



## **Department of Geography**

# **MSc. IN GEOGRAPHICAL INFORMATION SYSTEMS AND REMOTE SENSING**

## **COURSE HANDBOOK**

**2019-2020**

## **Contents of Handbook**

1. Welcome to the Department of Geography
2. Important Dates
3. Introduction and use of Handbook
4. Objectives of the MSc
5. Programme Outcomes
6. Teaching Team 2019-20
7. Programme Structure and Requirements
8. Course Timetable and Student Communication
9. Seminar Series
10. NIRSA, NCG & SCSi
11. Assessment Weightings
12. Missed assessments/deadlines/classes and examinations
13. Grade Related Criteria
14. Feedback on your work
15. Avoiding Plagiarism
16. MU Rules and Regulations
17. Module Descriptions
18. Dept. of Geography Seminar Series 2019-20

## 1. WELCOME TO THE DEPARTMENT OF GEOGRAPHY



Welcome to Maynooth Geography and to the MSc in GIS/Remote Sensing. This is the longest-established such course in Ireland. You join a group of scholars with an international reputation. At Maynooth Geographic Information Science is considered very broadly and you will work with people who are developing applications for Health Geographies and for Spatial Statistics. Maynooth geographers are pioneering new techniques of remote sensing thereby preparing you to enter your profession at the highest levels. Virtually all our graduates find employment and the placement element within your degree gives you valuable experience and priceless contacts. We are proud of the work we do here and soon I hope you will be too.

The external assessors of our work regularly praise the quality of work produced by Maynooth's graduate students in GIS/Remote Sensing. You are working at the research frontier and can expect speculations in one class to become hypotheses for published work later in the year. It's an exciting prospect for you. So please do follow the tradition of earlier MSc GIS/Remote Sensing students of being marvellous departmental citizens, attending department seminars, supporting department publications in the Department blog and in our staff-student publication, Milieu.

If you see me around, stop and say hello,

With best wishes,

A handwritten signature in black ink, which appears to read 'G. Kearns'. The signature is written in a cursive style and is positioned above a thin yellow horizontal line.

Gerry Kearns, Head of Department

## 2. IMPORTANT DATES

### First Semester

Monday 23rd September 2019: Lectures commence; Postgraduate Reception (26<sup>th</sup>)  
Monday 28th October to Friday 1st November 2019: Study Week  
Friday 20th December 2019: Conclusion of First Semester Lectures  
Monday 23rd December 2019 to Thursday 2nd January 2020: Christmas Vacation  
Monday 6th – Friday 24th January 2020: Examination period (No classes)  
January 27th to 31st 2020: Inter-Semester Break

### Second Semester

Monday 3rd February 2020: Lectures resume  
Monday 16th March to Friday 20th March 2020: Study Week  
Friday 10<sup>th</sup> to Friday 19th April 2020: Easter Vacation  
Friday 9th May 2020: Conclusion of Second Semester  
Monday 12th May 2020: Earliest start date for work placement  
Friday 31st July 2020: Deadline for submission of work placement reports and end of course

## 3. INTRODUCTION AND USE OF HANDBOOK

The MSc in GIS & Remote Sensing at Maynooth University is offered by the Department of Geography to provide Graduates with the knowledge, skills and experience necessary to enable them to *work in the GIS and Remote Sensing industries or to apply the skills learned to a range of other working environment*. It also develops core transferable skills, which match an increased public use and knowledge of geo-spatial data. The course was first offered as a Higher Diploma in 1996, (with a top-up MSc option in 2000), supported by the NDP's Advanced Technical Skills Programme, in response to the need for trained GIS and RS graduates and is the longest-running course of its type offered in Ireland. The programme transferred across to a full taught MSc in 2009-10.

The MSc in GIS & Remote Sensing is a full-time postgraduate programme running from the commencement of the first semester to the completion of the work placement at the end of July 2020. The modules offered are designed to impart a breadth of practical skills which will be of use in succeeding years, and to nurture independent and critical thinking on applied and theoretical aspects of GIS and Remote Sensing. 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 (Dr. Ronan Foley). 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. OBJECTIVES OF THE MSC

- To provide highly qualified, motivated graduates who have been trained in Geographical Information Systems, Remote Sensing, and Digital Image Processing and who can apply the information technology skills they obtain.
- To produce marketable graduates who will make significant contributions to Geographical Information Systems, Remote Sensing, and other disciplines within industry, government and academia.
- To provide an understanding of Geographical Information Systems and Remote Sensing, the technology involved and its applications for specific investigations.

## 5. PROGRAMME OUTCOMES

At the end of this course students will:

### *Remote Sensing Component*

- To understand the main physical principles behind remote sensing.
- To understand the operation of the main airborne and space-borne remote sensing systems currently being employed.
- To understand the applications of RS spatial data within information technology spheres.
- To be trained in satellite image analysis and interpretation.
- To understand the concepts of digital image processing and acquire digital image processing skills.
- To have gained computer modelling skills for a range of state of the art programs.

### *Geographical Information Systems Component*

- Understand the fundamental principles of Geographical Information Systems (GIS)
- Fully understand the theoretical structures which underpin GIS and the wider GI Science.
- Obtain experience in using core GIS software.
- Develop confidence in the use of GIS to analyse and present information.
- Demonstrate a knowledge of the basic structures of digital datasets.
- Be competent in general analysis and modelling using a GIS.
- Have a solid grounding in core professional skills relevant to the GIS industry

## 6. TEACHING TEAM 2019-20

Dr. Ronan Foley	Course Leader/GIS Office Hours: 10.30-12 Tuesday; 2.30-4 Thursday	R 12 Rhetoric	Ronan.Foley@mu.ie Phone: 01 708 6024
Dr. Conor Cahalane	Lecturer/RS Office Hours: 1-2 Monday; 1-2 Tuesday	R 7 Rhetoric	Conor.Cahalane@mu.ie Phone: 01 708 3748
Dr. Martin Charlton	CL. MSc GeoComp.	R2.21 Iontas, N. Campus	Martin.Charlton@mu.ie Phone: 01 708 6186
Prof. Chris Brunsdon	Head of NCG	R2.20 Iontas, N. Campus	Christopher.Brunsdon@mu.ie Phone: 01 708 6149

### *Other Teaching Staff*

Liadh Kelly	Dept. Of Computing	N. Campus	Liadh.Kelly@mu.ie
Hao Wu	Dept. Of Computing	N. Campus	haowu@cs.nuim.ie
Peter Mooney	Dept. Of Computing	N. Campus	<a href="mailto:peter.mooney@mu.ie">peter.mooney@mu.ie</a>
Xavier Monteys	Infomar	GSI	Xavier.Monteys@gsi.ie

### *Support Staff*

Michael Bolger	IT Technician	PG Lab	Michael.Bolger@mu.ie
Neasa Hogan	Departmental Admin.	Room 23c	geography.department@mu.ie
Una Holton	Departmental Admin.	Room 23c	geography.department@mu.ie

### *Additional Key Contacts*

Head Of Department:	Prof. Gerry Kearns	<a href="mailto:gerry.kearns@mu.ie">gerry.kearns@mu.ie</a>
Director of PG Studies:	Dr. Rowan Fealy	<a href="mailto:rowan.fealy@mu.ie">rowan.fealy@mu.ie</a>
External Examiner:	Dr. Avril Behan (Technological University Dublin)	

## 7. PROGRAMME STRUCTURE AND REQUIREMENTS

To meet the requirements of the MSc, students are required to accumulate 90 credits. The module names and credit weightings are listed below by semester. Effectively, 6 modules are compulsory, accounting for 80 credits, with a choice of three modules (in italics) from which to draw the remaining 10. The programme will be delivered through a variety of different teaching modes including; lectures, practicals (laboratory and field), workshops, visits and a work placement. A variety of assessment techniques will be used, including; practical assignments, examinations (practical, written and open book), reports and short essays. In addition this course, due to its specifically applied orientation, does not have a formal written thesis. Instead three substantial projects, each worth 10 credits, are embedded within taught modules to act as a *Thesis Portfolio*. We find that this gives students the chance to develop a breadth of knowledge and is often more appealing to potential employers than a hard bound thesis. The thesis portfolio will consist of one RS and two GIS projects. More details on the individual modules and the thesis portfolio component are listed in Sections 16 and 17 below.

To qualify for the award of Master of Science, students must obtain a minimum of 40% for their research thesis and an average of 40% for all remaining components. Full details on postgraduate Marks and Standards via <http://examinations.nuim.ie/documents/MARKSANDSTANDARDSFORPOSTGRADUATECOURSES.pdf>. Please consult the Course Director for more information on repeat options. Typically there can be, if required, repeat exams in the Autumn. Continuous Assessment grades are usually carried forward, other than in exceptional circumstances.

Total Credit Requirement 90 Credits (Incorporates 30 Thesis Portfolio Credits+)  
80 Compulsory Plus 10 Optional (*\*From Three*)

### *Semester 1*

GY641 Aerial Surveys and Drone Operations	Conor Cahalane	10 Credits
GY636 Intro to GI Systems & Science	Ronan Foley	20 Credits+

* CS620C Structured Programming	Liadh Kelly/Hao Wu	10 Credits
* CS621C Spatial Databases	Peter Mooney	10 Credits
* GY672 Analysing Spatial and Temporal Data using R	Chris Brunsdon	10 Credits
* GY643 Marine Remote Sensing – Infomar	Xavi Monteys +	10 Credits

#### *Semester 2*

GY642 Satellite RS and Earth Observation	Conor Cahalane	20 Credits+
GY638 GIS in Practice	Martin Charlton	20 Credits+

#### *Summer*

GY635 Work Placement	External	10 Credits
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## **8. COURSE TIMETABLE AND STUDENT COMMUNICATION**

The course timetable for semesters one and two are outlined below, all classes will be hosted in Rhetoric House in the Computer Laboratory 1 (CL1). Other rooms on the timetable include the Rocque Lab (RL) and the Seminar Room in Iontas as well as some field classes and visits across the two University Campuses. The timetable has been organised to allow more than sufficient time for preparation for class and the timely completion of assignments. Students will have priority use of the dedicated computer room. However the room is also occasionally used for general departmental teaching. Students should use their time in the computer lab as effectively as possible.

#### *RS Modules (GY641/GY642)*

Semester 1 GY641: Monday 9.00-11.00 and Tuesday 9.00-11.00

Semester 2 GY642: Monday 9.00-11.00 and Tuesday 9.00-11.00

Location: Physical Geography Lab (PGL)

#### *GIS Modules (GY636/GY638)*

Semester 1 GY636: Monday 14.00-16.00 and Tuesday 14.00-16.00

Semester 2 GY638: Monday 14.00-16.00 and Tuesday 14.00-16.00

Location: Physical Geography Lab (PGL) (plus classes in Iontas Seminar Room in Semester 2)

#### *CS/NCG/GSI Modules*

CS620C/ Three week intensive course prior to formal start (Sep 2<sup>nd</sup> to Sep 20<sup>th</sup>, 9.30-5)

CS621C 10-12 and 2-3.30 Thursday, Semester 1

GY672 Wednesday 11 am to 1 pm, Semester 1

GY643 Intensive one-week course, January 20<sup>th</sup> to 25<sup>th</sup>, Maynooth/Cork (tbc)

Location: CS Labs on North Campus/Seminar Room; NCG Iontas Building; Rhetoric House; External.

## **MOODLE**

In general, course material is disseminated via the University's virtual-learning environment, Moodle. Each individual module, as well as the course overall, will have an individual moodle page where new material, notifications, assessment and other directly relevant material will be posted. The overall course page will include any notifications related to the course overall and from the department. Examples would include information on departmental timetables, events and initiatives, visits and occasional lectures, postgraduate student-related links and other university/departmental standards, for example, a citing/referencing manual used across the department.

## **9. SEMINAR SERIES**

In semester one you are invited to attend the Department of Geography's seminar series which will include some topics which may be of interest. Some of the programme will have a GIS/RS specific component, though there are other potentially relevant speakers as well. The seminar series will take place on Thursday afternoons at 4.00 pm in the Rocque Lab and draft details are listed at the end of this handbook and will be posted in the labs and online. The series will introduce students to frontier research/research design in geography and will be delivered by a national or international researcher, who will explicate the methodology they have applied in a specific project. In addition, and of equal relevance, both NIRSA and the NCG run regular Seminar's in the Iontas Building on the

North Campus, generally on Wednesday's and Thursday's. Please check their respective websites for notifications and we will pass on any information we receive as well.

**10. NIRSA (National Institute of Regional and Spatial Analysis), NCG (National Centre for Geocomputation) and SCSI/RICS (Society of Chartered Surveyors Ireland/Royal Institute of Chartered Surveyors).**

Maynooth University has long been a leader in GIS research in Ireland and this is reflected in the presence on campus of two Research Institutes with firm geo-spatial foundations, both under the broad aegis of the Maynooth University Social Sciences Institute (MUSSI). NIRSA has a specific focus on more applied uses of geo-spatial data and contains a number of staff, postgraduate and post-doctoral students who work with and on GIS. In particular a sub-group within NIRSA called AIRO (The All-Ireland Research Observatory) led by Justin Gleeson, has a very visibly public presence as a provider of online GIS information. We have established links with NIRSA as part of the course, include occasional workshops, visits and placements.

The same applies to the NCG, where if anything the GIS components are even more established. The NCG was funded by SFI around 2003 and set up to be the national site for research on geo-spatial knowledge and information. It too has staff, postdocs and postgraduates, a number of whom are involved in teaching, especially the Director, Chris Brunson and Deputy Director, Martin Charlton. We will also have links with the NCG in terms of visits, seminars and possible placements, especially given their innovative work in the technical areas of mobile and locational GIS and in theoretical geo-computation. In addition, the NCG, in conjunction with the Department of Computing, run a parallel MSc in GeoComputation, with whom our programme has shared modules.

The consistent high quality of, and demand for, graduates from this MSc has resulted in the MSc in GIS & Remote Sensing being officially accredited by the Society of Chartered Surveyors Ireland (SCSI) and Royal Institute of Chartered Surveyors (RICS). Accreditation means that as a graduate from the MSc in GIS & Remote Sensing you will be eligible to proceed along the Geomatics pathway to professional membership of the SCSI and RICS. Being a Chartered Surveyor is a mark of excellence - one that combines academic achievement with internationally recognised professional standards. Achievement of chartered status will accelerate career progression in your profession, helps distinguish your business if self-employed and also facilitates working overseas as this is a globally recognised professional qualification.

**11. ASSESSMENT WEIGHTINGS AND TIMINGS**

*SEMESTER 1*

GY641 AERIAL SURVEYS/DRONES	10 CREDITS	80% CA, 20% DIGITAL EXAM
GY636 INTRO TO GIS	20 CREDITS	25% CA, 25% EXAM +THESIS PORTFOLIO 1 (50%)

*SEMESTER 2*

GY642 SATELLITE RS/EARTH OBS.	20 CREDITS	40% CA, 10% DIGITAL EXAM + THESIS PORTFOLIO 2 (50%)
GY638 GIS IN PRACTICE	20 CREDITS	20% CA, 30% OPEN BOOK EXAM + THESIS PORTFOLIO 3 (50%)

*SUMMER*

GY635 WORK PLACEMENT	10 CREDITS	100% CA (SHORT REPORT)
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Please refer to Department of Computing Details for information on assessment weightings on the CS620C and CS621C modules. Please refer to the NCG for information on assessment weightings on the GY672 module. Please refer to the Geological Survey of Ireland teaching team for information on assessment weightings on the GY643 module.

Deadlines (to assist students in their workload planning) are included for guidance below, but please note these may change depending on course. Deadlines for courses not taught by Geography staff are not included:

*Semester 1*

8 October:	GY636: Portfolio 1 (0%)
14 October	GY641: Practical 1 (0%)



22 October:	GY636: Portfolio 2 (12.5%)
04 November:	GY641: Practical 1 (40%)
12 November:	GY636: Portfolio 3 (12.5%)
25 November	GY641: Practical 2 (40%)
16 December:	GY641: Exam (20%)
19 December:	GY636: Exam (25/50%)
10 Jan:	GY636: Project (50%)

#### *Semester 2*

10 February:	GY638: Project Proposal (2.5%)
11 February:	GY642: Project Proposal & Presentation (2.5%)
24 February	GY642 Practical 1 (20%)
13 March:	GY638: Essay (20%)
23 March:	GY642: Practical 2 (20%)
21 April:	GY638: Project (47.5%)
28 April:	GY642: Project (47.5%)
4-8 May:	GY638: Exam (Open-Book) (30%)
5 May:	GY642: Digital Exam (10%)
31 July:	GY635: Work Placement Reports (100%)

Information on all formal module descriptors can also be access via the University's Courses Page which you can access via the following url;

<http://www.nuim.ie/courses/?TARGET=CS&MODE=SEARCH>.

## **12. MISSED ASSESSMENTS/DEADLINES/CLASSES/EXAMINATIONS**

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 coming to 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 course director.

Mandatory deadlines will be strictly enforced. We have coordinated all assignments across modules 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, with a cap/maximum penalty being that final grade can't drop below 40%. Exception: If there are, extremely extenuating personal or medical circumstances, the course director and instructor will consider 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, her/his 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 student's work, along with what percentage the submitted work is over/under the assigned word count. A blank cover sheet will be available on the GY660 webpage (MSc course Moodle page).

Word-count limits will be strictly enforced and penalties applied for continuous assessment work (incl. essays/literature reviews/critical reflections) significantly over- or under-word counts. For every 10.1% over/under a designated word-count, students will be penalised by 3% of their overall mark, with a cap/maximum penalty being that final grade can't drop below 40%. (So, if you are 10.1% over, you will be penalised 3% of your overall mark; if you are 20% over, you will be penalised 6%; if you are 30% over, you will be penalised 9%; and so on). Students are required to indicate what the assignment total word count is on the cover sheet accompanying submission of coursework.

## **13. GRADE RELATED CRITERIA**

Marking criteria and guidelines used for marking are presented below. These broad guidelines should be read in conjunction with any specific advice on assessment that may be provided by module leader.

The grading system used for each module is as follows:

First Class Honours:	70+%
Second Class Honours Grade I:	60<69%
Second Class Honours Grade II:	50<59%
Pass:	40<49%
Fail:	<40%

**ESSAYS, EXAMS, REPORTS**

Class	Mark Range	Grade Related Criteria for Essays/Exams/Reports
First Class Honours	80+ A+	<ul style="list-style-type: none"> <li>– Outstanding answer based on extensive reading that demonstrates an impressive ability to understand theoretical literature and to make connections between that literature and appropriate examples.</li> <li>– Exceptional insight and originality in the use of evidence.</li> <li>– Very well written with no grammatical or other errors.</li> <li>– Contains material of publishable quality, as a whole or in part, as a journal paper, and is worthy of retaining for reference.</li> </ul> <p><b>(Reports)</b></p> <ul style="list-style-type: none"> <li>– Exceptional insight and originality in the application of methodology</li> <li>– Exceptional analytical skills as evidenced by</li> <li>– Ability to make connections between own results and the literature, where appropriate</li> </ul>
	70-79 A (75-79) A- (70-74)	<ul style="list-style-type: none"> <li>– Excellent answer based on extensive reading and a clear understanding of theoretical debates.</li> <li>– Original or insightful answer drawing on own observations and critical treatment of literature.</li> <li>– Contains material that is potentially of publishable quality, in part, as a journal paper, and / or is worthy of retaining for reference.</li> </ul> <p><b>(Reports)</b></p> <ul style="list-style-type: none"> <li>– Strong insight and/or originality in the application of methodology</li> <li>– Original or insightful answer drawing on own observations</li> <li>– Strong analytical skills</li> <li>– Ability to make connections between own results and the literature, where appropriate</li> </ul>
Second Class Honours Grade I	60-69 B+ (67-69) B (64-66) B- (60-63)	<ul style="list-style-type: none"> <li>– Very good answer that shows a thorough understanding of arguments, contributions and context, with efficient use of relevant reading and examples.</li> <li>– Well organised, clearly expressed and a direct response to the question / topic.</li> <li>– Evidence of good analytical skills and reflecting wider reading.</li> <li>– Does not display the outstanding ability, critical acuity and/or originality characterising the award of first class honours</li> </ul> <p><b>(Reports)</b></p> <ul style="list-style-type: none"> <li>– Shows insight and thoroughness in the application of methodology</li> <li>– Good analytical skills</li> <li>– Ability to make connections between own results and the literature, where appropriate</li> </ul>
Second Class Honours Grade II	50-59 C+ (57-59) C (54-56) C- (50-53)	<ul style="list-style-type: none"> <li>– Competent treatment of ideas and concepts from classes and set reading</li> <li>– Little evidence of independent critical appraisal.</li> <li>– Evidence of good effort and sound argument, but little spark or critical insight.</li> </ul> <p><b>(Reports)</b></p> <ul style="list-style-type: none"> <li>– Competent but lacklustre application of methodology</li> <li>– Little attention given to limitations of approach</li> <li>– Good analytical skills</li> <li>– Lacks connections between own results and the literature, where appropriate</li> </ul>

<b>Pass</b>	40-49 D+ (47-49) D (44-46) D- (40-43)	<ul style="list-style-type: none"> <li>– Shows a basic understanding of the question / topic and of the broader subject area</li> <li>– Little evidence of detailed knowledge or reading is partial and selective</li> <li>– Contains mistakes, misunderstandings or irrelevant material.</li> <li>– Poor organisation, poor expression and an uncritical approach.</li> </ul> <p style="text-align: center;"><b>(Reports)</b></p> <ul style="list-style-type: none"> <li>– Poor organization and application of methodology</li> <li>– Poor analytical skill</li> <li>– Few connections between own results and the wider literature</li> </ul>
<b>Fail</b>	0-39 E (30-39) F+ (25-29) F (20-25) E (<20)	<ul style="list-style-type: none"> <li>– At worst, nothing of relevance in answer to the question / topic.</li> <li>– At best, not a direct response to the question / topic, but shows some basic understanding of the general field.</li> <li>– Likely to be muddled and/or incomplete, and poorly expressed.</li> <li>– Little evidence of reading or reading sources are trivial.</li> </ul> <p style="text-align: center;"><b>(Reports)</b></p> <ul style="list-style-type: none"> <li>– Inappropriate application of methodology</li> <li>– Poor understanding of approaches</li> <li>– No analysis of results</li> <li>– No connections between own results and the wider literature</li> </ul>

#### 14. RECEIVING FEEDBACK ON YOUR WORK

Feedback will be provided on your coursework both in terms of a numerical grade and written comments and suggestions on how to improve in further work. The marking criteria above 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. The timing of receipt of feedback after this time will vary between teaching staff, but every effort will be made to return work as promptly as possible.

#### 15. AVOIDING PLAGIARISM

All work submitted by a student must be expressed in the student's own words and must incorporate his or her own ideas and judgments. This applies equally to coursework and dissertations no less than to examinations. **Plagiarism—the presentation of another person's thoughts or words as one's own—in essays, dissertations or other assessed work violates all principles of sound academic practice and is a serious disciplinary offence. Where plagiarism is confirmed, candidates will be subject to University policy with the potential for award of zero on work submitted.**

To avoid plagiarism *direct* quotations from the published or unpublished work of others must always be clearly identified as such by being placed inside quotation marks, and a full reference to their source must be provided in the proper form. Equally, if you summarise another person's ideas or judgements, you must refer to that person in your text, and include the work referred to in your bibliography. Failure to observe these rules may result in an allegation of cheating. You should therefore consult your module leader or course director if you are in any doubt about what is permissible.

#### 16. MAYNOOTH UNIVERSITY POLICIES, RULES AND REGULATIONS

Maynooth University has a number of rules and regulations linked to its wider governance structures. Many of these are general for all students, but there are some of specific relevance to taught postgraduate courses. The main relevant links are as follows:

## *ACADEMIC POLICIES AND PROCEDURES*

This is the starting point for information across the board and ranges from University governance down to student services and supports: <https://www.maynoothuniversity.ie/university-policies/academic-policies-procedures>

There are five categories with further information under the headings: Academic, Admissions, Examinations, Graduate Studies and Marks & Standards. Clicking on each sub-heading brings up a list of downloadable documents. The main ones of postgraduate interest (with latest update) are:

### *ACADEMIC:*

Teaching & Learning Guidelines (August 2018). This document lists a number of expectations linked to teaching and learning environments including expectations of both students and academic staff.

### *EXAMINATIONS:*

Examination Regulations and Procedures (November 2013). This applies more to formal examinations run by the University but may have some relevance.

Examination checking and appeals procedures (June 2016). Again focused more on undergraduate processes but

### *MARKS AND STANDARDS*

Marks and Standards (April 2019). A document on credits, progression, grades etc., applicable to all undergraduate and postgraduate students, academic year 2018-19 and beyond.

For full information and access to other policies, please click on: <https://www.maynoothuniversity.ie/university-policies>.

## **17. MODULE DESCRIPTIONS**

### ***SEMESTER ONE***

#### **GY641 Aerial Surveys and Drone Operations (10)**

This module is taught within three broad areas. The first (i) introduces the key concepts of passive airborne surveys, including image capture methodologies, navigation and sensor technology and photogrammetric principles. A second area (ii) introduces the students to an active airborne survey technique, Light Detection and Ranging (LiDAR) and the potential complementary capabilities of this technology for different environments. The final component (iii) demonstrates the opportunities provided by drones as a new airborne survey platform, encompassing hardware, datasets, flight planning and operational restrictions. The module is a combination of theoretical and practical based sessions using both commercial and open source software

#### **GY636 Introduction to Geographical Information Systems & Science (20)**

This module introduces students to GIS Software and the core concepts of GI Science. It is an intensive practical-based module, which is primarily based around the following industry-standard GIS software: ArcGIS and MapInfo. The module seeks to familiarise the students with the software but simultaneously introduces key concepts and analytical approaches within GI science more broadly. This is illustrated through a series of cumulative practical exercises based on a series of GIS applications. The applications are based primarily within the areas of geography, environmental modelling and visualisation. Students will also gain experience of manipulating and understanding digital data files and associated databases in the course of this module.

#### **CS620C Structured Programming (10)**

This intensive three-week module, held prior to the beginning of Semester 1 introduces students to the basics of programming. Content includes; Programming fundamentals: variables, types, expressions and assignment; simple I/O; Conditional and iterative control structures (if statements and while loops); Strings and string processing; Use of class APIs for creating objects and calling methods; Understanding data abstraction and encapsulation; Problem solving: understanding and developing algorithms; Implementing algorithms as simple programs. Introduction to algorithms and data structures. Review of elementary programming concepts suitable for the implementation of abstract data types (operators, types and expressions; control of flow; methods; recursion; input & output); Algorithms for searching: linear, bounded linear and binary searches; Algorithms for sorting: selection, insertion, bubble and quick sorts; Fundamental linear data structures: stacks, queues, linked lists; Object-oriented programming: encapsulation and information hiding, classes, interfaces, class hierarchies, inheritance, polymorphism, basic exception handling; Analysis of basic algorithms.

### **CS621C Spatial Databases (10)**

The main focus of this module will be to introduce students to core aspects of spatial databases and their significance within GI Science. A range of skills will be learnt on this intensive 6-week module including; Designing and implementing spatial databases using standard models and spatial database management systems; Analysing and optimising spatial database designs to maximise efficiency and effectiveness; Querying spatial databases using standard query tools and languages; Creating interfaces to view, customise and interact with spatial data; Designing and implementing spatial indices for efficient searching of data and exploring reliability, security, integrity and privacy in spatial databases.

### **GY672 Analysing Spatial and Temporal Data using R (10)**

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.

### **GY643 Marine Remote Sensing – Infomar (10)**

This module is taught within three broad areas. The first (i) introduces the concept of ocean remote sensing, the marine framework and applications. A second area (ii) will encompass the Irish national seabed-mapping programme; INFOMAR ([www.infomar.ie](http://www.infomar.ie)), detailing the current and future science and technologies employed in ocean mapping (iii), the third introduces students to different datasets and spatial data management tools for ocean remote sensing. The module is a combination of theoretical and practical based sessions using both commercial and open source software.

## **SEMESTER 2**

### **GY642 Satellite RS and Earth Observation. (20)**

This module is taught within three broad areas. The first (i) introduces the main concepts of satellite remote sensing including electromagnetic radiation and its interaction at different wavelengths with the atmosphere and surface for both passive and active sensors. A second area (ii) focuses on sensor technology and data acquisition systems of the primary space based remote sensing platforms including; the COPERNICUS missions; Landsat; geostationary satellites; commercial platforms. The final component (iii) focuses on digital image processing - i.e. how images acquired by different satellites are analysed and interpreted to provide information on the Earth. The module is a combination of theoretical and practical based sessions using both commercial and open source software.

### **GY638 Geographical Information Science in Practice. (20)**

This module examines aspects of geographical information science - the theoretical basis for geographical information systems. GIS may be thought of as a fusion of concepts emanating from cartography, computer science and geography. The module will have a particular focus on the core skills that students will need to enter the industry as professionals. The course will be run as a series of professional training workshops based around the core skills listed below. The workshops will be associated with a range of external agencies and internal experts to introduce students in turn to subjects including Internet GIS, Spatial Data Portals, Database Management Systems, Programming, Visualisation and Volunteered GI. The module will be run as a mix of professional training and practical applications.

### **GY635 Work Placement (10)**

This module provides students with practical experience in a work environment within which they can employ the GIS or RS skills that they have acquired during the course. Students are required to undertake a minimum of 250 hours work placement in a company(s) within which they will employ the knowledge and skills learned on the course. Typically work placements run from early May to the end of July with a six-week minimum period of employment. The department has forged strong links with information technology based companies and many

county councils and is often contacted by such companies seeking to employ such students. A selective list of companies, which have employed students in the past, include:

Aviva Insurance; Compass Informatics; Coillte Teoranta; County Councils (Various); Demographics Ireland; EraMaptec; ESRI Ireland; Gamma; Geological Survey of Ireland; Government Departments (Various); Icon Group; IRIS Spatial Data Products; Irish Water; Mallon Group; Mapflow; Marine Institute; National Institute of Regional and Spatial Analysis; National Centre for Geocomputation; National Parks & Wildlife Service; Office of Public Works; Ordnance Survey of Ireland; Paradigm; Proteus Solutions; Spatial Data Products; Spectral Signatures; Specterra Services, Teagasc. *Overseas placements:* NASA; New York State Water Board; Saudi Arabian Government Departments.

## 18. 2019-20 GEOGRAPHY SEMINAR SERIES

### 2019

- September 26<sup>th</sup> **Department of Geography Postgrad Welcome**
- October 10<sup>th</sup> **Laura McAtackney** (Aarhus University): *Material, Memory and Ruination at a former Magdalene Laundry: towards using archaeology and heritage as tools of transitional justice.* Part of the Spatial Justice Seminar Series
- October 17<sup>th</sup> **Dr Huhana Smith** (Massey University): *Socio-spatial relations within hapū-led resilient pathways for climate change.* Part of the Spatial Justice Seminar Series. Funded by the IRC New Foundations Scheme
- October 24<sup>th</sup> **André Dusterhüs** (Maynooth University): *Seasonal to decadal climate prediction.* Joint event with ICARUS and Met Éireann
- November 14<sup>th</sup> **Malene Jacobsen** (Maynooth University) *Where is War? What is Refuge?*
- November 20<sup>th</sup> (prov.) Geoweeek University Library\*  
Artists **Monica de Bath, Cathy Fitzgerald, Pauline O'Connell, Seóidin O'Sullivan**, in conversation with geographers **Patrick Bresnihan** and **Karen Till**.  
*Tírdhreach Feasach: Irish Environments in Transition: Exhibition launch and symposium.* Joint event with Kildare County Council Arts Service and Maynooth University Library, with additional support from the IRC New Foundations Scheme and Creative Ireland.
- November 28<sup>th</sup> Iontas Seminar Room\*  
**Martina O'Brien**, Kildare Weather Observers & others *The Art of Citizen-Science: Monitoring a Climate Disaster.* Exhibition launch and symposium. Joint event with Maynooth University Illuminations Gallery, Kildare County Council Arts Service and Creative Ireland
- December 12<sup>th</sup> **Eugene McGovern** (Technical University of Dublin) *Geomatics - State-of-the-art and some interesting applications.*

### 2020

- February 6<sup>th</sup> (prov.) **Geography Taught Postgraduate Presentations** (Maynooth University)
- February 13<sup>th</sup> **Danny Dorling** (Oxford University) *The Geography of falling apart - United Kingdom 2020.* Part of the Spatial Justice Seminar Series
- TBC* **New PhD Student Research Presentations** (Maynooth University)

All seminars (unless otherwise marked) will be held from 4:00 to 5.30pm in the Rocque Lab, ground floor of Rhetoric House, South Campus, Maynooth University. YOU ARE WELCOME TO COME ALONG!