

AGRI S9Z08: Food Biotechnology

Module Details	
Module Code:	AGRI S9Z08
Full Title:	Food Biotechnology APPROVED
Valid From::	Semester 1 - 2019/20 (June 2019)
Language of Instruction:	English
Duration:	1 Semester
Credits::	7.5
Module Owner::	Caroline Gilleran
Departments:	Unknown
Module Description:	This module will examine the role and potential of biotechnology from a food perspective, describing biotechnology advances, methods and applications from across the food industry.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	Module Learning Outcome Description
MLO1	Evaluate and appraise the impact of biotechnology on food production, quality and processing.
MLO2	Distinguish between and apply advanced analytical and molecular biology techniques for the assessment of biotechnology-based foods and for the development of novel detection assays.
MLO3	Critically assess and justify the usefulness of biotechnology in specific food industries.
MLO4	Appraise current EU and International legislation regarding Novel foods (including GM) and examine current policy on novel foods and the implications of policy on the industry.
MLO5	Critically evaluate the technical, economic and social implications of novel foods including genetically modified foods.
Pre-requisite learning	
Module Recommendations <i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named DkIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i>	
No recommendations listed	

Module Indicative Content	
Introduction to food biotechnology Overview of the application of technology to modify genes of animals, plants, and microorganisms to create new species which have desired production, marketing, or nutrition related properties and a demonstration of the effect biotechnology has on food production, processing, and quality.	
Food ingredient biotechnology Bacteria and Enzymes in the food industry: cheese making, whey processing, brewing, baking, meat and fish processing (fish fermentates); role of enzymes in brewing, baking, distilling and meat processing. Exploration of the marketed enzymes produced using gene technology. Nutraceuticals and their health benefits.	
Applications of biotechnology in the food industry Exploration of fermentation biotechnology of modern and traditional foods worldwide, including beverages and the bioprocessing of food wastes. Evaluation of the food applications of algae. Insights into the biotechnology applications of functional foods and ingredients including dairy products, single cell protein, food cultures, nutraceuticals, bioactives, in vitro meat culture, bio-functional molecules, molecular farming and edible vaccines.	
Analytical methods for assessment and detection of GM foods Molecular techniques and instrumental analysis methods for food safety assessment and assessment of nutritional value of GM foods. Use of genotyping assay for GM traceability monitoring or to detect adulterations of meat (e.g. pork in Halal foods or horse in beef). GC-MS and AAS techniques for nutritional value assessment of GM foods. Biosensors for food quality assessment.	
Legislation and social issues surrounding biotechnology in food Introduction to EU and USA legislation regarding regulatory approval for novel foods (including GMOs). Approval for research, cultivation and commercialization. Introduction to other regulatory / advisory bodies that are involved in legislation such as OECD, JEFCA (WHO/FAO) and UPOV. ; the reaction of society to GM food, biodiversity protection and sustainability of GM foods; a look at policy on novel foods and the implications of policy on the industry.	
Module Assessment	
Assessment Breakdown	%
Course Work	40.00%
Final Examination	60.00%
Module Special Regulation	

Assessments

Full Time On Campus			
Course Work			
Assessment Type	Practical/Skills Evaluation	% of Total Mark	30
Marks Out Of	0	Pass Mark	0
Timing	Week 25	Learning Outcome	2
Duration in minutes	0		
Assessment Description Students will perform a number of advanced analytical and molecular techniques for GM food analysis and will be required to write a formal report based on the Advanced laboratory (15%) and Masterclass sessions (15%).			
Assessment Type	Project	% of Total Mark	10
Marks Out Of	0	Pass Mark	0
Timing	Sem 2 End	Learning Outcome	1,2,3,4,5
Duration in minutes	0		
Assessment Description Learning outcomes will be assessed synoptically with those of the "Animal Biotechnology" module. This assessment will cover one or more of the Learning Outcomes for each of the modules involved (e.g. essay on GMO legislation, a group report on current use of a biotechnology application in food production, a presentation and discussion on ethical issues of GMOs or a similarly relevant assessment)			
No Project			
No Practical			
Final Examination			
Assessment Type	Formal Exam	% of Total Mark	60
Marks Out Of	0	Pass Mark	0
Timing	End-of-Semester	Learning Outcome	1,3,4,5
Duration in minutes	0		
Assessment Description n/a			

Module Workload

Workload: Full Time On Campus

Workload Type	Contact Type	Workload Description	Frequency	Average Weekly Learner Workload	Hours
Lecture	Contact	This module will consist of 3hrs each week for lectures or practicals (two 3hr practicals per semester)	Every Week	2.60	2.5999999046325684
Practical	Contact	This module will contain two 3hr practicals per semester, instead of lectures, one Masterclass and one Advanced Lab.	Every Week	0.40	0.40000000596046448
Directed Reading	Non Contact	No Description	Every Week	3.00	3
Independent Study	Non Contact	No Description	Every Week	5.00	5
Online Contact	Contact	On-line discussion forum	Every Week	0.50	0.5
				Total Weekly Learner Workload	11.50
				Total Weekly Contact Hours	3.50

This module has no Part Time On Campus workload.

Module Resources

Recommended Book Resources

Anthony Pometto, Kalidas Shetty, Gopinadhan Paliyath, Robert E. Levin. (2006), Food Biotechnology, 2. CRC Press.
Belitz, H.-D., Grosch, Werner, Schieberle, Peter,. (2009), Food Chemistry, 4th revised and extended ed..

Supplementary Book Resources

Valverde, J.. (2013), Industrial applications of phytochemicals in Handbook of Plant Food Phytochemicals: Sources, Stability and Extraction, eds B.K. Tiwari, N. P. Brunton and C. S. Brennan. Wiley.

Recommended Article/Paper Resources

Current research publications from peer-reviewed journals will be used as additional material.

Other Resources

Website, The European Food Information Council.

<http://www.eufic.org/>

Website, Department of Environment, Community and Local Government. GMO Section of The Department of Environment,

<http://www.environ.ie/en/GMO/>

Website, GMO Section of EU Commission for Health and Consumers,

http://ec.europa.eu/food/index_en.htm

Website, Teagasc Ashtown Food Research Centre,

<http://www.teagasc.ie/training/colleges/ashtown.asp>

Website, Kyoto Encyclopedia of Genes and Genomes,

<http://www.genome.jp/kegg/>

Website, The Food Safety Authority of Ireland,

<http://www.fsai.ie/>

Website, Environmental Protection Agency,

<http://www.epa.ie>

Website, European Food Safety Authority,

<http://www.efsa.europa.eu/>