

SUBJECT OUTLINE DETAILS

1. Subject: INTRODUCTION BIOTECHNOLOGY

- Code: BT 201C
- Credits: 02
- Hours: 30 theory hours, and 60 self-study hours.

2. Management Unit:

- Department of Microbial Biotechnology
- Biotechnology Research and Development Institute.

3. Prerequisites: none

4. Subject objectives:

4.1. Knowledge:

Students will develop knowledge and understanding of:

4.1.1. Help students to understand principles of biotechnology

4.1.2. Supply a basic knowledge of biotechnology including classical and modern biotechnology, such as Applied and Industrial Microbiology; Food biotechnology; Beer and Wine; Genetic Engineering; Medical biochemistry; Antibiotic production; Agriculture and plant biotechnology; and Environment biotechnology.

4.2. Skill: students will be able to

4.2.1. increases awareness of different levels of thinking: comprehension, application, and evaluation.

4.2.2. apply investigative and problem-solving skills.

4.2.3. work individually and in teams

4.3. Attitude:

4.3.1. Actively participate in class activities

4.3.2. Students are encouraged to develop positive values and informed critical attitudes.

4.3.3. Develop a sense of independent learning and an inquiry mind for self-study.

4.4 Brief description of subject content: This course will acquaint students with the principles of biotechnology. Topics include the Applied and Industrial Microbiology; Food biotechnology; Beer and Wine; Genetic Engineering; Medical biochemistry; Antibiotic production; Agriculture and plant biotechnology; and Environment biotechnology.

4.5 Subject content structure:

Contents	Hours	Objectives
Chapter 1. Introduction to basic biotechnology. 1.1 Biotechnology? 1.2 What Are the Benefits of Biotechnology?; 1.3 What Did These Individuals Contribute to Biotechnology?; 1.4 Molecular Biotechnology; 1.5 Genetic Engineering; 1.6 History of Biotechnology; 1.7 Some Figures of transgenic crops; 1.8 Application of biotechnology (medicine, Agriculture, Animal , Environmental 1.9 Conclusion	3	4.1.1
Chapter 2. Applied and Industrial Microbiology. 2.1 Growth curve of micro-organisms 2.2 Primary and Secondary Metabolites; 2.3 Characteristics of Large-Scale Fermentations; 2.4 Antibiotics: Isolation and Characterization; Penicillins and Tetracyclines; 2.5 Vitamins and Amino Acids; 2.6 Enzymes as Industrial Products; 2.7 Alcohol and Alcoholic Beverages; 2.8 Vinegar Production; 2.9 Citric Acid and Other Organic Compounds.	3	4.1.1; 4.12
Chapter 3. Food biotechnology 3.1 Food Biotechnology Introduction; 3.2 Conventional breeding and Genetic modification; 3.3 Food Biotechnology Applications; Examples of GMO and GM food; 3.4 How can DNA be moved from one organism to another; 3.5 Consumer Benefits of Food Biotechnology; 3.6 Environmental Impact of Agricultural Biotechnology; 3.7 Developing Nations: Biotechnology's Impact on Food Security; 3.7 Current Products of Food Biotechnology; 3.8 U.S. Labeling Policy for Food Biotechnology; 3.9 How common are GMO foods? 3.10 Potential Benefits; Possible Risks for GM Foods; 3.11 Potential Environmental Hazards; Potential Human Health Risks; Economic Hazards; Creating a balance; 3.12 What Does the Future Hold?	3	4.1.1; 4.12
Chapter 4. Beer and Wine 4.1 History of beer brewing 4.2 Barley and malt	4	4.1.1; 4.12

<p>4.3 Mashing 4.4 Water, Hops, 4.5 Wort (boiling, clarification and cooling) 4.6 Yeasts 4.7 Brewery fermentation 4.8 Filtration 4.9 Packaging 4.10 History of Wine 4.11. Grapes 4.12. Grape processing 4.13 Fermentation 4.14. Clarification, Filtration 4.15. Aging 4.16. 9 Packaging</p>		
<p>Chapter 5. Genetic Engineering 5.1 Introduction 5.2 Genetic Engineering (GE) 5.3 Genetic Modified Crops (GMC) 5.4 Genetic Modified Organism (GMO) 5.5 Genetic Modified Food (GMF) 5.6 Conclusion</p>	3	4.1.1; 4.12
<p>Chapter 6. Medical Biotechnology. 6.1 Introduction 6.2 Gene therapy; 6.3 Cell and tissue transplantation; 6.4 Xenotransplantation; 6.5 Stem cells, Embryonic Stem Cells, Reprogramming; Sources of adult and infant stem cells; 6.6 Possible solution: introduce stem cells to affected area of the brain; 6.7 Cloning; 6.8 Regulations and ethics related to stem cell. 6.9 Conclusion</p>	3	4.1.1; 4.12
<p>Chapter 7. Production of antibiotics by fermentation 10.1 Overview of antibiotic classes 10.2 Overview of β-lactam antibiotics 10.3 Penicillins, Cephalosporins, Tetracyclines, Aminoglycosides 10.4 Strain improvement and Genetic engineering 10.5 Production processes 10.6 The growth medium and the production media 10.7 Foam control, Fed-batch feeding, pH, and Dissolved oxygen 10.8 Culture preservation and aseptic propagation 10.9 Recovery and post-recovery processing 10.10 Future prospects for fermentation-based antibiotics 10.11 Conclusion</p>	4	4.1.1; 4.12

<p>Chapter 8. Agriculture and plant biotechnology 6.2 Why is agricultural biotechnology important? 6.3 Creating Gene banks 6.4 Genetic Modification 6.5 Micropropagation 6.6 Genetic Engineering 6.7 Artificial insemination (AI) and multiple ovulation/embryo transfer (MOET) 6.8 Plant transgenics 6.9 Genetic engineering techniques applied to plants 6.10 Antisense technology Insecticide biotechnology Plant vaccines 6.11 Metabolic engineering to improve efficiency of biological production of biofuels</p>	4	4.1.1; 4.12
<p>Chapter 9. Environmental Biotechnology 7.1 Molecular Ecology; 7.2 Bioremediation (site restoration) and Biotechnology for waste treatments; 7.3 Biosensor (monitoring of pollution); 7.4 Environmental applications of genetically modified organisms and Genetic Exchange in Environment; 7.7 Biofuel 7.8 Conclusion</p>	3	4.1.1; 4.12

7. Teaching methods:

- Introducing and explaining.
- Providing supplements, media resources.
- Encourage students self- learning and - searching knowlegde for seminars

8. Duties of student:

- Lecture/Class attendance: not allow to absent more than 20% of lectures.
- Seminar attendance: mandatory.
- Discussion and homeworks: mandatory

9. Assessment of student learning outcomes:

9.1. Assessment

No.	Point components	Rules and Requirement	Weights
2	Midterm exam/ Seminars	Tests/ Oral presentation	30%
3	Final exam	Tests	70%

9.2. Grading

- Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place.
- Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

10. Materials:

Materials information	Code number
[1] Basic biotechnology (0 521 77074 2) / COLIN RATEDGE; Biên tập, hiệu đính: COLIN RATLEDGE, Bjorn Kristiansen: Cambridge, 2001, 0 521 77074 2.- 660.62/ B311	MON.102641
[2] Biotechnology (Fourth Edition): Studies in Biology, John E. Smith, Cambridge University Press, 2004.	<u>KH000519</u> ; <u>NN000220</u>
[3] Biotechnology A guide to genetic engineering / Pamela Peters.- 1st.- Boston, Massachusetts: McGraw-Hill, 1993, 253p, 0 697 12063 5.- 660.65/ P483	
[4] Environmental biotechnology / ALAN SCRAGG.- 1st.- Edinburg Gate, England: Longman, 1999, 249p, 0 582 27682 9.- 628.5/ S433	<u>CN.001830</u>
[5] Modern industrial microbiology and biotechnology. Okafor, Nduka. 2007, Science Publishers, Enfield, NH, USA	Viện NC&PT CNSH
[6] Food, Fermentation and Microbiology	Viện NC&PT CNSH

11. Self-study Guide:

Week	Content	Theory (hours)	Students' duties
1	Chapter 1: Introduction to biotechnology	6	Reading: [2] chapter 1
2	Chapter 2: Applied and Industrial Microbiology	6	Reading: [5] chapter 1; Reviewing [2] chapter 1
3	Chapter 4: Food biotechnology	6	Reading: [2] chapter 11 Reviewing [1] chapter 5
4	Beer and Wine	8	Reading: [6] chapter 2, 3; Reviewing: [2] chapter 11
5	Chapter 5: Genetic engineering	6	Reading: [1] chapter 5; [2] chapter 3; [3] Reviewing: [6] chapter 2, 3.
6	Chapter 6: Medical biotechnology	6	Reading: [2] chapter 8 Reviewing [2] chapter 11
7	Production antibiotic by fermentation	8	Reading: [1] chapter 18 Reviewing [2] chapter 8
8	Chapter 7: Agriculture and plant biotechnology	8	Reading: [2] chapter 10 Reviewing [1] chapter 18
9	Chapter 7: Environmental Biotechnology	6	Reading: [1] chapter 9 [2] chapter 17 Reviewing [2] chapter 10
	Total	60	
16			Taking the Final exam

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**ON BEHALF OF RECTOR
DEAN/ DIRECTOR**

HEAD OF DEPARTMENT