St. Augustine Orchid Society. (www.staugerchidsociety.org). 3. E. S. Teoh, <i>Orchids as aphrodisiac, medicine or food</i>. Singapore: Springer Nature, 2019. 4. Assagaf MH. <i>1001 Spesies Anggrek yang Dapat Berbunga di Indonesia</i>. Jakarta: Kataelha. 2012. 5. <i>International Code Of Botanical Nomenclature online website</i> (https://www.iapptaxon.org/icbn/main.htm). 6. M. M. Hossain, R. Kant, P. T. Van, B. Winarto, S. Zeng, and J.A. Teixeira da Silva, <i>The Application of Biotechnology to Orchids, Critical Reviews in Plant Sciences</i>, vol. 32, no. 2. pp.69–139. 2013. 7. Shao SC, Burgess KS, Cruse-Sanders JM, Liu Q, Fan XL, Huang H, Gao JY. <i>Using in situ symbiotic seed germination to restore over-collected medicinal orchids in Southwest China</i>. <i>Frontiers in plant science</i>. 2017. 8. Lee Yi. <i>In vitro culture and germination of terrestrial Asian orchid seeds</i>. In <i>Plant Embryo Culture</i>. 2011. |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Animal Reproduction

| | |
|---|--|
| Module designation | : Animal Reproduction |
| Semester(s) in which the module is taught | : odd |
| Person responsible for the module | 1. Dr. Asmoro Lelono, M.Si 2. Dra. Susantin Fajariyah, M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Presentation, Project Based Method |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr lecture-discussion: 34.00 hr Presentation : 11.33 hr Project based method: 45.33 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Animal development |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: Able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach (LO 5) |
| Content | This course describes the concept of animal reproduction including oogenesis, spermatogenesis, puberty, reproductive cycle, ovulation, Fertilisation, implantation, parturition, lactation, insemination, cryopreservation, In vitro fertilisation, embryo transfer, embryo clone. Laboratory work was implied by the project method. |
| Examination forms | <ul style="list-style-type: none"> ● Essay test (30 %) ● Presentation: (10 %) ● Project based method: (60 %) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | <ol style="list-style-type: none"> 1. Hafest, E.S.E., & B. Hafest. 2000. Reproduction in Farm animal. Seventh Edition. Lippincott Williams & Wilkins USA 2. Johnson, M. & B. Everitt. 2007. Essential Reproduction. Third edition. Blackwell Scientific Publication, London 3. Liu. E. & J. Fan. 2018. Fundamentals of Laboratory Animal Science. CRC Press: London 4. Neill, J. D. (Ed). 2006. Knobil and Neill's Physiology of Reproduction. Academic Press, USA 5. Schatten, H., & G. M. Constantinescu. 2007. Comparative Reproductive Biology. Blackwell Publishing Ltd: Australia |

Credits to ECTS conversion formula 1 SKS TM = 50 min T+60 min TS+60 min M (170 minutes)
x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Parasitology

| | |
|---|---|
| Module designation | : Parasitology |
| Semester(s) in which the module is taught | : Odd |
| Person responsible for the module | 1. Purwatiningsih, S.Si., M.Si., Ph.D. 2. Dr. Drs. Hidayat Teguh Wiyono, M.Pd. 3. Husnatun Nihayah, S.Si., M.Biomed. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation shared with bachelor in biology of University of Malang |
| Teaching methods | : Lecture- Discussion, Laboratory work, Project Based Method |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90,67 hr a. Lecture-Discussion: 45,33 hr b. Laboratory work: 11,33 hr c. Project Based Method: 34,00 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Animal Systematic |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) |
| Content | This course describes concepts parasitology about the definition, terms and scope of parasitology; knowledge of morphology, life cycle, pathology, infective stage, epidemiology, diagnosis and prevention efforts in animals that are parasitic from the group of protozoa, helminths and insects. There are also describing and analysing the article of parasitology. Laboratory works cover: the morphology of parasitic agents from protozoa (Ciliophora, Mastigophora, Sporozoa), helminth (Nematoda, Cestoda, Trematoda) and arthropoda (Arachnida, Insecta) There are also scientific methods for parasitology through a Project Based Method by parasit collection. The project result then will be shown by the article draft and presentation. |
| Examination forms | a. Essay test (5%) b. Paper review (10%) c. Assignment (10%) d. laboratory work report (10%) e. Project based methods: ● Design methods (10%) ● Writing draft article: (45%) ● Project presentation (10%) |
| Study and examination requirements | : Requirements for successfully passing the module |
| Reading list | a. Levin, N. D. 1995. Protozoologi veteriner. Gajah Mada University Press. Yogyakarta |



| | |
|--|---|
| | <p>b. Marvin C Meyer and O.Wilford Olsen, 1976. Essential of Parasitology, 2nd Ed, Dubuque, IOWA: WMC Brown Company Publisher</p> <p>c. Raymond M. Cable, 1965 an illustrated laboratory manual of Parasitology. Minneapolis, Burgess: Publishing Company</p> <p>d. Sutanto I, Ismid I S, Sjarifuddin P, Sungkar S. 2008. Parasitologi Kedokteran, edisi ke 4. Fakultas Kedokteran Universitas Indonesia. Jakarta</p> <p>e. Pusarawati S, Ideham B, Kusmartisnawati, Tantular I, Basuki S. 2009. Atlas Parasitologi Kedokteran. Penerbit Buku Kedokteran EGC. Jakarta.</p> <p>f. Balai Besar Penelitian dan Pengembangan Vektor dan Reservoir Penyakit, Badan Penelitian dan Pengembangan Kesehatan. 2017. Pedoman Pengumpulan Data Vektor (Nyamuk) di Lapangan. Kementerian Kesehatan RI. Jakarta</p> <p>g. Diez-Fernandez, Puenten J, Gangoso L, Lopez P, Sorigues R, Martin J, Figueralo J. 2020. Mosquitoes are attracted by the outdoors of Plasmodium-infected birds. International Journal for Parasitology Volume 50, Issue 8, July 2020, hal. 569-575</p> |
|--|---|

Credits to ECTS conversion formula 1 SKS TM = 50 min T+60 min TS+60 min M (170 minutes)
 x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Animal Behaviour

| | |
|---|---|
| Module designation | : Animal Behaviour |
| Semester(s) in which the module is taught | : even/II |
| The Person responsible for the module | 1. Dr. Asmoro Lelono M.Si 2. Eva Tyas Utami, S.Si, M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory /elective / specialisation shared with a bachelor in Chemistry of University of Jember and bachelor in the Biology of University of Malang |
| Teaching methods | : Lecture-Discussion, Project base study, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90,67 hr a. lecture-discussion: 56,67 hr b. project base method: 11,33 hr c. presentation: 22,67 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Animal Systematic |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course describes concepts of behaviour, the mechanisms that underlie the emergence of behaviour, physiological-ecological relationships and behaviour, individual behaviour: innate and learned behaviour, migration and navigation, behaviour in groups: competition for resources, mating and child care systems, and the role of understanding animal behaviour for human interests There is also implementation of scientific methods for animal behaviour through a Project-based Method by problem solving related to certain major issues in animal behaviour (reproductive, parenting, social behaviour). The project result then will be shown by the project report and presentation . |
| Examination forms | essay test (20%); a. project report (30%) b. activity observation (10%) c. project report (20%) d. Presentation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. A Lelono, B Riedstra, TGG Groothuis, The relationship between male social status, ejaculate and circulating testosterone concentration and female yolk androgen transfer in red junglefowl (<i>Gallus gallus</i>). Hormones and Behavior 116, 104580 2. Ucu Julita, Lulu Lusianti Fitri, Ramadhani Eka Putra and Agus Dana Permana, Mating Success and Reproductive Behavior of Black Soldier Fly <i>Hermetia illucens</i> L. (Diptera, Stratiomyidae) in Tropics, Journal of Entomology, DOI: 10.3923/je.2020.117.127 |



| | |
|--|--|
| | <ol style="list-style-type: none">3. Drickamer, L.C., Vessey, S.H., Jakob, E.M. 2002. <i>Animal Behavior: Fifth Edition</i>. McGraw-Hill4. Alcock, J., 2009. <i>Animal behavior: An evolutionary approach</i>. Sinauer associates.5. Hogan, J.A., 2017. <i>The study of behaviour: organisation, methods, and principles</i>. Cambridge University Press.6. BOLHUIS, J.J., <i>The Behavior of Animals: Mechanisms, Function and Evolution</i> Oxford: Blackwell Publishing, 2005, 536 pages (ISBN 0-631-23125-0, US \$69.95 Paperback). |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50 min T+60 min TS+60 min M (170 minutes)
x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Entomology

| | |
|---|---|
| Module designation | : Entomology |
| Semester(s) in which the module is taught | : Odd |
| Person responsible for the module | 1. Purwatiningsih, S.Si., M.Si., Ph.D. 2. Husnatun Nihayah, S.Si., M.Biomed. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Laboratory work, project based methods |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90,67 hr a. Lecture-Discussion: 45,33 hr b. Laboratory work: 2,83 hr c. Project based method: 42,50 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Animal Systematic |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) |
| Content | This course describes entomology about concepts of insect biology, evolution and coevolution, insect morphology, digestive system, circulatory system, respiratory system, muscular system and movement. Excretory system, nervous system, endocrine system, reproductive system, development and metamorphosis, behaviour and ecology, social insects, useful insects, nuisance insects and IPM. There are also describing and analysis the article of entomology Laboratory works cover: observing the anatomy and morphology of insects. There are also implementation scientific methods for entomology through a Project Based Method by insect collection and preservation. The case result then will be shown by the project progress and insectarium product. |
| Examination forms | a. Essay test (15%) b. Assignment (10%) c. Paper review (10%) d. Laboratory work - Project Based Method: Post test (5%); Project design (20%); Mounting process (10%); case method product (insectarium) (20%); Project presentation (10%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Gullan, P.J. & Cranston, P.S. (2000). The insects: an outline of entomology (second edition). Blackwell Science, Oxford, UK. 2. Romoser, W. S. (1981). The Science of Entomology. Maxmillan Publishing, New York. |



| | |
|--|--|
| | <ol style="list-style-type: none">3. McGavin, G.C (2000). Essential Entomology: An order-by-order Introduction. Oxford University Press, Oxford, England, UK.4. Elzinga, R.J. 1978. Fundamentals of Entomology. New Jersey: Prentice Hall Inc.5. Untung K. 1996. Pengantar Hama Terpadu, Yogyakarta: Gadjah Mada University Press. |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50 min T+60 min TS+60 min M (170 minutes)
x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Endocrinology

| | |
|---|---|
| Module designation | : Endocrinology |
| Semester(s) in which the module is taught | : even/II |
| The Person responsible for the module | 1. Dr. Asmoro Lelono M.Si 2. Husnatun Nihayah, S.Si,M.Biomed |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory /elective / specialisation |
| Teaching methods | : Lecture-Discussion, Case study, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90,67 hr a. lecture-discussion: 45,33 hr b. Case base method: 11,33 hr c. Presentation: 34 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Animals Physiology |
| Module objectives/intended learning outcomes | <p>Knowledge:</p> <ul style="list-style-type: none"> • Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO 2) • Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) <p>Competence: Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4)</p> |
| Content | <p>This course describes concepts the scope of endocrinology; understanding and classifying hormones, especially chemical structures, biological activities of the glands and hormone products synthesized by the thyroid gland, gastrointestinal hormones which include pancreatic hormones and gastrointestinal hormones, reproductive hormones, hormone receptors in the membrane and cytoplasm also discuss communication between cells, hormonal disorders.</p> <p>There are also implementation scientific methods for endocrinology through a Case-based Method by problems solving related to thyroid gland and its synthesized hormone products, reproductive hormones by type and function in each sex, gastrointestinal hormone along with the types of enzymes and their functions, adrenal glands and their synthesized hormone products. The project result then will be shown by the case report and presentation.</p> |
| Examination forms | a. Essay test (40%) a. case report: activity observation (5%); progress report (5%); case report (20%); Presentation (30%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Gardner, D.G. and Shoback, D.M., 2017. Greenspan's basic and clinical endocrinology. McGraw-Hill Education. 2. Larry, J.J., 2013. Harrison's endocrinology. 3. Badiu, C., 2019. Williams textbook of endocrinology. Acta Endocrinologica (Bucharest), 15(3), p.416. |



Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x
16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Immunology

| | |
|---|--|
| Module designation | : Immunology |
| Semester(s) in which the module is taught | : Even/VI |
| Person responsible for the module | 1. Dr. Rike Oktarianti, M.Si 2. Syubbanul Wathon, S.Si, M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion-assignment, Practical course |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90,6 hr a. Lecture-Discussion: 45,3 hr b. Assignment/presentation 8,5 hr c. Practical course: 36,83 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) |
| Content | This course describes the history of immunology, basic principles of immunology, cells in the immune system, non-specific and specific immune responses, antigens, immunoglobulins, immune system mechanisms in eliminating infectious agents (bacteria, viruses, tumors), hypersensitivity reactions, autoimmune diseases., antibody production techniques (monoclonal and polyclonal), as well as vaccine development and application. Review. Laboratory works cover: testing of antigen-antibody reactions by rhesus testing, determination of the number of leukocytes, isolation and extraction of mosquito salivary gland proteins, qualitative analysis of the human immune response by dot blot and westerns blot analysis and quantification analysis of human immune responses by Elisa analysis. |
| Examination forms | a. Essay test (35%) b. Quiz (15%) c. Assignment (individual/team work observation(20%) d. Practical course (30%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Abbas A.K., Lichtman A.H., 2005, Cellular and Molecular Immunology, 5th Ed., WB Saunders Co., Philadelphia 2. Baratawidjaja K. G., 2002, Imunologi Dasar, Edisi V, Balai penerbit FKUI, Jakarta 3. Brown F., Dougan, Hocy E.M., Martin S.J., Rima, B.K., and Trudgett A., 1993, Vaccine Design, John Wiley & Son, West Sussex 4. Burgess G. W, 1995, Teknologi Elisa Dalam Diagnosis dan Penelitian, Cetakan Pertama, Gadjah Mada University Press, Yogyakarta |



Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x
16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Human Physiology

| | |
|---|--|
| Module designation | : Human Physiology |
| Semester(s) in which the module is taught | : Even |
| Person final practical testble for the module | 1. Dr. Teguh Hidayat Wiyono, M.Pd 2. Dra. Susantin Fajariyah, M.Si 3. Husnatun Nihayah, S.Si, M.Biomed |
| Language | : Bilingual |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Practical course, presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. Lecture-Discussion: 34. hr b. Practical course: 45.33 hr c. Presentation : 11.33 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Animal Physiology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) |
| Content | This course describes the principles of human physiology in group. The basic principles of human physiology, Homeostasis, Stimulus, Nerve response, Endocrine glands, Hematopoiesis, Blood pressure, Reproductive system, Regulation of breathing, Mechanism of urine formation, Digestion and absorption of nutrients, and gastrointestinal regulation. |
| Examination forms | 1. Essay test (40 %) 2. Presentation : (30%) 3. Laboratory work: (30%) a. Pre-test (5%) b. laboratory work Observation (activities) (5%) c. laboratory work report (10%) d. final practical test (10%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Barret, K., Brooks, H., Boitano, S., & Barman.2010. Ganong's Review of Medical Physiology. 23 Ed. Mc.Graw-Hill Companies, Inc. New York. 2. Sherwood. 2010. Human physiology from cell to system. 7 Ed. Brooks/Cole, Cengage Learning, US 3. Stanfied, C.L. 2013. Principal of Human Physiology. 5Ed. Pearson Education. USA 4. Tortora, G.J & Nielsen, M.T. 2017. Principal of Human Anatomy. 14 Ed. Jonh Wiley and Sons, Inc. USA. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Ecotourism

| | |
|---|--|
| Module designation | : ECOTOURISM |
| Semester(s) in which the module is taught | : odd/V/VII |
| Person responsible for the module | : 1. Dra. Hari Sulistiyowati, MSc., PhD. 2. Rendy Setiawan, SSi., MSi. 3. Arif Mohammad Siddiq, SSi., MSi. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture- Discussion: 45.34 hr b. Project Based Method : 45.34 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Terrestrial Ecology and Aquatic Ecology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Competence: <ul style="list-style-type: none"> ● Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course analyzes concepts of Ecotourism: Definition, Types and Policy Potential Tourism Destination in tropics, Project Based Method (scientific methods) for ecotourism development (4A-Attraction, Accessibility, Amenity, Ancillary) by conducting a comprehensive analysis of areas to be developed into ecotourism destinations. The integration of the four components (4A) needs to be planned and analyzed by considering all aspects of funding, human resources, infrastructure, organization, and policies, including involvement at the community level, village government, sub-district, district, and province as scientific article. The final project is communicated through presentation in class covering Promotion (7 P- Product, Positioning, Price, Promotion, Place, Packaging, Partnership) |
| Examination forms | a. Essay test (30%) b. Project Based Evaluation (70%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Drumm A & A Moore. 2002. An Introduction to Ecotourism Planning Vol 1. The Nature Conservancy, Arlington, Virginia, USA 2. Fennell, D.A. and Dowling, R.K. 2003. Ecotourism Policy and Planning. CABI Publishing. UK 3. Weaver DB. 2001. The Encyclopedia of Ecotourism. CAB International 4. Wood, ME. 2002. Ecotourism. Principles, Practices and Policy for Sustainability. UNEP 5. Indonesia Regulation related to Ecotourism |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS

Valuation of Natural Resources

| | |
|---|--|
| Module designation | : Valuation of Biological Resources |
| Semester(s) in which the module is taught | : even/VI |
| Person responsible for the module | <ol style="list-style-type: none"> 1. Dra. Hari Sulistiyowati, MSc., PhD. 2. Rendy Setiawan, SSi., MSi. 3. 3. Arif Mohammad Siddiq, SSi., MSi. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, laboratory work, field work, project study |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture- Discussion: 22.67 hr b. Case Based Method: 22.67 hr c. Practical Work Based Project: 45.34 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Terrestrial Ecology and Aquatic Ecology |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3)</p> <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7)</p> |



| | |
|--------------------------------|---|
| Content | <p>This course Describe and analysis: Health Ecosystem, Structure or Goods Functions or Services, Biological resources (Plant,wildlife, and aquatic fauna) Valuation Application, Forest Ecosystem ValuationEcosystem Degradation.</p> <p>Project Based Method on biological resources threats in tropics through practical and field works. It assigned in individual or teamwork covering 1) determination of title of independent research - biological resources Valuation (Determination of Tangible and intangible value Plants, wildlife or aquatic fauna in tropic), 2) Preparation of independent research background, 3) The method of collecting data on the structure and function (tangible and intangible values), 4) Analysis of Plants, wildlife or aquatic fauna structure data in tropic, 5) Analysis of Plants, wildlife or aquatic fauna function data in tropic, 6) Data analysis (Using Microsoft Excel and Primer Software) of Total Ecological Value of Plants, wildlife or aquatic fauna in tropic, 7) Results and Discussion of Project . The Project is reported as a scientific article draft and presented in class.</p> |
| Examination forms | <ol style="list-style-type: none"> Essay test (15%) Case Based Evaluation (15%) Practical Work Based project (70%) |
| Study examination requirements | <p>: passing grade 70%</p> <p>Requirements for successfully passing the module</p> |
| Reading list | <ol style="list-style-type: none"> Brauman, K. D. (2007). The Nature and Value of EcosystemServices: An Overview Highlighting Hydrologic Services. Annu. Rev. Environ. Resour. 32 (2007) , 67–98. Cardinale, B.J., Duffy, M., Gonzalez, A., Hooper, D.U., Perrings, C., Venail, P., Narwani, A., Mace, G.M., Tilman, D., Wardle, D.A., Kinzig, A.P., Daily, G.C., Loreau, M.C., Grace, J.B., Larigauderie, A., Srivastava, D., and Naeem, S. Review: Biodiversity loss and its impact on humanity. Nature 486 (2012): 59-67 CBD, 2009, Forest Resilience,Biodiversity,and Climate Change: A Synthesis of the Biodiversity/Resilience/Stability Relationship in Forest EcosystemsTechnical No. 43 the Convention of Biodiversity (CBD). Sulistiyowati, H. and Buot, I.E. 2016. Ecological Valuation Tools To Appraise Biomass, Necromass And Soil Organic Matter In A Natural Forest Ecosystem. J. Wetlands Biodiversity 6: 97-108 Costanza, R. d. (Vol 38 (1997)). The value of the world's ecosystem services and natural capital. Nature 38. Nature . Costanza, R., 2000. Social goals and the valuation of ecosystem services. Ecosystems 3: 4–10. B, Kautsky N, Levin S, Lubchenco J, Mäler KG, Simpson D, Starrett D, Tilman D, Walker B.2000. Ecology. The value of nature and the nature of value. Science 289(5478):395-6. Straton, A. 2006. A complex systems approach to the value of ecological resources. Ecological Economics 56 (3): 402–411 Related Scientific Article Journals or Webscience |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Environmental Biomonitoring

| | |
|---|---|
| Module designation | : ENVIRONMENTAL BIOMONITORING |
| Semester(s) in which the module is taught | : odd/V/VII |
| Person responsible for the module | : 1. Dr. Dra. Retno Wimbaningrum, M.Si. 2. Rendy Setiawan, SSi., MSi. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, Laboratory work, Project study, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture- Discussion: 22.67 hr b. Case Based Method : 22.67 hr c. Practical Work Project Based 45.34 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Environmental Sciences |
| Module objectives/intended learning outcomes | <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Knowledge: Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO 2)</p> <p>Competence:</p> <ul style="list-style-type: none"> • Able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach (LO 5) • Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course describes, and correlates the basic concepts that are relevant to environmental biomonitoring. It implements scientific methods (Project Based Method) for biological environmental quality assessment by analyzing: river water, lake water, air and intertidal zone quality through practical, problems solving in environmental quality assessment in tropics through presentation and paper draft |
| Examination forms | <ul style="list-style-type: none"> • Essay test (15%) • Case Based Evaluation (30%) • Practical Work Based project (55%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. Borja, A., Franco, J., and Perez, V. 2000. A marine biotic index to establish the ecological quality of soft-bottom benthos within the European estuarine and coastal environment. <i>Marine Pollution Bulletin</i>. 40 (12): 1100-1114. 2. Mandaville SM. 2002. Benthic macroinvertebrates in freshwaters-taxa tolerance values, metrics, and protocols. Project H-1, Soil & Water Conservation Society of Metro Halifax. California (US). 3. Merritt, R.W. & Cummins, K.W. 1996. An introduction to the aquatic insects of North America. 3rd Ed. Kendall/Hunt Publishing Company. Iowa. 4. Neher, D.A. 2001. Role of nematodes in soil health and their use as indicators. <i>Journal of Nematology</i>, 33(4):161–168. 5. Pulak D. S. Joshi, J.Rout & D. K. Upreti. 2013. Lichen Diversity For Environmental Stress Study: Application Of Index Of Atmospheric Purity (IAP) And Mapping Around A Paper Mill In Barak Valley, Assam, Northeast India. <i>Tropical Ecology</i> 54(3): 355-364. 6. Rosenberg, D.M. & Resh, V. H. 1993. Freshwater biomonitoring and benthic macroinvertebrates. Chapman and Hall. New York. 7. Soto, R.L. 2012. Nematodes as soil quality indicators in coffee systems. Thesis. Wageningen University. Wageningen. 8. |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Biogeography

| | |
|---|--|
| Module designation | : Biogeography |
| Semester(s) in which the module is taught | : Odd/V or VII |
| Person responsible for the module | 1. Dra. Hari Sulistiyowati, MSc., PhD 2. Dra. Rike Oktarianti, MSi., PhD. 3. Arif Mohammad Siddiq, SSi., MSi. |
| Language | : English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project-lab works, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.66hr a. lecture-Discussion: 25.50 hr b. Case Based Method: 19.83 hr c. Practical Work Based Project: 45.34 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Fundamental Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course is describe and analysis scope of Biogeography of tropical species: Definition and Importance of Biogeography, History of Biogeography, Ecological Biogeography, Paleoecology Evolution and Speciation, Island Biogeography (Evolution, Immigration, Extinction), Plate Tectonics (Impacts on Flora and Fauna), Phytogeography (Provincialism and Floristic Kingdom) Concept of Zoogeography, Major biogeographic regions (Palearctic, Nearctic, Paleotropical, Neotropic, Oriental, Australian and Oceanic), Animal Distribution Pattern, Environmental Changes to biogeography, Rarity and Extinction, Hotspots and coldspots fragmentation of the ecosystem, Distribution pattern (Disjunction, Continuous, Cosmopolitan, Endemic) and influencing factors distribution (Long distance and Land bridges), and refugia/ glaciation of tectonic plates. It also implements team work project based research on Flora or Fauna geography through laboratory works covering: specific flora-fauna selected with fossil record, construction of flora-fauna selected phylogenetic by using gene banks and the Mega 7 application , description of the flora-fauna gene-bank tracking through the Mega 7 application, implementation of Bioedit application , fossils Mapping by using the Ocean Drilling Stratigraphic Network (ODSN) application , writing draft article and presenting the result of project on flora and fauna biogeography. |
| Examination forms | a. Essay test (15%) b. Case Based Method (15%) c. Practical Work Based Project (70%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. Cox CB, Moore PD, and Ladle R. 2016. Biogeography: An Ecological and Evolutionary Approach Ninth Edition. London (UK): John Wiley & Sons . 509pp. ISBN 9781118968581 2. Ebach, M. C. 2015. Origins of Biogeography The role of biological classification in early plant and animal geography. Netherlands: Springer. 185pp 3. Strahler, A. 2013. Introducing Physical Geography. USA: John Wiley & Sons. Inc. 661pp 4. Losos, J. B. and Ricklefs, R.E.2010. The theory of island biogeography revisited. New Jersey: Princeton University Press. 495pp 5. Whittaker RJ, Palacios JMF. 2007. Island Biogeography: Ecology, evolution, and conservation Second Edition. New York (US): Oxford University Press. 6. Renema W (Eds). 2007. Biogeography, Time, and Place: Distributions, Barriers, and Islands. Netherlands: Springer 7. Huggett, R. J. 2004. Historical Biogeography: An Introduction. London (UK): Harvard University Press. 456pp 8. Related Scientific articles Journals or web science |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x
 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Wildlife Management

| | |
|---|--|
| Module designation | : Wildlife Management |
| Semester(s) in which the module is taught | : even/VI |
| Person responsible for the module | 1. Dra. Hari Sulistiyowati, M.Sc., Ph.D. 2. Arif Mohammad Siddiq, S.Si., M.Si. |
| Language | English |
| Relation to curriculum | Compulsory / elective / specialisation Chemistry UNEJ |
| Teaching methods | lecture - Discussion, Project Based Method |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture- Discussion: 39.67 hr b. Project Based Method (Project): 51.00 hr |
| Credit points | 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | Terrestrial Ecology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: <ul style="list-style-type: none"> ● Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course describe and analyze the concept of wildlife management: wildlife ecology, habitat management, and population management. This course also implementation scientific methods for Wildlife Management through Case-Based Method by identifying degradation habitat or decreasing population of wildlife, Proposing the objective, selecting the suitable method for wildlife Population or habitat management, Analyze and discussing results, then finally writing a project report as a scientific review article draft and presentation in class. |
| Examination forms | a. Essay test (45%) b. Project Based Method (Project) (65%) |
| Study and examination requirements | Passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. Alikodra, H. 1990. Pengelolaan Satwa Liar [Indonesian]. Bogor (ID): IPB Press. 2. Alikodra, H. 2010. Teknik Pengelolaan Satwa Liar dalam Rangka Mempertahankan Keanekaragaman Hayati Indonesia [Indonesian]. Bogor (ID): IPB Press. 3. Harrison C, Greensmith A. 1993. Birds of The World. New York (US): Dorling Kindersley Handbooks 4. McComb BC. 2007. Wildlife Habitat Management Concepts and Applications in Forestry. New York (US): CRC Press. 5. Mills LS. 2013. Conservation of Wildlife Populations Demography, Genetics, and Management. Oxford (UK): Wiley Blackwell. 6. McComb BC. 2016. Wildlife Habitat Management Concepts and Applications in Forestry 2nd Edition. New York (US): CRC Press. 7. Morrison ML, Mathewson HA. 2015. Wildlife Habitat Conservation Concepts, Challenges, and Solutions. Maryland (US): John Hopkins University Press. 8. Sinclair ARE, Frycell JM, Caughley G. 2006. Wildlife Ecology, Conservation and Management, 2nd Edition. Oxford (UK): Blackwell Publishing 9. Wilson DE. 2015. Wildlife of the world. New York (US): DK Smithsonian. 10. Indonesia Regulation related to Wildlife Management 11. Related Scientific Article Journals or Webscience |
|--------------|---|

Credits to ECTS conversion formula 2 SKS TM = 2 (50min T+60min TS+60min M (170 minutes) x 16 weeks) = 90.67 Hours. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Bio-invasion Ecology

| | |
|---|---|
| Module designation | : Bio-Invasive Ecology |
| Semester(s) in which the module is taught | : odd/V/VII |
| Person responsible for the module | 1. Dra. Hari Sulistiyowati, MSc., PhD. 2. Rendy Setiawan, SSI., MSi. 3. Arif Mohammad Siddiq, SSI., MSi. |
| Language | : English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture- Discussion: 28.33 hr b. Project Based Method: 62.34 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Terrestrial Ecology and Aquatic Ecology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Competence: <ul style="list-style-type: none"> ● Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course Describe and analysis scope of Bio-invasion Ecology: Terminology and Development of Bio Invasive, Invasion pathway of invasive species, Impact of bioinvasion (abundance of invasive species, biodiversity of endemic species, biogeochemical cycles), Distribution, geographic and evolution of invasive species, and invasive species management. It implements scientific methods (Case Based Method) for ecology invasive species management by analyzing: the problem in tropics related to the characteristics and value of invasive species, the historical invasive species colonization, impact of invasive species colonization (adaptation, abundance, dan distribution); the course also covers problems solving in bio invasive management in tropics through presentation and paper draft |
| Examination forms | a. Essay test (40%) b. Project Based Method (60%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Liebhold, AM., Brockerhoff EG., et al, 2017 Biological Invasions in Forest Ecosystems, Biol Invasions vol 19: 3437-3458 2. Gobster, P. H. 2005. Invasive Species as Ecological Threat: Is Restoration an Alternative to Fear-based Resource Management? Ecological Restoration 23 (4): 261-270 3. Beisel J-N (2001) The elusive model of a biological invasion process: time to take differences among aquatic and terrestrial ecosystems into account? Ethology Ecology & Evolution 13: 193–195 4. Richardson, DM (Ed). 2011. Fifty Years Of Invasion Ecology The Legacy Of Charles Elton. UK. Blackwell Publishing Ltd Lockwood, J.L., Hoopes, M. F., and Marchetti M. P. 5. 2013. Invasion Ecology. Second Edition. UK. Wiley-Blackwell. Gallien, L. and Carboni, M. 2017. The community ecology of invasive species: where are we and what's next? Ecography 40: 335–352, 2017 6. Inderjit (Ed). 2005 Invasive Plants: Ecological and Agricultural Aspects. Berlin. Birkhäuser Verlag 7. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Phytoremediation

| | |
|---|---|
| Module designation | : Phytoremediation |
| Semester(s) in which the module is taught | : even/VI/VIII |
| Person responsible for the module | : Dr. Dra. Retno Wimbaningrum, M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation Biology UNSOED, Biology UN Gorontalo |
| Teaching methods | : Lecture- Discussion, Project, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr d. lecture- Discussion: 22.67 hr e. Case Based Method : 22.67 hr f. Practical Work Project Based 45.34 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Environmental Science |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyse the principles of biology, mathematics, and other relevant natural sciences (LO 2)</p> <p>Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6)</p> <p>Competence:</p> <ul style="list-style-type: none"> • Able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach (LO 5) • Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course describe, and correlate the basic concept that are relevant to the phytoremediation, It implements scientific methods (Case Based Method) for wastewater management by analyzing: effectiveness of artificial wetland in phytoremediation of industrial wastewater through practical, implementation of phytoremediation in artificial wetland as problems solving in industrial wastewater management in tropics through presentation and paper draft |
| Examination forms | a. Essay test (15%) b. Case Based Evaluation (30%) c. Practical Work Based project (55%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. Brisson, J. & Chazarenc, F. 2009. Maximizing pollutant removal in constructed wetlands should we pay more attention to macrophyte species selection? <i>Science of The Total Environment</i>. 407: 3923-3933 2. Chandra, R., N.K. Dubey, and V. Kumar. 2018. <i>Phytoremediation of environmental pollutants</i>. CRC Press. 3. EPA. 1999. <i>Manual constructed wetlands treatment of municipal wastewaters</i>. EPA/625/R-99/010. National Risk Management Research Laboratory Office of Research and Development U.S. Environmental Protection Agency Cincinnati. Ohio. 4. EPA. 2000. <i>Introduction to phytoremediation</i>. EPA/600/R-99/007. National Risk Management Research Laboratory Office of Research and Development U.S. Environmental Protection Agency Cincinnati. Ohio. 5. McCutcheon, S. and J.L. Schnoor. 2003. <i>Phytoremediation transforms and controls contaminants</i>. John Wiley & Sons Inc. New Jersey. 6. Terry, N. 2020. <i>Phytoremediation contaminated soil and water</i>. 1st edition. CRC Press. 7. |
|--------------|---|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Coastal Area Management

| | |
|---|--|
| Module designation | : Coastal Area Management |
| Semester(s) in which the module is taught | : odd/VI/VIII |
| Person responsible for the module | 1. Dr. Dra. Retno Wimbaningrum, MSi. 2. Rendy Setiawan, SSi., MSi. |
| Language | : English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, case method |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture- Discussion: 45.33 hr b. Case Method: 45.33 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Terrestrial Ecology and Aquatic Ecology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Competence: <ul style="list-style-type: none"> ● Able to implement scientific methods for the biological resources management and commercial products development in tropics (LO 4) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course Describe and analyze scope of Coastal Area Management such as Coastal boundaries and general characteristics of the coastal area in Indonesia also Importance, use, and problems of coastal resources. It implements scientific methods (Case Based Method) for Coastal Area Management based on biota economy and ecological value; the course also covers problems solving in Coastal Area management in tropics through presentation and paper draft |
| Examination forms | a. Essay test (30%) b. Case Based Method (70%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none"> 1. Clark, J.R. 1998. Coastal seas. The conservation challenge. Oxford: Blackwell Science Ltd. 2. Hemmings, M.A. & Duarte, C.M. 2000. Seagrass ecology. Cambridge: Cambridge University Press. 3. MPP-EAS. 1999. Total economic valuation: coastal and marine resources in the straits of Malacca. Quezon City: GEF/UNDPIMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas. 4. Nordstrom, K.F. & Roman, C.T. 1996. Estuarine shores: evolution, environment, and human alteration. Chichester: John Wiley & Sons, Inc. 5. Nybakken, J.W. 1982. Marine biology: an ecological approach. Diterjemahkan oleh: Eidman, M., Koesoebiono, Bengen, D.G., Hutomo, M. Sukardjo, S.). Jakarta: P.T. Gramedia Pustaka Umum. 6. Purnomo A.H., Suryawati, S.H., Radjawane, I.M. Sembiring, K.O. 2015. Perubahan iklim di wilayah pesisir. Konsepsi dan aplikasi strategi adaptasi. Penerbit ITB. Bandung. 7. Supriharyono, M.S. 2000. Pelestarian dan pengelolaan sumber daya alam di wilayah pesisir tropis. Jakarta: P.T. Gramedia Pustaka Utama. |
|--------------|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Mangrove Ecology

| | |
|---|--|
| Module designation | : Mangrove Ecology |
| Semester(s) in which the module is taught | odd/V/VII |
| Person responsible for the module | 1. Dr. Dra. Retno Wimbaningrum, M.Si. 2. Rendy Setiawan, S,Si., M.Si. |
| Language | English |
| Relation to curriculum | Compulsory / elective / specialisation |
| Teaching methods | lecture - Discussion, Case-Based Methods, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture- Discussion: 51 hr b. Case Based Method: 39.67 hr |
| Credit points | 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | Terrestrial Ecology and Aquatic ecology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Competence: <ul style="list-style-type: none"> ● Able to internalise norms and ethics based on Pancasila in working independently or in groups (LO 1) ● Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course discusses the meaning and limitations of mangrove ecosystem areas, types of mangrove plants (morphology, adaptation, reproduction and taxonomy), factors limiting the existence of mangrove forests, plant zoning patterns mangroves, the distribution of mangrove forests in the world and in Indonesia, diversity of mangrove forest fauna, energy flow, material cycle and mangrove forest productivity, methods ecological research in mangrove forests, ecological benefits and economics of the mangrove ecosystem, the condition of the mangrove forest in Indonesia and its conservation efforts. This course also implements scientific methods for mangrove Ecology through Case-Based Method by conservation strategy and management of mangrove, writing paper reports, and presenting in class. |
| Examination forms | a. Essay test and discussion participative (35%) b. Case Based Method (65%) |
| Study and examination requirements | Passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|---|
| Reading list | <ol style="list-style-type: none"> 1. Aksornkoe, S. 1993. Ecology and Management of Mangroves. Bangkok: UCN Chapman, V. J. 1976. Mangrove Vegetation. Vaduz: J. Cramer. 2. Hutchings, P and P. Saenger. 1987. Ecology of Mangroves. London: University of Queensland Press. 3. Inoue, Y., O. Hadiyati, H. M. A. Affendi, K. R. Sudarma, dan I. N. Budiana. 1999. Sustainable Management Models for Mangrove Forests. Denpasar: Ministry of forestry and Estate Crops and JICA 4. Kitamura, S., Chairil Anwar, Amalyos Chaniago, Shigeyuki Baba. 1997. Handbook of Mangroves in Indonesia. Bali & Lombok. Denpasar: ISME. 5. Noor, Y. R., M. Khazali dan I. N. N. Suryadiputra. 1999. Panduan Mengenal Mangrove di Indonesia. Bogor: Wetlands International Indonesia Programme. 6. Tam, N. F. and Y. Wong. 1999. Hong Kong Mangroves. Kowloon: City University of Hong Kong Press. 7. Tomlinson, P. B. 1986. The Botany of Mangroves. Cambridge: Cambridge University Press. |
|--------------|---|

Credits to ECTS conversion formula 2 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 90.67 Hours. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Tropical Forest Ecology

| | |
|---|--|
| Module designation | : Tropical Forest Ecology |
| Semester(s) in which the module is taught | odd/V/VII |
| Person responsible for the module | 1. Dra. Hari Sulistiyowati, M.Sc., Ph.D. 2. Arif Mohammad Siddiq, S.Si., M.Si. |
| Language | English |
| Relation to curriculum | Compulsory / elective / specialisation |
| Teaching methods | lecture - Discussion, Case-Based Methods, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr c. lecture- Discussion: 51 hr d. Case Based Method: 39.67 hr |
| Credit points | 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | Terrestrial Ecology |
| Module objectives/intended learning outcomes | <p>Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3)</p> <p>Competence:</p> <ul style="list-style-type: none"> • Able to internalize norms and ethics based on Pancasila in working independently or in groups (LO 1) • Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course discusses the structure and function of tropical forests, composition and character of tropical forests, disturbance dynamics, tropical biodiversity, frugivores, seed dispersal, Tree Recruitment, predation, and trophic cascades. This course also implements scientific methods for Tropical Forest Ecology through Case-Based Method by identifying factors causing deforestation of tropical forest and conservation strategies, writing paper reports, and presenting in class. |
| Examination forms | c. Essay test and discussion participative (35%) d. Case Based Method (65%) |
| Study and examination requirements | Passing grade 70% Requirements for successfully passing the module |



| | |
|--------------|--|
| Reading list | <ol style="list-style-type: none">1. Allaby M, Garratt R. 2006. Tropical Forests. New York (US): Chelsea House.2. Corlett RT, Primack RB. 2011. Tropical Rain Forests: An Ecological and Biogeographical Comparison, Second edition. New Jersey (US): Wiley Blackwell.3. Goldsmith FB. 1998. Tropical Rain Forest: A Wider Perspective. Dordrecht (ND): Springer Netherlands4. Sudarshana P, Nageswara-Rao M, Soneji JR. 2012. Tropical Forests, InTech Chapters: ISBN 978-953-51-0255-7.5. Montagnini F, Jordan CF. 2005. Tropical Forest Ecology. New York (US): Springer.6. Qayim I. 2008. Ekologi Hutan Tropis [Indonesia]. Jakarta (ID): Universitas Terbuka Press.7. Indriyanto. 2006. Ekologi Hutan [Indonesia]. Jakarta (ID): Bumi Aksara.8. Turner IM. 2001. The Ecology of Trees in the Tropical Rain Forest. Cambridge (UK): Cambridge University Press.9. Zang X, Wang M, Liang X, Valk AGVd. 2009. Forest ecology: recent advances in plant ecology. Dordrecht (ND): Springer Netherlands |
|--------------|--|

Credits to ECTS conversion formula 2 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 90.67 Hours. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Forensic Biology

| | |
|---|---|
| Module designation | : Forensic Biology |
| Semester(s) in which the module is taught | : odd/V/VII |
| Person responsible for the module | Mukhamad Su'udi, PhD. Syubbanul Wathon, M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr lecture-discussion: 45.33 hr Case-study: 34 hr Presentation: 11.33 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Biochemistry |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Competence: Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course describes and analysis scope of Forensic Biology: terminology, other major/disciplines required for supporting & development of forensic biology, type of evidence arising in crime scene, and investigation steps applied in forensic analysis. It integrates bioscience for proposing/ or giving the recommendation as a solution (Case-based method) of the problems found in crime scene during forensic investigation occurs in recent/ unsolved cases and reporting (presentation).. |
| Examination forms | a. Essay test (12.5%) b. Quiz (12.5%) c. Assignment (25%) d. Article review and Presentation (case-study) (50%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Gunn A. 2009. Essential Forensic Biology, 2nd edition. Oxford: Wiley-Blackwell. 2. Coyle HM. 2005. Forensic Botany, Principles and Applications to Criminal Casework. Archibold, O.W. 1995. Ecology of World Vegetation. Boca Raton: CRC Press. 3. Li R. 2011. Forensic Biology. Boca Raton: CRC Press. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Industrial Biotechnology

| | |
|---|---|
| Module designation | : Industrial Biotechnology |
| Semester(s) in which the module is taught | : odd/V |
| Person responsible for the module | 1. Dr. Rike Oktarianti 2. Syubbanul Wathon, M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture-Discussion, Case Based Methods, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture-discussion: 45.3 hr b. Case based methods: 34 hr c. Presentation: 11.3 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Molecular Biology |
| Module objectives/intended learning outcomes | Competence: <ul style="list-style-type: none"> • Able to implement the logic of critical thinking on biosafety and environmental issues related to the field of biology with a scientific and bioethical approach (LO 5) • Able to employ bioscience in solving problems related to biological resources in tropics and to communicate the results (LO 7) |
| Content | This course discusses the basic concept and scope of industrial biotechnology, genetic in the study of industrial biotechnology, industrial biotechnology ethics, biomass as a substrate for industrial biotechnology, bioprocess engineering technology, industrial biotechnology and environmental studies. There are also integrating bioscience in problems solving related to application of industrial biotechnology in aquatic and marine, application of industrial biotechnology in agriculture, application of industrial biotechnology in animal husbandry, application of industrial biotechnology in food and beverage, application of industrial biotechnology in food additive and supplement, application of industrial biotechnology in pharmacy and medicine, application of industrial biotechnology in renewable energy resources, and regulation of genetic modified organism and safety. |
| Examination forms | a. Essay test (30%) b. Quiz (20%) c. Cased methods (50%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Galzer A.N. & Nikaido H. 2007. Microbial Biotechnology. Cambridge University Press, New York. 2. Mosier N.S. & Ladisch M.R. 2009. Modern Biotechnology. Wiley-Interscience, New York. 3. Persley J. & MacIntyre. 2002. Agriculture Biotechnology. CAB publishing, Washington. 4. Smith J.E. 2004. Biotechnology, fourth edition. Cambridge University Press, New York. |



Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x
16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Plant Biotechnology

| | |
|---|--|
| Module designation | : PLANT BIOTECHNOLOGY |
| Semester(s) in which the module is taught | : even/VI/VIII |
| Person responsible for the module | 1. Prof. Bambang Sugiharto, D.Agr.Sc 2. Mukhamad Su'udi, PhD |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Project/Laboratory/Field Work, Presentation. |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 136hr a. lecture- Discussion: 34 hr b. Laboratory Works: 68 hr c. Presentation: 34 hr |
| Credit points | : 3 credits or 4.53 ECTS |
| Required and recommended prerequisites for joining the module | : Biochemistry, Plant Physiology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) Competence: able to implement the logic of critical thinking on biosafety and environmental issues related to plant biotechnology and its product with a scientific and bioethical approach (LO5) |
| Content | This course describe and analysis scope of Plant Biotechnology: definition, terminology, relatedness between plant tissue culture technique for plant biotechnology application, the steps for selecting target genes, vector construction and cloning, and the steps for producing transgenic plants and its analysis. It implements the logic of critical thinking (Case-based Method) on the biosafety issue and regulation related to genetic-modified product, and future prospect of plant biotechnology application. For facilitating student special skills, this course provides laboratory works such as: explant preparation, genetic transformation, detection and confirmation of putative transformants, and transgenic plantlets maintenance. |
| Examination forms | a. Essay test (30%) b. Laboratory Work (30%) c. Assignment (20%) d. Presentation (20%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Prasad, B. D., Sahni, S., Kumar, P., & Siddiqui, M. W. (Eds.). 2017. Plant Biotechnology, Volume 1: Principles, Techniques, and Applications. CRC Press. 2. Stewart Jr, C. N. (Ed.). 2016. Plant biotechnology and genetics: principles, techniques, and applications. John Wiley & Sons. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Health Biotechnology

| | |
|---|--|
| Module designation | : Health Biotechnology |
| Semester(s) in which the module is taught | : even/VI |
| Person responsible for the module | 1. Dr. rer. nat. Kartika Senjarini 2. Dr. Rike Oktarianti 3. Syubbanul Wathon, M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation Biology UNSOED and Biology UM |
| Teaching methods | : lecture- Discussion, Project, Presentation, |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. lecture-discussion: 76.33 hr b. presentation: 11hr c. Laboratory practice: 45hr |
| Credit points | : 3 credits or 4.5 ECTS |
| Required and recommended prerequisites for joining the module | : Molecular Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) |
| Content | This course describe and analysis the terminology, scope and development of health biotechnology, Molecular biology base in health biotechnology, molecular epidemiology & diagnostics, gene therapy, stem cell technology, recombinant DNA technology, biosimilar, biomarker, vaccine development, immunotherapy, ethics and regulation of animal models in health biotechnology research. There are also practicing laboratory of DNA plasmid isolation, DNA restriction, DNA ligase, DNA electrophoresis, cell competence & DNA transformation, recombinant protein extraction, SDS-PAGE, Western blotting, and DNA fingerprint |
| Examination forms | a. Essay test (35%) b. Presentation (20%) c. Quiz and assignment (15%) d. Laboratory practice (30%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Glick BR & Pasternak JJ. 2002. Molecular Biotechnology: principles and application of recombinant DNA. ASM Press 2. Albert S. 2005. Medical Biotechnology. United Nations University Press 3. Lewins B. 2013. Genes X. Publisher: Jones & Bartlett. 9th edition 4. Godbey WT. 2014. An introduction to biotechnology. Academic Press. 5. Firdos AK. 2014. Biotechnology in Medical Sciences. CRC Press 6. Bernard RG, Terry LD, Chyeril LP. 2014. Medical Biotechnology. ASM Press. |



| | |
|--|--|
| | 7. Alberts B, Johnson A, Walter P, Lewis J. 2015. Molecular Biology of the Cell. 6th Edition. Publisher Taylor & Francis |
|--|--|

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS

Molecular Genetics

| | |
|---|---|
| Module designation | : Molecular Genetic |
| Semester(s) in which the module is taught | : even/VI |
| Person responsible for the module | : 1. Dr. rer. nat. Kartika Senjarini 2. Syubbanul Wathon, M.Si. |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : lecture- Discussion, Case Based Methods, Presentation |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 90.67 hr a. Lecture-discussion: 45,3 hr b. Case based method: 34 hr c. Presentation: 11.3 hr |
| Credit points | : 2 credits or 3.02 ECTS |
| Required and recommended prerequisites for joining the module | : Molecular Biology |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) |
| Content | The course discusses the basic concepts and scope of molecular genetics, genetic material and genomic structure, chromosomal structure, DNA replication, transcription and post transcription, translation and post translation, materials cytoplasmic genetics, gene mutation, gene recombination, regulation of protein synthesis, regulation of gene expression in prokaryotes, regulation of gene expression in eukaryotes. |
| Examination forms | a. Essay test (30%) b. Quiz (10%) c. Cased methods (35%) d. Presentation paper review (25%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Lewin B. 1999. Gene VI. Oxford University Press, New York 2. Klug, WS & Cummings, MR. 1998. Concepts of Genetic. Macmillan Publishing Company, New York. 3. Howe, C. 2007. Gene Cloning and Manipulation. Cambridge University Press, New York. 4. Jusuf, M. 1999. Genetika 1. Struktur dan Ekspresi Gen. Sagung Seto, Jakarta 5. Yowono, T. 2005. Biologi Molekular. Erlangga, Jakarta. |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS



Population Genetics

| | |
|---|---|
| Module designation | : Population Genetics |
| Semester(s) in which the module is taught | : Even/VI |
| Person responsible for the module | 1. Dr. Rike Oktarianti, M.Si 2. Dr. Hidayat Teguh Wiyono, M.Pd 3. Syubbanul Wathon, S.Si, M.Si |
| Language | : Indonesian and English |
| Relation to curriculum | : Compulsory / elective / specialisation |
| Teaching methods | : Lecture- Discussion, paper review, case based methods |
| Workload (incl. contact hours, self-study hours) | (Estimated) Total workload: 91 hr a. Lecture-Discussion: 57 hr b. Presentation paper review 17 hr c. Case based method: 17 hr |
| Credit points | : 2 credits or 3,02 ECTS |
| Required and recommended prerequisites for joining the module | : Genetics |
| Module objectives/intended learning outcomes | Knowledge: Able to analyse the principles of molecular biology, cells, organisms and management of tropical biological resources (LO 3) Skill: Able to do laboratory work and/or in the field independently and/or in groups for biological concepts implementation (CLO 6) |
| Content | This course discusses the basic concepts and scope of population genetics, the techniques used in population genetic analysis, and the application of population genetics in various fields. The study includes basic statistics in population genetics, Hardy Weinberg's law of genetic equilibrium and its application, genetic polymorphisms, factors driving the occurrence of genetic equilibrium deviations in populations, mating systems of living things in nature, benefits and impacts, quantitative inheritance in a population and estimation of heritability values. |
| Examination forms | a. Essay test (30%) b. Quiz (10%) c. Presentation/paper review (25%) d. Case methods (35%) |
| Study and examination requirements | : passing grade 70% Requirements for successfully passing the module |
| Reading list | 1. Gillespie J.H. 2004. Population Genetics; A Concise Guide, 2 nd edition. Johns Hopkins University Press. 2. Hartl D.L., Clark A.G. (2007) Principles of Population Genetics, 4 th edition. Sinauer Associates. 3. Halliburton R. 2004. Introduction to Population Genetics. Pearson Prentice Hall. 4. Weir. B.S, 1990. Genetic Data Analysis. Methods for Discrete Population Genetic Data. Sinauer Associates, Inc, Publisher. 5. John, J. Chen. 2010. Hardy-Weinberg Principle and Its Application in Modern Population Genetics. Frontiers in Biology, vol 5, issue 4, pp 348-353 |

Credits to ECTS conversion formula 1 SKS TM = 50min T+60min TS+60min M (170 minutes) x 16 weeks = 45.33 Hours 1 SKS Practice = 170 min. 1 ECTS = 29.99 hours 1 Credit = 1.51 ECTS