



YOGYAKARTA STATE UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCES

SYLLABI

FRM/FMIPA/063-00
 Februari 2013

Faculty : Mathematics And Science
 Study Program : Biology Education
 Subject : Biotechnology
 Credit : Theory 2 unit of semester credit
 Semester : VI
 Prerequisite Subject : Biology Cell and Moleculer, Microbiology, Genetics
 Lecturer : Evy Yulianti, M.Sc., Paramita Cahyaningrum K., M.Sc.,
 Lili Sugiyarto, M.Si.

I. Subject Description

Biotechnology study the *technologies that involve* the use of living organisms or products from living organisms in order to benefit humans usually for medical, agricultural and industrial application

II. Standard of Competence

The main goal of this subject for students is to gain an understanding of the basic technique in biotechnology and the medical, agricultural and industrial application

III. Lesson Plans

Meeting	Basic of Competence	Topics	Strategy	References	Character
1 st	Describe what biotechnology is and the subject supporting biotechnology, describe the history of biotechnology	Introduction - Meaning of biotechnology - Subject supporting biotechnology - History of biotechnology	Lecturer, presentation and discussion		Appreciating diversity/appreciation of diversity, Curious/curiosity, Passionate about learning/passion for learning
2 nd	Describe the PCR reaction mixture, condition and the use of PCR	Basic Technique in molecular Biology: PCR - PCR reaction mixture - PCR Conditions - PCR-RFLP	Lecturer, presentation and discussion		Appreciating diversity/appreciation of diversity, Curious/curiosity, Passionate about learning/passion for learning

		- Principles and Medical Applications of the Polymerase Chain Reaction			
3 rd	Describe how DNA being manipulated, explain kind of restriction enzyme and how they work, explain how to make recombinant DNA and the function of recombinant DNA	Basic Technique in molecular Biology: DNA recombinant technology - The Manipulation of Nucleic Acids: Basic Tools and Techniques - Restriction Enzymes - Use of restriction enzymes - Recombinant DNA - Transformation of Bacteria - Constructing DNA libraries	Lecturer, presentation and discussion		Curious/curiosity, Passionate about learning/passion for learning
4 th	Explain biotechnology application in human gene therapy, IVF and DNA fingerprinting	Biotechnology application : in health and forensic - Human Gene Therapy - The technique of IVF - DNA fingerprinting	Lecturer, presentation and discussion		Curious/curiosity, Passionate about learning/passion for learning
5 th	Explain biotechnology application in cloning	Biotechnology application : in livestock - Cloning	Lecturer, presentation and discussion		Curious/curiosity, Passionate about learning/passion for learning
6 th	Describe the history of plant biotechnology, methods used in plant biotechnology (tissue culture and transgenic)	Methods of Plant Biotechnology	Lecture and discussion	D and E (see list of references below)	
7 th	Describe the method of obtaining	Plant Transgenesis	Lecture and	D and E	

	transgenic plants and the use of molecular markers		discussion	(see list of references below)	
8 th		Midterm I			
9 th	Describe the methods used for several examples of the application of plant biotechnology (vaccine for plants, genetic pesticides, herbicide resistance, enhanced nutrition, pharmacology, fuels)	Application of Plant Biotechnology	Lecture and discussion	D and E (see list of references below)	
10 th	Describe and analyze the negative and positive effects of biotechnology on the development of new plant varieties.	Health and environmental concerns	Lecture and discussion	D and E (see list of references below)	
11 th	Presentation				
12 th		Microbial biotechnology (scope, technique) Microbial diversity Introduction of DNA into yeast cell	Lecture and discussion		
13 th		Industrial application Fermentation process and fermenters Production of antibiotics Goals of antibiotic research	Lecture and discussion		
14 th		Environmental application The process of biodegradation Biodegradation of organic pollutants Bioremediation	Lecture and discussion		
15 th		Human insulin gene Production of microbial enzyme Application of microbial enzyme	Lecture and discussion		
16 th	Presentation				

IV. Reference

Compulsory reading :

- A. Agrawal, S. 2008. Techniques in Molecular Biology. International Book Distributing Co.
- B. Popping B, Diaz-Amigo C, Hoenicke K. 2010. Molecular Biological And Immunological Techniques And Applications For Food Chemists.. John Wiley & Sons, Inc.
- C. Walker, J. M., Rapley R. 2008 Molecular Biomethods Handbook. Humana Press, a part of Springer Science
- D. Mantell, S.H., J.A. Matthews, and R.A. McKee. 1985. Principles of Plant Biotechnology. Blackwell Scientific Publications. London. UK. 258p
- E. Renneberg, R. 2006. Biotechnology for Beginners. (Ed. Arnold.L. Demain). Elsevier Inc. Muenchen. Germany. pp. 171-202.
- F. Syukur, M., S. Sujiprihati, dan R. Yuniarti. 2012. Teknik Pemuliaan Tanaman. Penebar Swadaya. Hal 173-184
- G. Thieman, W.J., and M.A. Palladino. 2013. Introduction to Biotechnology. Pearson Education, Inc. USA. Pp. 158-174

V. Evaluation

No	Component of evaluation	Score (%)
1	Attendance	10
2	Participation	20
3	Assignment	20
4	Midterm	20
5	Final Examination	30
	Total	100

Yogyakarta, Februari 2013

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