THE MODULE HANDBOOK
FACULTY OF BIOLOGY

Population Genetics

Module code	BIO 40402
Module level	Undergraduate
Abbreviation, if applicable	-
Sub-heading, if applicable	-
Courses included in the module, if applicable	-
Semester/ term	Odd
Module coordinator(s)	Dra. Tuty Arisuryanti, M.Sc., Ph.D.
Lecture(s)	Dr. Budi Setiadi Daryono, M. Agr. Sc. Dr. Niken Satuti Nur Handayani, M.Sc. Ganies Riza Aristya, S.Si., M.Sc.
Language	Indonesia
Classification within the Curriculum	Cumpolsory
Teaching format/ class hours per week during the semester	This course is organised into 4 parallel classes and planned to have 14 teaching weeks and 2 weeks of examination.
Workload	Estimated working hour: 6 hours/week (or equal to 2 credits of course)
Credit points	2-0 credits
Requirements	Genetics (BIO 30401)
Learning goals/ competencies	**1. Knowledge and understanding** a. Population Genetic Concept b. Allele frequency, genotype frequency and phenotype frequency c. Principles, assumption and prediction of Hardy Weinber Equilibrium d. Factors which can change Hardy Weinberg Equilibrium and effect of the change e. Microevolutionary Forces (mutation, migration, selection, genetic drift, and non random mating f. Relationship between Hardy Weinberg Equilibrium and Microevolution g. Three types of selection stabilizing selection, directional selection, and disruptive selection

h. Two types of genetic drift (founder effect dan bottleneck effect)
i. Prezygotic Isolating Mechanisms and Post-zygotic Isolating Mechanisms
j. Type of speciation (Phyletic, Allopatric, Parapatric, Sympatric, and Quantum Speciation) and pattern of speciation (Divergence and Convergence)
k. Genetic variation (from morphology to molecular)
l. Molecular tehniques for population genetics (Allozyme–isozyme electrophoresis, Sequencing, RFLP, RAPD, DGGE, Microsatellite)
m. The important role to prevent genetic variation in a population and understand the effects of decrease in genetic variation in a population
n. Quantitative traits and quantitative inheritance

2. Ability/intelectual skill

a. Calculate allele frequency and genotype frequency of a population
b. Calculate Chi-Square test for Hardy Weinberg equilibrium prediction
c. Calculate, analyse, interpret heritability of quantitative traits and discuss advantage of heritability in breeding program
d. Analyse and interpret genetic characters of a population
e. Discuss how microevolutionary forces can change allele frequency of a population
f. Discuss the role of Population Genetic in conservation, breeding program and health
g. Discuss how speciation can occur in a population
h. Discuss problems in Population Genetics and try to get good solution with many references and information

3. Practical skill

a. Access sequence data from GenBank for genetic variation analysis using bioinformatics
b. Analyse genetic variation of a population using free software i.e. MEGA, MESQUITE, and DnaSP

4. Managerial and transferable skill

a. Do discussion groups of genetic population cases
b. Explain application of Genetic Population for studying biodiversity, conservation, breeding program and health program
c. Use information technology to get many information related to Genetic Population cases for discussion groups
d. Make summaries and give solutions on Genetic populations problems

	5. Attitude a. Have a curiosity on Population Genetic problems b. Have respect to others in discussion groups
Content	Population Genetic course contains Population Genetic concept, Hardy Weinberg Equilibrium, micro-evolutionary forces, isolation mechanism and speciation, molecular techniques used for population genetic analysis and the use of bioinformatics and population genetic software to analyse genetic variation.
Study/ exam achievements	1. Midterm: 25% 2. Final examination: 35% 3. Presentation: 10% 4. Assignment (1): 10% 5. Assignment (2): 10% 6. Attendance, quiz and activity: 10%
Forms of media	White board, LCD, video
Literature	1. Allendorf and Luikart.2007.Conservation and The Genetic Populations. Blackwell Publishing (UK) 2. Arisuryanti, T. dan Daryono, B.S. 2009. *Bahan Ajar Genetika Populasi*. Laboratorium Genetika, Fakultas Biologi UGM 3. Avise, J.C. 1994. *Molecular Markers, Natural History, and Evolution*. Chapman and Hall (Melbourne) 4. Campbell, N.A., L.G. Mitchell, and J.B. Reece. 2006. *Biology. Concept and Connection.* The Benyamin Cummings Publ.Co.Inc., California (USA) 5. Cook, L.M. 1991. *Genetic and Ecological Diversity*. The Sport of Nature. Chapman and Hall (Melbourne) 6. Gillespie, J.H. 1998. *Population Genetics. A Concise Guide*. The Johns Hopkins University Press, London 7. Griffith, A.J.F., J.F.Miller, D.T. Suzuki, R.C. Lewontin, and W.M. Gelbart. 1999. *An Introduction to Genetic Analysis*. W.H. Freeman & Co., New York (USA)