



**Maynooth  
University**  
National University  
of Ireland Maynooth

**Maynooth University  
Department Of Geography**

**MSc. Climate Change**

**Course Handbook**

**2024-2025**

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## **1. WELCOME TO THE DEPARTMENT OF GEOGRAPHY**

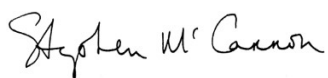
Dear MSc Climate Change students,

I am delighted to welcome you to Maynooth Campus and the Department of Geography. Some of you will have come from an undergraduate educational experience over the last few years and others may be returning to taught education after a year or more of employment. Such diverse backgrounds make this course of particular interest, and as active learners we hope you will contribute your own perspectives as well as learn from others. Whatever the personal life-long learning journey you are on, you are all very welcome.

Our MSc in Climate Change has been running successfully for many years now and in this time our students have studied with a range of leading experts in the field. As students I hope you will collaborate with our faculty staff to develop your studies and projects. Our Course Director, Prof Conor Murphy has broad experience in such engagement and the variety of research undertaken by Maynooth Geography staff across physical, human and environmental subject areas, which gives lots of scope to form and understand connections. I know you will learn much from all the graduate teaching staff and research students you encounter during your studies with us.

Several of our MSc Climate Change students have gone on to doctoral research, whereas others find jobs in a range of fields. In your future work it will be important to engage, understand and network and we encourage you to do this during your study this year. Look out for externally hosted events and symposia to attend in addition to your Maynooth-based events. In particular, it is important to understand the connectivity of all aspects of Geography and to try to engage in issues from many perspectives.

To stay abreast of this active and creative Department, you may want to follow us on Twitter and also to sign up for notifications from our blog. You may also want to do some writing of your own either for one of our blogs or for our staff-student journal, Milieu. But, most of all, do talk to us about our research and yours and consider how each part links together to aid our understanding of the Earth, our shared and crisis-ridden home, and how we can live on it better, together.



Dr. Stephen McCarron, Head of Geography, Maynooth University.

## **2. IMPORTANT DATES**

**KEEP AN EYE ON IMPORTANT DATES PAGE ON THE UNIVERSITY WEBPAGE**

<https://www.maynoothuniversity.ie/registrar/key-term-dates>

### **First Semester**

17<sup>th</sup> September: Taught Masters Induction (University)

23<sup>rd</sup> September: Start of Lectures

23<sup>rd</sup> September: Course Orientation 14.00–16.00, Physical Lab, Laraghbryan House, Maynooth University

8<sup>th</sup> October: Department of Geography welcome for PG students, 16.00, Rocque Lab, Rhetoric House

28<sup>th</sup> October: Study Week

23<sup>rd</sup> December: Christmas Vacation

### **Second Semester**

4<sup>th</sup> February: Start of Lectures

14<sup>th</sup> February: Thesis Proposal Presentations

18<sup>th</sup> – 25<sup>th</sup> April: Study Week and Easter Vacation

9<sup>th</sup> May: Last day of term

7<sup>th</sup> July: Deadline for submission of thesis paper for feedback

31<sup>st</sup> July: Deadline for submission of thesis paper and end of course

## **3. INTRODUCTION AND USE OF HANDBOOK**

The MSc in Climate Change at Maynooth University is offered by the Department of Geography to provide graduates with the knowledge, skills and experience necessary to enable them to undertake analysis of both global and Irish related climate change science, impacts and policies. The MSc was first offered in 2008–09 in response to the need for trained graduates in meeting the challenges posed by climate change.

The MSc in Climate Change is a full-time postgraduate programme running from the commencement of the first semester to the submission of a research thesis paper (deadline end of July). The modules offered are wide ranging and designed to impart a breadth of skills that will be of use in succeeding years, and to nurture independent and critical thinking on climate change issues.

This handbook is intended to be the first point of reference for module overviews and assessment or for any queries that you have about the course. If you cannot find answers to any question you may have please get in contact with the course director (Conor Murphy). Students are encouraged to actively participate in all lectures, practicals and seminars and to fulfill the requirements of the various components of the course. Since this is a postgraduate course, a high level of performance and contribution is expected from each participant.

#### **4. IRISH CLIMATE ANALYSIS AND RESEARCH UNITS (ICARUS)**

*ICARUS* is the largest dedicated climate change research and modelling centre in Ireland and conducts both pure and applied research covering all aspects of climate change from regional climate modelling to impact assessments in a variety of sectors and provides a wide and diverse range of research capabilities in the climatic arena. Researchers in *ICARUS* have a strong record of publication in International journals and have provided climate change information for key policy documents in Ireland as well as leading and contributing to the international Intergovernmental Panel on Climate Change (IPCC) reports. Key researchers with *ICARUS* will be involved in teaching and supervising on the MSc throughout the year, with the objective of linking teaching with cutting edge research that is being undertaken by *ICARUS*. There is a vibrant postgraduate environment in *ICARUS* of which you will be an important part and will be expected to contribute to. For more information on *ICARUS* and the type of research undertaken see the following link: <http://icarus.nuim.ie/>

#### **5. OBJECTIVES OF THE MSC CLIMATE CHANGE**

- To introduce students to current global climate change issues and impacts
- To provide training in research methods appropriate for understanding observed and future climates and their impacts
- To develop the capacity for undertaking independent research in the climate change area
- To provide a professional education in the area of climate change policy for those who need to be familiar with current developments for mitigating and adapting to future climate change.

## **6. PROGRAMME OUTCOMES**

At the end of this course students will:

- Have a knowledge and understanding of the basic principles involved in the wide range of subject material that can be involved in tackling the management of climate change.
- Have developed specialist knowledge and skills in the area of climate change.
- Have developed the ability to bring specialist knowledge and skills together in order to develop an understanding of alternative courses of action in the management of environmental problems.
- Appreciate the complex and multi-faceted nature of climate change problems and to realise that no one simple formulation or solution to them is likely.
- Have the ability to convey ideas and recommendations clearly and logically in both verbal and literary form.

## **7. TRANSFERABLE SKILLS**

In addition to in-depth specialist knowledge, the realisation of programme outcomes will also impart a range of valued and transferable skills that are relevant for a wide range of future employment and research opportunities. These include:

- data processing and analysis skills (such as quality assurance, statistical techniques);
- writing policy and technical reports;
- assembling scientific evidence in decision-making contexts;
- technical presentations;
- research design;
- quantitative methods and modelling concepts

## **8. PROGRAMME STRUCTURE AND REQUIREMENTS**

To meet the requirements of the MSc in Climate Change, students are required to accumulate 90 credits. Table 1 shows the modules available in semesters one and two and the associated credits for each module. All modules are compulsory and the thesis is a required module. The programme will be delivered through lectures, practicals and seminar presentations. A variety of assessment techniques will be used, including; practical assignments, group and individual seminar presentations, terminal examination and research thesis. The sections of this handbook detailing the module outlines provide further information on the types of assessment for individual modules. Students are encouraged to closely read the marks and standards guidelines laid down by the university. You can find them here: <https://www.maynoothuniversity.ie/university-policies/academic-policies-procedures>

To qualify for the award of Master of Science, students must:

- Pass all modules (40% or higher).
- Obtain at least 40% in the research thesis paper.
- Obtain at least 40% on aggregate in the course.

For modules other than the thesis a mark of at least 35%, but less than 40% can be compensated for by other modules. Marks below 35% cannot be compensated and will be recorded as incomplete/not passed. A student who has an incomplete grade in one or more modules will not be assigned a course mark and will be graded as Fail or Incomplete as appropriate. In

cases where a student obtains a mark of less than 35% in a module (excluding the thesis) effort will be made to provide a supplemental assessment during the same period of study. A course mark will not be allocated to a student who has insufficient credits - either by not being registered or by not attending the relevant examination or if they are not awarded a mark in a module. The grading system used for each module and the overall course is as follows and grade related criteria for different forms of assessment can be found later in the handbook:

First Class Honours:	>69.1
Second Class Honours Grade I:	59.1-69.0
Second Class Honours Grade II:	49.1-59%
Pass:	39.1-49.49%
Fail:	<39.0%

	<b>Code</b>	<b>Module Name</b>	<b>Credits</b>
<b>Semester One</b>	GY652	Applied Climate Sciences (PT)	10
	GY655	Impacts, Adaptation and Mitigation (CM)	10
	GY672	Spatial and Temporal Data using R (CB)	10
	GY668	Climate Research in Action (CM)	10
	GY660	Research Workshops (CM)	
<b>Semester Two</b>	GY667	The Ocean and Climate Change (GMC)	10
	GY664	Paleoclimatology (HS/NS)	10
	GY668	Climate Research in Action (CM)	10
	GY660	Dissertation/Thesis Paper	30
	GY660	Research Workshops (CM)	

**Table 1: MSc Structure and module credits**

## 9. COURSE TIMETABLE



The course timetable for semesters one and two are outlined below, most classes will be hosted in lab in Laraghbryan House. Some modules will run in workshop format facilitating students to focus on developing thesis topics, especially in the second semester. The timetable has been organised to allow more than sufficient time for preparation for class and the timely completion of assignments. Students will have use of the department computer rooms in Rhetoric house. However, these rooms are also used for general departmental teaching. Students should use their time in the computer lab as effectively as possible. The times below are core hours for each module. However, it is important to note that class activities may take place outside these hours and you will be advised in each module when this might occur, for example for longer workshops, field excursions and class assignments.

**Table 2 Timetable schedule for Semester 1**

<b>Time</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
09.00-10.00					
10.00-11.00	GY652 (Lab)				
11.00-12.00	GY652 (Lab)	GY655 (Lab)	GY672 (Iontas Room 2.31)		
12.00-13.00		GY655 (Lab)	GY672 (Iontas Rm 2.31)		
13.00-14.00					
14.00-15.00					
15.00-16.00					
16.00-17.00					

**Notes on semester 1 timetable**

**GY652, GY655 and GY672** will run weekly throughout the semester. GY652 with Prof. Thorne may need some flexibility and will provide a detailed schedule at first class.

In addition we will run some of the **GY668 Workshops** in Semester 1 to free up research time in semester 2. Dates for your diaries as follows:

Detection and Attribution Workshop 1: Friday 11<sup>th</sup> October 2024: 13.00–17.00 in the Lab

Detection and Attribution Workshop 2: Friday 18<sup>th</sup> October 2024: 10.00–16.00 in the Lab

Courtown Field Trip 28<sup>th</sup> and 29<sup>th</sup> October (overnight stay in Gorey, Co. Wexford).

Finally, we will also host a Thesis Preparation Workshop: Friday 8<sup>th</sup> November 2024: 10.00–16.00 in the lab as part of GY660.

The semester 2 timetable will be provided in due course.

## **10. ATTENDANCE AND ASSIGNMENTS**

Attendance, punctuality and participation are compulsory for all classes and students are expected to come prepared to class. If there is a documented personal/medical reason for not participating in class, it is the student's responsibility to let the instructor and course director know in advance. As a postgraduate student learning to be a Master of your discipline, it is expected that you turn up for class on time and participate fully on all occasions. Problematic attendance, punctuality and participation will be reported to the course director.

Deadlines will be strictly enforced. We have coordinated all assignments across modules as much as possible so that student workload will not get piled up. Assignments submitted after the set deadlines will be penalised 3% of their overall mark per day for late submissions. Exception: If there are extenuating personal or medical circumstances, the course director and instructor will facilitate extensions on a case-by-case basis. The circumstances must be communicated to, and accepted by, the lecturer prior to, or, in cases of unexpected emergencies, immediately after, the relevant deadline.

For all module assignments/coursework, the standardised **cover sheet** must include: the name of the student, student number, the title and

code of the module, the name of the lecturer who gave the assignment in question; when appropriate, a thematic title for the work; and the total word count of the work. A blank cover sheet will be available on the GY660 webpage (MSc course Moodle page).

## **11. GRADE RELATED CRITERIA**

Grade related criteria give you a insight into the standard of work required to achieve a certain grade. They are used by lecturers to guide marking of your submitted work. It is therefore very important that you examine these. Grade related criteria for essays, reports, orals presentations and the thesis paper are provided on the GY660 moodle page.

## **12. RECEIVING FEEDBACK ON YOUR WORK**

Feedback will be provided on your coursework in the form of a numerical grade and written suggestions on how to improve in further work. The grade related criteria will help you to interpret the numerical grade assigned to your work. Feedback will not be provided before the final cut-off date for submission has passed. Every effort will be made to return marks and feedback as promptly as possible, certainly within two weeks. Feedback will be provided on a standard form and will highlight strengths, areas for improvement, aspects to note for future work and any appropriate additional comments.

## **13. ACADEMIC INTEGRITY**

### ***Plagiarism***

Plagiarism is taking credit for the work of someone else. When you are asked to submit work for evaluation we are testing your understanding of the concepts, information, and debates within the field. Of course, your work will draw upon the ideas, data, and discussions presented whether by your lecturers or in the articles or books that have been recommended to you or that you have found for yourself. You avoid plagiarism by

composing your answer for yourself while giving credit to your sources. There are three main ways that plagiarism arises.

1. *Using the words of someone else without proper acknowledgement*

Sometimes you will think it helpful to use the words of someone else in your essay. This may be because you want to discuss further something you have read. It may be because it is a particularly concise statement of something. In any such case you must indicate that the phrase, sentence or short paragraph is the work of another person. You should put their words in quotation marks—" ". You should also give a reference to the source. In the text of your essay and immediately following the quotation you should give the source in some form similar to this—(Bloggs, 2008: 33). The first part of the reference here is the author's surname and the year of publication, and this tells me where in your bibliography I can find the full details (and this is why your essay must have a bibliography). The part at the end is the page number where I could find the quotation if I wanted to look it up. In this way you have told me your source and you have let me check it for myself. You can find further guidance to referencing in *The Reference Point: The Maynooth Guide to the Harvard Referencing System*, [available online here](#).

Even if you use the words of another person and you put them in quotation marks and you give the source you used, you must still explain in your own words what this means or make it clear from the context in your essay that you understand the sense of the quotation. For example, it would be perfectly alright for you write something like this—'The reasons why land values are generally high at the core of cities include accessibility and prestige, and these have been called the "benefits of centrality" (Christaller, 1945: 66).' I am telling you where I learned about the causes of high land values at the centre of cities and it is clear from the context that I understand accessibility and prestige to be what Christaller referred to as the "benefits of centrality."

*2. Relying too heavily upon the words of others even with proper acknowledgement*

Remember, that we are trying to assess your understanding of what you have read. We can't do that if your essay is mainly composed of extracts from the works of others even if these are properly referenced both in text and in your bibliography. One way to avoid this is to remember that when you quote someone's words you must show that you have understood what is being said. This will mean that most quotations will be accompanied by explanatory text of your own relating to the quotation to the question you have been asked to consider. Also remember that there is little point quoting your source if there is no special reason for doing so. As I said above this might be because you specifically want to discuss in detail the claim made by the author or it might be because they have expressed things particularly clearly and your own explanation can best be developed by elaborating upon these quoted words. As a guide for you, it would be odd for quotations in a student essay in Geography to make up as much as a quarter of the essay although for some work in Literary Geography that might occasionally occur.

*3. Using the work of others without proper acknowledgement even where no direct quotation is included*

You are always being asked questions that require you to draw upon the work of others to answer them. We need to know the source of your information. For example, if I were to be asked how central places develop in a predominantly agricultural society, I might talk about Walter Christaller's central place theory that I may read about in book by Peter Haggett. If so, I might write something like this—'In agricultural societies, the bringing of food to market may cause the development of market towns. Christaller argued that these would likely be relatively evenly spaced across the landscape (Haggett, 1965).' I am telling you that this idea comes from the work of Christaller and I am telling you that I learned about this in the book by Haggett, the details of which I will provide in the Bibliography at the end of the essay. In other words, I must give a source even where I do not directly quote words from that source.

#### *4. Using Artificial Intelligence to write your assignments*

Please note that it is considered a form of plagiarism to use AI websites or software (i.e. chatGPT) in your writing assignments, unless you are explicitly instructed to use AI by your course leader for a particular piece of work. Inappropriate AI use will be treated as plagiarism by module and course leaders (see the consequences section below).

### **Avoiding Plagiarism**

#### *1. Taking notes*

It is very dangerous to take notes by cutting-and-pasting from things you read online. If you do make notes like this, then, at the very least put quotation marks around everything you insert from another place and make a note to yourself of its source. This is laborious but necessary. It is far better to make notes in your own words. Even if you download the source onto your laptop, notes in your own words can capture your understanding when the reading is fresh in your mind. You might read a paragraph and make a note to yourself if there is something there that could be useful in your essay and this, then, will be your understanding of the relevance of that part of the article you were reading. We might imagine note-taking as leaving a record for ourselves of what we understood when reading so that we can easily recover that understanding when later we need it again. No one remembers all they read and understand without such prompts. It is a sort of conversation with yourself, or at least with the future self who will read the notes at some later point. When you turn to your notes to compose your essay, it needs to be crystal clear to you which words are yours and which come directly from a source. Of course, in your notes you will need the full details of your sources so that they can be given in your bibliography. You will also want the page numbers for any sections of text you quote into your notes.

#### *2. Writing your essay or assignment*

Essays begin with a blank sheet and you have to compose your answer. You will want to show you have understood the question set and then you

will draw upon your notes about your readings in order to compose your answer. It really will not do to copy paragraphs from online sources into your essay and then work at disguising this by swapping out certain words, or rearranging parts of sentences in a different order. Yes, these will in some sense be your words but it is not your understanding. You must read, understand and then explain. This is hard work and there is no short-cut. Start with your own words. How would you explain this to someone who had not read what you have read? You can go back to the sources for illustration and also to document where your ideas come from. But, start with your own understanding in your own words.

### *3. Collaborating with other students*

It is a very good idea to talk about your essay with other students, even if they are not taking the same course. This helps you clarify your own ideas. Except in cases where group work is specifically required, however, the composition of the essay must entirely be your own. Remember, plagiarism is taking credit for work that is not your own. If you borrow chunks from another student's essay you both may be complicit in cheating. This is also called collusion. Of course, you may not ever submit work written by another person as if it were your own.

### *4. Using Turnitin*

If you submit work via Moodle, it is very likely that you will be able to get a Turnitin report on your work. This will identify parts of your essay that have been seen elsewhere. There may be very good reasons for this. For example, the details of most of your bibliography is very likely to be found in other articles or essays so that these will be highlighted. Any quotations you include, even if you put them in quotation marks, will be highlighted but, provided you have given your source correctly and this does not make up too much of your total length of your essay there is no problem. Turnitin may suggest that various other common phrases (such as "central place theory" or "European agricultural history") are not original to you. This also is not a problem. However, if you see chunks of your essay highlighted by Turnitin and you have not given a source and it is not a commonly used phrase, then, you should ask yourself if you have inadvertently copied into

your essay something from a source you were reading. You will want to rephrase this to ensure that you are writing in your own words. A low “score” in Turnitin is no guarantee that there is no plagiarism in your work, particularly if you write your essay by copying into it chunks of text that you then amend. This is why it is so important to follow good practice in taking notes and composing essays.

### ***Consequences of Plagiarism***

The University has a clear and strict policy on plagiarism and you [can read it here](#). If a lecturer suspects that your work shows evidence of plagiarism, it will be reported to the Head of Department. The Head of Department will look at the work and review the concerns of the lecturer. If it looks like you are claiming credit for work that is not your own, then, the Head of Department will first determine whether you have been reported previously for plagiarism. If you have not been reported previously for plagiarism, either in Geography or elsewhere in the University, then, you will be invited to a meeting with the Head of Department. You will get an opportunity to explain how the appearance of plagiarism has arisen. If the Head of Department decides that this is a case of plagiarism you will be given the opportunity to submit a replacement assignment but that will have a cap of 40% to the mark it may be awarded. The Head of Department will make a report to the Registrar and you will then have a recorded case of plagiarism. If you have been reported previously for plagiarism, then, the Head of Department will prepare a report on the suspected plagiarism and this will be referred directly to the Registrar and ultimately to the Academic Discipline Board—the members of the Board are [given here](#). At this point, the Board will offer you a hearing to answer the case. After that they will make a determination of the facts of the case and in light of that may impose various penalties up to and including expulsion from the University.

### **14. ATHENA SWAN**

The Athena Swan Charter is a national strategy to promote gender equality in higher education and was launched in Ireland by the Higher Education Authority in 2015. The Department of Geography and ICARUS has



committed itself to the Athena Swan process of critical self-assessment and after a rigorous application, we were one of the first departments at Maynooth to earn 'bronze status'. This year we have had this bronze status renewed. We are committed to this process of advancing gender equity and opportunity, which means that during the year we will offer workshops that you can participate in. You will certainly be asked to let us know how we are doing through the end of semester and year questionnaires about the modules and teaching we offer. The responses are anonymised by the University Athena SWAN officer and then passed back to the Department where they are considered by our Athena SWAN Committee. Recommendations are then passed to the Head of Department, and discussed in our Undergraduate, Postgraduate and Research Committees, and at Staff Meetings.

In this, we are supported by the University with its policies addressing: the under-representation of women in higher administrative and academic offices in the university; the need to make the campus a place where diverse gender identity and expression are respected, including for our transgender and gender diverse staff and students; and a data collection and analysis system that alerts us to the many complex dimensions of equality, diversity, inclusion and interculturalism. We know that gender and sexuality intersect with other forms of discrimination in society, including around race, class, physical and mental challenges, citizenship-status, and nationality. With your help we will learn how to make Maynooth University a leader in recognising the sustaining a flourishing and diverse community.

## **15. BULLYING AND SEXUAL HARASSMENT**

Bullying and sexual misconduct are unacceptable at Maynooth University. Bullying is where repeated mistreatment of a person undermines their capacity to thrive at university. In a university setting, this includes, but is not limited to, ridiculing a person or making abusive remarks. Sexual misconduct includes any sexual contact that is unwanted or to which someone did not or was not able to give consent. In full confidence of your complaint being received respectfully, seriously, and

in confidence, you may contact the course director Prof. Conor Murphy (conor.murphy@mu.ie), the Head of Department, Dr. Stephen McCarron (stephen.mccarron@mu.ie); or you may contact the Maynooth Student Union Vice President for Welfare and Equality, welfare@msu.ie, (01) 708 6808, (087) 630 6433; the Student Services Centre, 01 708 3554; or Maynooth University Access Office, [access.office@mu.ie](mailto:access.office@mu.ie), (01)708 4600. There are also support services for victims of sexual violence including the 24-hour Rape Crisis Centre, [counselling@rcc.ie](mailto:counselling@rcc.ie), 1 800 77 8888; the Student Health Centre, (01) 708 3878; and the Student Counselling Service, (01) 708 3554.

## **16. SEMESTER ONE MODULES**

### **Module name: GY652 Applied Climate Sciences**

**Credit Weighting:** 10 ECTS

**Module Content:** This module explores the complex physical basis of climate change with an emphasis on understanding the key natural and human drivers of change. Students will be trained in the analysis of climate data in order to develop practical skills and knowledge of how to interpret a climate change signal. These skills will be further developed through the use and application of modelling techniques to generate regional climate scenarios, through the incorporation of user-friendly tools and software. The impact of aleatory ('unknowable' knowledge) and epistemic ('incomplete' knowledge) uncertainty in the science of climate change will also be explored through an assessment of uncertainties in climate models and emissions scenarios. The knowledge and skills developed during this module will be furthered by an exploration of the links between science, policy formulation and decision making.

**Learning Objectives:** On successful completion of the module, students should be able to:

- Explain the key natural and human drivers of climate change
- Review the concepts behind modelling the climate system

- Assess why differences occur in both global and regional climate change scenarios
- Use, develop and apply statistical based modelling techniques to generate regional climate scenarios
- Discuss the impact of uncertainty in the science of climate change and climate modelling

**Assessment:** 100% Continuous Assessment

**Module Name: GY672 Analysing Spatial and Temporal Data using R**

**Credit Weighting:** 10 ECTS

**Module Content:** This module provides an introduction to the basics of data analysis, exploration and visualisation, with particular focus on spatial and temporal data. The module consists of a series of lectures including an introduction and start-up session to a take away practical exercise using the statistical programming language R. The module begins with basic methods to explore, describe and graphically represent one- and two-dimensional data, before moving on to consider more advanced methods to manipulate and visualise geographical information, and explore and identify trends and seasonal patterns in time series data. In addition, some methodological aspects of data analysis are introduced, in particular the use of open data and 'citizen science' data and the idea of reproducibility in data analysis.

**Assessment:**

1. Continuous Assessment 50%
2. End of year in-house exam 50%

**Module name: GY655 Impacts, Adaptation and Mitigation**

**Credit Weighting:** 10 ECTS

**Module Content:** Climate change is having both positive and negative impacts in many areas of our natural, social, economic and political world. This module is designed to equip students with knowledge and understanding on a diverse range of potential and real climate change impacts. Issues surrounding these impacts and related policy approaches for mitigation will be scrutinised. The implications of modelling based projections of the enhanced greenhouse effect for Ireland and other parts of the world will be analysed, as will options to mitigate global warming. This module will be delivered by several academics working on specific impact areas. Possible topics to be incorporated into the module may include agriculture, soils, biodiversity, marine/coasts, pests, energy, transport, health, construction, tourism and planning.

**Learning Outcomes:** On successful completion of the module, students should be able to:

- Distinguish a diverse range of potential and real climate change impacts.
- Identify and discuss issues surrounding these impacts and related policy approaches for their mitigation.
- Analyse the implications of modelling based projections of the enhanced greenhouse effect for Ireland and other parts of the world.
- Appraise options to mitigate global warming.

**Assessment:** Continuous Assessment 100%

## **17. SEMESTER TWO MODULES**

**Module name: GY664 Paleoclimatology**

**Credit Weighting:** 10 ECTS

**Module Content:** This module provides an overview of palaeoclimate research, the study of how the Earth's climate system can change over hundreds, thousands, and millions of years. Research into how and why

climate has changed in the past allows us to have a greater understanding of the functioning of the climate system and how it responds to both abrupt and gradual change. This is vital in both modelling projected climate change and in understanding societal-ecological-climate interactions and feedbacks. This module will introduce students to the Earth's climate history, explore palaeoclimate methods, and provide practical field and/or laboratory experience, allowing students to critically assess the strengths, limitations, and challenges of collecting, analysing and interpreting proxy datasets. From this, students will gain insights into the complexities of natural and human drivers of climate change over different times and timescales, placing anthropogenic changes in context.

### **Learning Outcomes**

On successful completion of the module, students should be able to:

- Describe how the climate has varied in the past and the evidence for this change
- Understand the mechanisms and drivers of past climate change
- Compare the strengths and limitations of different proxies and methods used to research past climate
- Apply computer, laboratory and/or field-based palaeoclimate approaches and evaluate the findings
- Explain how complex feedbacks have driven interactions between climate, ecosystems and society

**Assessment:** 100% Continuous Assessment

**Module name:** GY667 The Ocean and Climate Change

**Credit Weighting:** 10 ECTS

**Module Content:** Modern climate change, at its most fundamental level, is the consequence of the radiative imbalance caused by increased and increasing anthropogenic greenhouse gases in the atmosphere. This

radiative imbalance causes an excess of heat to be trapped in the atmosphere, which is where the term 'global warming' arises. Over 90% of this excess heat trapped in the atmosphere has been stored in the ocean--in other words, 'global warming' could as accurately be described as 'ocean warming'. Understanding the ocean's response to climate change is key to understanding climate change itself. This course uses the IPCC AR5 report as the fundamental jumping off point for investigation of the ocean and climate change. The fundamental properties of the ocean (temperature, salinity, chemistry, freezing) are introduced first and threaded through the course to study ocean warming, salinity, sea ice, sea level rise and the ocean's overturning circulation.

**Assessment:** 100% Continuous Assessment

**Module name: GY668 Climate Research in Action**

**Credit Weighting:** 10 ECTS

**Module Content:** This module deals with key issues in doing climate science and in linking climate science with policy and action. Over the course of the module we will examine key issues from the physical and social sciences and communication of climate change with the public. Delivery will be workshop based and be led by leading academics in the field. Learning will be supplemented with field visits, working and engaging with practitioners and policy makers. The focus of workshops will vary from year to year but will focus on key topics such as data collection, quality assurance, detection and attribution of climate change in historical records, attribution of extreme events, working with different sources/types of climate information, the importance of the social sciences in developing sustainable climate policy, evaluating the outcomes of adaptation actions and communicating climate change. The key objective of the module is to better understand how climate research, broadly defined can inform decision making and make real world impact.

**Learning Outcomes:** On successful completion of the module, students should be able to:

- Have a critical appreciation of approaches and methods for data collection in the field
- Understand the vital importance of navigating the science policy interface
- Understand how climate change science can inform decision making
- Have a critical understanding of the value of social and physical science in informing sustainable climate action
- Analytical skills to detect and attribute climate change signals
- Critical appreciation of approaches to communicate climate change to different audiences

**Assessment:** 100% Continuous Assessment

**MODULE NAME: GY660 THESIS**

**Credit Weighting:** 30

**Module objectives:** Exploration of an original research project (7-13k words) under supervision of a staff member. Module will involve a written proposal outlining the research project; writing up the research paper; workshops during the course of the year and submission of final thesis paper.

**Learning Outcomes:** On successful completion of the module, students should be able to:

- Identify and develop an appropriate research topic in the arena of Climate Change
- Conduct self-directed primary and secondary research on an agreed research topic
- Introduce, discuss and analyze research findings in a relevant theoretical context
- Demonstrate effective writing and referencing skills

**Assessment:** Submission of thesis paper, deadline 31<sup>st</sup> July

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## 18. TEACHING AND SUPPORT STAFF CONTACTS

<b>Academic Staff</b>	<b>Email</b>	<b>Room</b>
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### **Support staff**

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***R = Rhetoric House; LB = Laraghbryan House; ION = Iontas Building; C= Callan Building***

More details and staff biographies are available at Geography and ICARUS homepages

<https://www.maynoothuniversity.ie/geography/our-people>

<https://www.maynoothuniversity.ie/icarus/our-people>