APPROVED

AGRI S7019: Agriculture and Climate Change

Module Details

Module Code:	AGRI S7019
Full Title:	Agriculture and Climate Change APPROVED
Valid From::	Semester 2 - 2020/21 (February 2021)
Language of Instruction:	English
Duration:	1 Semester
Credits::	5
Module Owner::	• Caroline Gilleran • Breda Brennan • Caroline Gilleran
Departments:	Agriculture, Food and Animal Health
Module Description:	In this module, students will learn about climate change in Ireland, reflect on our global mitigation commitments and explore and appraise mitigation options and emerging technologies for agriculture with regard to climate change.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	**Module Learning Outcome Description**
MLO1	Evaluate the mechanisms of climate change and assess the impacts for agriculture in Ireland.
MLO2	Appraise the mitigation pathways and alternative technologies towards low-carbon agricutlure.
MLO3	Analyse the role of clean technologies and bioenergy on the environment, particularly in the face of climate change and resource limitation.
MLO4	Interpret the significance of relevant EU environmental directives, national legislation and regulations, and the UN Sustainable Development Goals (SDGs) to the agricultural community and climate change.

Pre-requisite learning
Module Recommendations *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).*
No recommendations listed

Module Indicative Content
Climate change Mechanisms and processes of directional climate change; measured effects on global and local climate, and projected future changes; effects on ocean acidification; effects on global freshwater water availability and water security.Implications of global climate change for agriculture in Ireland, including the contribution of agriculture to greenhouse gases, and the challenges of adapting to a changing climate.
Policy EU climate and energy legislation. The implications of EU directives, national regulations and the UN SDGs for the agricultural community in relation to climate change. International mitigation commitments: COP 21 (UNFCCC Paris agreement).
Land-use mitigation Carbon sequestration: Land-use change, improved grassland management, hedgerows,inclusion of cover crops in tillage, forestry, agroforestry.
Agricultural mitigation Low emission technologies: reducing emissions from animals, animal waste and fertiliser. Improving efficiences: higher animal productivity, improving animal health, increasing genetic merit, extending grazing season, additives (feed and slurry), multi-species swards, GM crops. Agricultural diversification e.g. agroforestry, bioenergy, agritourism.
Energy mitigation Increased farm energy efficiency. The energy problem, sources of biomass (Miscanthus, willow, etc), feedstock sustainability, global patterns of biomass use. Bioenergy technologies: anaerobic digestion and biomethane, biofuels for transport. Fundamentals of clean technology.

Module Assessment

Assessment Breakdown	%
Practical	40.00%
Final Examination	60.00%

Module Special Regulation

Assessments

Part Time On Campus

No Course Work

No Project

Practical

Assessment Type	Practical/Skills Evaluation	**% of Total Mark**	40
Marks Out Of	100	**Pass Mark**	40
Timing	n/a	**Learning Outcome**	1,2
Duration in minutes	0		

Assessment Description
This activity will require the use several web tools to analyze CO2 concentrations from sites around the globe, measured by National Oceanic and Atmospheric Administration (NOAA) in the U. S. Students will analyze real scientific measurements of carbon dioxide (CO2), one of the most important greenhouse gases (GHGs) which influence climate change. Students will construct graphs from data sets and analyse the trends in CO2 emissions from 3 selected global locations. By analyzing short and long-term trends of CO2 in the atmosphere, students will learn how the atmosphere and climate are changing and determine the causes that are responsible for these changes.

Final Examination

Assessment Type	Formal Exam	**% of Total Mark**	60
Marks Out Of	0	**Pass Mark**	0
Timing	End-of-Semester	**Learning Outcome**	1,2,3,4
Duration in minutes	0		

Assessment Description
End of semester examination.

Reassessment Requirement

Reattendance
The assessment of this module is inextricably linked to the delivery. Therefore reassessment on this module will require the student to reattend (i.e. retake) the module in its entirety.

Module Workload

This module has no Full Time On Campus workload.

Workload: Part Time On Campus					
Workload Type	*Contact Type*	*Workload Description*	*Frequency*	*Average Weekly Learner Workload*	*Hours*
Lecture	Contact	Interactive lectures specific to indicative content	Every Week	2.50	2.5
Independent Study	Non Contact	Independent study in relation to indicative content.	Every Week	2.00	2
Directed Reading	Non Contact	Directed reading specific to indicative content and reading list.	Every Week	2.00	2
Online Contact	Contact	Online Support	Every Second Week	0.50	1
				Total Weekly Learner Workload	7.00
				Total Weekly Contact Hours	3.00

Module Resources

Recommended Book Resources

Godfrey Boyle. (2012), Renewable Energy, OUP Oxford, p.584, [ISBN: 9780199545339].

H.P. Das. (2016), Climate Change and Agriculture Implication for Global Food Security, 1st. CRC Press, [ISBN: 9781498769761].

Supplementary Book Resources

Jason Smerdon. (2018), Climate Change : The Science of Global Warming and Our Energy Future, 2nd. Columbia University Press, New York.

Jochen Bundschuh, Guangnan Chen. (2017), Sustainable Energy Solutions in Agriculture, 1st. CRC Press, [ISBN: 9781138077744].

Recommended Article/Paper Resources

Janusz Nowotnya, John Dodsonb, Sebastian Fiechterc, Turgut M. Gürd, Brendan Kennedye, Wojciech Macykf, Tadeusz Baka, Wolfgang Sigmundg, Michio Yamawakih, Kazi A. Rahmana. (2018), Towards global sustainability: Education on environmentally clean energy technologies, Renewable and Sustainable Energy Reviews, 81, p.2541.

Gary J. Lanigan & Trevor Donnellan. (2019), An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030, Teagasc Greenhouse Gas Working Group,
https://www.teagasc.ie/publications/2019 /an-analysis-of-abatement-potential-of-g reenhouse-gas-emissions-in-irish-agricul ture-2021-2030.php

Department of the Environment, Climate and Communications. (2017), National Mitigation Plan,
https://www.gov.ie/en/publication/48d4e- national-mitigation-plan/

Trevor Donnellan, Kevin Hanrahan and Gary Lanigan. (2018), Future Scenarios for Irish Agriculture: Implications for Greenhouse Gas and Ammonia Emissions, Teagasc,
https://www.teagasc.ie/publications/2018 /future-scenarios-for-irish-agriculture- implications-for-greenhouse-gas-and-ammo nia-emissions.php

Other Resources

Website, Global Monitoring Laboratory. (2021), U.S. National Oceanic and Atmospheric Administration,
https://www.esrl.noaa.gov/gmd/

Website, AGRI-I. (2021), Agricultural Greenhouse Gas Research Initiative - Ireland,
https://agri-i.ie/