



JOGJAKARTA STATE UNIVERSITY
MATHS AND SCIENCE FACULTY

SILLABUS

FRM/ FMIPA/063-01
18 February 2011

Faculty	: Maths and Science
Study program	: Biology Education and Biology
Course / Code	: BIC 223
Credits	: Theory = 2 Practical = 1
Semester	: IV
Pre-requisite course / code	: -
Lecturers	: Victoria Henuhili, M.Si., Suratsih, M.Si., Paramita C.K., M.Sc.

I. Course Description

This course discuss the history of genetics, the concept of genes, and the theory of chromosomes. Artificial crosses that were done by Mendel as the beginning of the finding for the unit of inheritance in organisms. Mathematical formulas are introduced to predict the chance of inheriting a certain trait from a certain cross and to prove whether a trait is expressed due to the genetic composition or not. This course also study the character of the gene and how it is passed on in a family using a family tree or a pedigree. The study on the development of genetics after Mendel and its inheritance including linkage, crossing over and making a chromosome map is also covered n this course. Population genetics is also covered such as the application of the Hardy-Weinberg Law to find out the frequency of allele and genotype in a population and to find out their changes due to non random mating situations. Other topics are : the identification of sex, change in the chromosome structure and number, mutation, and extranuclear inheritance.

II. Standard Competencies of The Course

At the end of the course, students should be able to :

1. Describe the history of genetics
2. Describe the pattern of inheritance in Mendelian Genetics
3. Calculate, using mathematical formula, to predict the outcome of a cross and prove if a certain trait is genetic
4. Analyze the character of a gene and how it is passed on through generations using a pedigree diagram
5. Describe genetics after Mendel
6. Describe the inheritance of linkage, crossing overs, and compose a chromosome map

7. Analyze the frequency of allele and genotype in a population using the Hardy-Weinberg Law and the effect of non random mating
8. Describe the mechanism of mutations (change in structure and number of chromosome)
9. Describe the method of sex identification in several organisms and that the Y chromosome determine the male sex
10. Describe the mechanism of extranuclear inheritance

III. Lesson Plan

Meetings	Basic Competencies	Topics	Lecture strategy	Reference	Lecturer
1	Describe the history of genetics	Introduction : history and development of genetics, concept of gene and chromosome	Lecture and Discussion	A : 1,2	Paramita C.K., M.Sc.
2	Describe the pattern of inheritance in Mendelian genetics	Mendelian Genetics : Mendel postulate and monohybrid, dihybrid, trihybrid crosses	Lecture and Discussion	A : 1,2	Paramita C.K., M.Sc.
3	Calculate, using mathematical formula, to predict the outcome of a cross and prove if a certain trait is genetic	Probability, binomial theorem, and chi-square test	Lecture and Discussion	A : 1,2	Paramita C.K., M.Sc.
4	Analyze the character of a gene and how it is passed on through generations using a pedigree diagram	Pedigree : symbols and analysis	Lecture and Discussion	A : 1,2	Paramita C.K., M.Sc.
5	MID EXAM I				
6-8	Describe genetics after Mendel	Development of Mendelian genetics : alleles with Mendelian inheritance but different	Lecture and Discussion	A : 1,2	Victoria H., M.Si.

		phenotypes, multiple alleles, lethal alleles, sex linkage and gene expression			
9-10	Describe the inheritance of linkage, crossing overs, and compose a chromosome map	Linkage, crossing - over, and chromosome map	Lecture and Discussion	A : 1,2	Victoria H., M.Si.
11	MID EXAM II				
12	Analyze the frequency of allele and genotype in a population using the Hardy-Weinberg Law and the effect of non random mating	Population genetics : Hardy-Weinberg Law of equilibrium and Inbreeding	Lecture and Discussion	A : 1,2	Suratsih, M.Si.
13	Describe the method of sex identification in several organisms and that the Y chromosome determine the male sex	Sex determination and sex chromosom : systems XX-Xy, ZZ-ZW, XO-XX, the Y chromosome	Lecture and Discussion	A : 1,2	Suratsih, M.Si
14-15	Describe the mechanism of mutations (change in structure and number of chromosome)	Mutations : changes in the structure and number of chromosomes	Lecture and Discussion	A : 1,2	Suratsih, M.Si
16	Describe the mechanism of extranuclear	Extranuclear inheritance : mitochondria (Neurospora),	Lecture and Discussion		Suratsih, M.Si

	inheritance	chloroplast (Chlamydomonas), maternal effect (Limnea peregra)			
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IV. Reference

A. Compulsory :

1. Klug, W.S., M. R. Cummings, C. A. Spencer, 2006, *Concepts of Genetics*, Pearson Education international, London
2. Brooker, R. J., 2009, *Genetics, Analysis & Principle*, McGraw-Hill Higher Education, Boston

B. Suggested :

1. Gardner, E. J. and D. P. Snustad, 1984, *Principle of Genetics*, John Wiley and Sons, New York
2. Hartl, D. L., 1991, *Basic Genetics*, Jones & Barlett Publishers, Boston
3. Suryo, 1984, *Genetika*, Gadjah Mada University Press, Yogyakarta
4. _____, 1989, *Genetika Manusia*, Gadjah Mada University Press, Yogyakarta
5. _____, 1995, *Sitogenetika*, Gadjah Mada University Press, Yogyakarta
6. Tamarin, R. H., 1999, *Principles of Genetics*, McGraw Hill, Boston

V. Evaluation

The evaluation will be done based on the topics and percentages of each test (MID exams) that has been written in the study contract at the beginning of the course. The percentages of each components are as follows :

No	Component of evaluation	Percentage (%)
1	Class participation / attendance	Compulsory attendance of min 75%
2	Assignment	10
3	MID Exam I	30
4	MID Exam II	30
5	Final Examination	30
	TOTAL	100%

Yogyakarta, Februari 2012

Head of Department
Biology Education Department

Lecturer

Dr. Slamet Suyanto
NIP 19620702 199101 1 001

Paramita Cahyaningrum Kuswandi, M.Sc.
NIP 19781022 201012 2 001

