

Subject Description Form

Subject Code	FSN4409 (ABCT4409)
Subject Title	Food Biotechnology
Credit Value	3
Level	4
Pre-requisite	Microbiology (ABCT2134) or Clinical Microbiology (SN206)
Exclusion	Microbial Biotechnology (ABCT4110)
Objectives	Developing in students a comprehensive knowledge and understanding of the use of modern biotechnologies in the production of food. Global trends in biotechnological development in food production and the opportunities associated will be discussed. The safety of using biotechnology in food industry will also be highlighted.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> Understand the common bio-techniques used in food industry and how these techniques are applied to food product development; Identify major types of food products that are developed through the use of biotechnology and recognize the global trends and opportunities of biotechnological applications on food supply and consumer acceptance of food products; Apply microbiological and molecular biological techniques in food testing; Analyze critically various controversial issues relating to the safety of using modern biotechnology in food production; Demonstrate skills in critical thinking, information acquisition and communication and appreciate the importance of professional integrity and the new development in food biotechnology.
Subject Synopsis/ Indicative Syllabus	<p><u>Introduction to Food Biotechnology</u></p> <p><u>Essentials of Recombinant DNA Tech</u> Basic knowledge and processes in recombinant DNA, including cloning, restriction digestion, transformation, and their applications.</p> <p><u>Animal and Plant Biotechnology</u> Transgenic animals and animal cell culture; applications of animal biotechnology; genetically engineering of plants: methodology; examples of genetically modified crops.</p> <p><u>Genetically Modified Food and Food Safety</u> Potential impact of GMO on human and environment; Safety evaluation of genetically modified food; labelling and detection of genetically modified food; consumer acceptance of genetically modified food; regulations of GM food in different countries.</p> <p><u>Biotechnology in Food Productions</u> Key food types and their production processes. Recent biotechnological development in food innovations will also be discussed.</p>

Teaching/Learning Methodology	<p>The basic contents of this subject will be presented through lecture notes and other teaching tools. The lectures will begin with the introduction that summarizes the basic concepts of biotechnology used in food industry including genetic, cell, and enzyme engineering, fermentation, transgenic techniques and downstream processing. Mechanisms in producing genetic modified organisms will be covered, followed by real-life examples. Safety assessment and detection of GMO will be discussed along with case-study. The tutorial section may also include some lectures due to the lack of enough lecture schedules.</p> <p>Three laboratory sessions will also be provided for students to gain practical training in genetically modified (GM) food detection. Students are also expected to study reference materials as well.</p> <p>The course will consist of one weekly two-hour lectures and one-hour tutorial. Lectures will be supplemented with visual aids and handout material. The course materials for next lecture will be given to students before hands through LMS. Students are expected to study the slides before each class to understand the class contents better in the class and also encouraged to ask question during the lecture.</p>																																															
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Assessment</th><th rowspan="2">% Weight</th><th colspan="5">Intended Subjects Learning Outcomes to be assessed</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th><th>e</th></tr><tr><td>Lab Report</td><td>10%</td><td></td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Mid-term</td><td>20%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td>Group Project</td><td>30%</td><td>√</td><td>√</td><td></td><td>√</td><td>√</td></tr><tr><td>Final</td><td>40%</td><td>√</td><td>√</td><td>√</td><td>√</td><td>√</td></tr><tr><td></td><td>100%</td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Mid-term test</p> <p>The mid-term test will take the form of short, long and case study questions. The test is worth 20% of the subject assessment. The test will focus on your knowledge and intellectual skills by testing your understanding and application of the subject and the application of concepts.</p> <p>Lab report</p> <p>The lab report accounts for 10% of the subject assessment and <u>each individual</u> needs to write their own lab report. The criteria for the assessment are as following:</p> <ol style="list-style-type: none">1. The report is in a logical format2. Adequate and appropriate background information3. Objective(s) is clearly stated4. The experimental procedures and information are clearly written in correct English5. Raw data and results are included and in a systemic and easily comprehensive format6. Tables, charts, diagrams, picture, photos are clearly presented with proper labeling and description in text7. Result analysis is thorough, logical and step by step	Assessment	% Weight	Intended Subjects Learning Outcomes to be assessed					a	b	c	d	e	Lab Report	10%		√	√	√	√	Mid-term	20%	√	√	√	√	√	Group Project	30%	√	√		√	√	Final	40%	√	√	√	√	√		100%					
Assessment	% Weight			Intended Subjects Learning Outcomes to be assessed																																												
		a	b	c	d	e																																										
Lab Report	10%		√	√	√	√																																										
Mid-term	20%	√	√	√	√	√																																										
Group Project	30%	√	√		√	√																																										
Final	40%	√	√	√	√	√																																										
	100%																																															

	<p>8. Significant findings, summaries or conclusions are clearly stated and are logical</p> <p>9. Discussions are logical and not far-fetched, on the results and not on the experimental procedures</p> <p>10. With proper listing of references if necessary</p> <p>These criteria will be used to assess the outcome of the lab section and the lab outcome will include the following:</p> <ol style="list-style-type: none"> 1. Knowledge of food biotechnology technique and its applications 2. Ability to apply the biotechnology techniques in experimental studies 3. Ability to plan and perform the experiments independently, logically and systemically 4. Ability to analyze the results critically 5. Ability to interpret the findings logically and critically 6. Ability to present the work and findings logically, clearly, and in correct English in the written report format. <p>Group Project Students are expected to conduct a brief review on the latest development of biotechnology in food production. Beneficial and/ or controversial issues related to application of biotechnology can also be included. Students' performance will be assessed by their oral presentation.</p> <p>Final exam The final exam is worth 40% of the subject assessment and covers all course content. The examination will comprise of short, long and case study question, which mainly assess your understanding of concepts and the ability to analyze and apply concepts.</p>	
Student Study Effort Expected	Class contact:	
	▪ Lecture	22 Hrs.
	▪ Tutorial	4 Hrs.
	▪ Laboratory	9 Hrs.
	▪ Presentation	4 Hrs.
	Other student study effort:	
	▪ Report writing	9 Hrs.
	▪ Self study	70 Hrs.
	Total student study effort	118 Hrs.
Reading List and References	<p>Lee, B.H. Fundamentals of food Biotechnology. Wiley-VCH 2015</p> <p>Zaikov, G.E. Biotechnology, agriculture and the Food industry. Nova Science Publishing 2006</p> <p>Evenson, R.E. and Santaniello, V. Consumer acceptance of genetically modified. Food CABI Publishing 2004</p> <p>Shetty, K. Food Biotechnology (2nd ed.). CRC press/Taylor & Francis 2003</p> <p>Gutierrez-Lopez, G.F. and Barbosa-Canovas, G.V. Food Science and food biotechnology. CRC press 2003</p>	