

Full Title:	Food Biotechnology
Language of Instruction:	English
Module Code:	AGRI S9Z08
Credits:	7.5
Valid From:	Semester 1 - 2019/20 (June 2019)
Module Delivered in	3 programme(s)
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.
Learning Outcomes:	
<i>On successful completion of this module the learner should be able to</i>	
<ol style="list-style-type: none"> 1. Evaluate and appraise the impact of biotechnology on food production, quality and processing. 2. 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. 3. Critically assess and justify the usefulness of biotechnology in specific food industries. 4. 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. 5. Critically evaluate the technical, economic and social implications of novel foods including genetically modified foods. 	

Module Content & Assessment

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.

Assessment Breakdown

	%
Course Work	40.00%
End of Module Formal Examination	60.00%

Full Time

Course Work

Assessment Type	Assessment Description	Outcome addressed	% of total	Marks Out Of	Pass Marks	Assessment Date	Duration
Practical/Skills Evaluation	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%).	2	30.00	0	0	Week 25	0
Project	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)	1,2,3,4,5	10.00	0	0	Sem 2 End	0

No Project

No Practical

End of Module Formal Examination							
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Marks Out Of</i>	<i>Pass Marks</i>	<i>Assessment Date</i>	<i>Duration</i>
Formal Exam	n/a	1,3,4,5	60.00	0	0	End-of-Semester	0

DKIT reserves the right to alter the nature and timings of assessment

Module Workload & Resources

Workload: Full Time

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

This course has no Part Time workload.

Resources
<i>Recommended Book Resources</i>
<p>Anthony Pometto, Kalidas Shetty, Gopinadhan Paliyath, Robert E. Levin 2006, <i>Food Biotechnology</i>, 2 Ed., CRC Press</p> <p>Belitz, H.-D., Grosch, Werner, Schieberle, Peter, 2009, <i>Food Chemistry</i>, 4th revised and extended ed. Ed.</p>
<i>Supplementary Book Resources</i>
<p>Valverde, J. 2013, <i>Industrial applications of phytochemicals in Handbook of Plant Food Phytochemicals: Sources, Stability and Extraction</i>, eds B.K. Tiwari, N. P. Brunton and C. S. Brennan Ed., Wiley</p>
<i>Recommended Article/Paper Resources</i>
<p>Current research publications from peer-reviewed journals will be used as additional material</p>
<i>Other Resources</i>
<p>Website: The European Food Information Council/n/a http://www.eufic.org/</p> <p>Website: Department of Environment, Community and Local Government <i>GMO Section of The Department of Environment</i> http://www.environ.ie/en/GMO/</p> <p>Website: <i>GMO Section of EU Commission for Health and Consumers</i> http://ec.europa.eu/food/index_en.htm</p> <p>Website: <i>Teagasc Ashtown Food Research Centre</i> http://www.teagasc.ie/training/colleges/ashtown.asp</p> <p>Website: <i>Kyoto Encyclopedia of Genes and Genomes</i> http://www.genome.jp/kegg/</p> <p>Website: <i>The Food Safety Authority of Ireland</i> http://www.fsai.ie/</p> <p>Website: <i>Environmental Protection Agency</i> http://www.epa.ie</p> <p>Website: <i>European Food Safety Authority</i> http://www.efsa.europa.eu/</p>

Module Delivered in

Programme Code	Programme	Semester	Delivery
DK_NACFB_9	Certificate in Food and Feed Biotechnology	2	Mandatory
DK_SAGBI_9	Master of Science in Agricultural Biotechnology	2	Mandatory
DK_SAGPD_9	Postgraduate Diploma in Agricultural Biotechnology	2	Mandatory