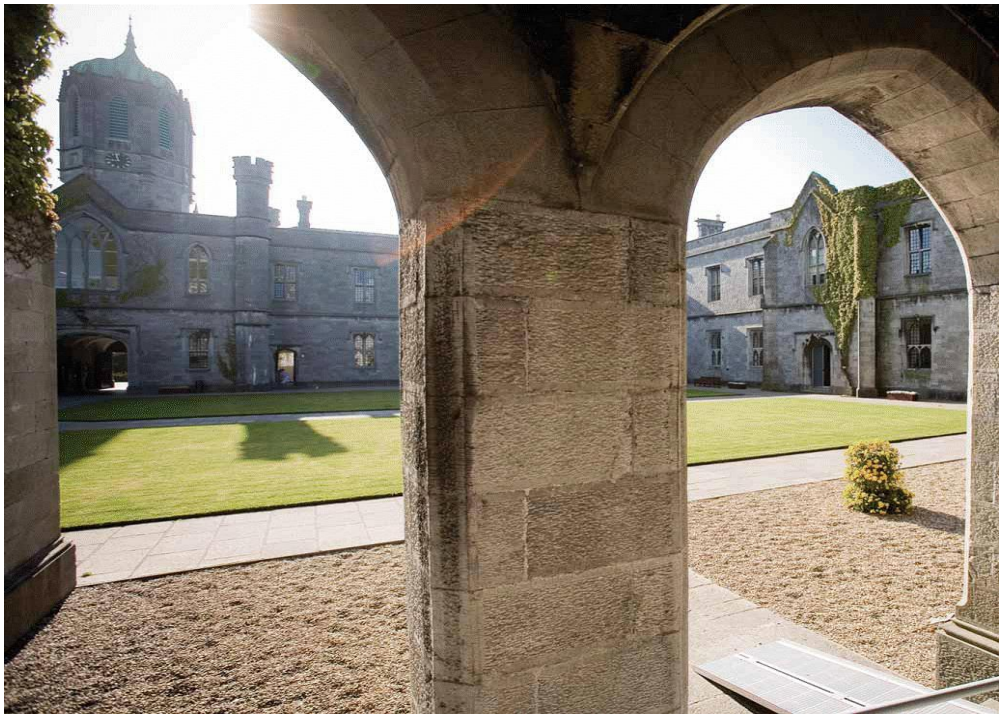
Ollscoil na Gaillimhe
University of Galway

SCHOOL OF BIOLOGICAL AND CHEMICAL SCIENCES



4th Year Chemistry

Information Booklet

2024-2025

CONTENTS

***subject to change**

SUMMARY OF COURSE STRUCTURE 2024-2025

INDUCTION

A welcome/induction session will be held on Monday, 9th September from 10-11 in room 231.

Semester I

	Examination
Research Investigation (CH4101, 20 ECTS)	continuous assessment
Analytical chemistry (CH448, 5 ECTS)	continuous assessment (4 tests)
Practical Skills Development (CH451, 5 ECTS)	continuous assessment

Semester II

Physical Chemistry (CH429, 5 ECTS)	2 h Exam paper + 2 CA
Biophysical Chemistry (CH432, 5 ECTS)	2 h Exam paper + 2 CA
Bioorganic Chemistry (CH438, 5 ECTS)	2 h Exam paper + 2 CA
Advanced Inorganic Chemistry (CH445, 5 ECTS)	2 h Exam paper + 2 CA
Bioinorganic and Inorganic Medicinal Chemistry (CH446, 5 ECTS)	2 h Exam paper + 2 CA
Organic Chemistry (CH4113, 5 ECTS)	2 h Exam paper + 2 CA

Notes on workload expected for each module

Workload for a 5 Credit Module **125 h**

The workload includes the teaching contact with staff & autonomous learning.
Autonomous learning & working includes time spent working independently carrying out assignments, learning, revising, additional reading. Normally this is 4 times that of the contact time spent with staff. Thus the contact time with staff in each module above is 25 h and students would be expected to spend over 100 h working independently studying these modules.

Continuous assessment in Semester II

The continuous assessment will be in the form of in-class tests during the teaching semester that will be graded. The 2 CA will contribute 20% of the overall grade for each module.

SEMESTER I TIMETABLE

Week Beginning	09-Sep	16-Sep	23-Sep	30-Sep	07-Oct	14-Oct	21-Oct	28-Oct	04-Nov	11-Nov	18-Nov	25-Nov	02-Dec	09-Dec	16-Dec
Spectroscopic and Physical Methods and Application - CH448															
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Wed 10-11 Room 231	LR	LR	OT	OT	OT	OT	SVE	SVE							
Wed 11-12, Room 231	LR	LR	OT	OT	OT	OT	SVE								
Thu 10-11 , Room 231	LR	LR	OT	OT	OT	SVE	SVE								
Practical Skills Development - CH451															
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Tues 10-11, Room 231	LC	ML	ML								LC				
Research Investigation - CH4101															
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mon	10-11, **Welcome/ Induction;** 2-4pm Safety, room 231	Research (Mon-Fri; 25-35 h per week)			Research	Research (Mon-Fri; 25-35 h per week)					Research	Write-up		Project Submission deadline ***Monday 9th December at 15.00***	Presentation on Project to be held this week
Tue	Research														
Wed	Research				*Meeting with 2nd Reader*						*Meeting with 2nd Reader*				
Thu	Research				Research						Research				
Fri	Research														

CH448: SPECTROSCOPIC AND PHYSICAL METHODS AND APPLICATIONS (SEMESTER I)

Staff: Prof. Olivier Thomas (coordinator), Dr Luca Ronconi, Dr Stan Von Euw

The main objectives of this module are to provide the necessary background in analytical chemistry to perform the 4th year project in the best conditions. No final exam will be organised and the assessment will be performed through three tests in each of the following parts:

1. Analytical techniques for inorganic molecules (7 h)
2. NMR and mass spectrometry for organic molecules (12 h)
3. Electron Microscopy (5 h)

Course Topics:	Learning Outcomes
PART 1: Organic molecules (12 h including 2 h of test)	
1D NMR experiments including ^{1}H, ^{13}C DEPT Other nuclei	Understand the basics of 1D NMR experiments. How to perform an experiment. How to interpret data of a 1D NMR experiment. Number of qC, CH, CH_2 and CH_3. Applications to other nuclei such as F and P.
2D NMR experiments to establish the planar structures of organic molecules	Be able to use COSY experiments to build Spin Coupled Systems. Be able to use HSQC/HMQC experiments to complete the SCS. Link the different SCS and heteroatoms using HMBC spectra.
Coupling constant values interpretation for cyclic compounds and couble bonds Spatial coupling such as ROESY and NOESY experiments to gain insights into the 3D structures of (bio)organic molecules	Be able to use nOe and coupling constant values to propose relative configurations of organic molecules.
Mosher method	Use Mosher method to assess the absolute configuration of organic molecules
Mass spectrometry low and high resolution	Use data from low and mass spectrometry to obtain information such as the molecular formula of organic molecules. Use of chemcalc
Structure elucidation of organic molecules	Understand how to elucidate the 2D and then 3D structures of organic molecules using NMR and MS data.
PART 2: Inorganic molecules (7 h including 1 h of test)	
Electronic spectra of metal complexes (microstates, spectroscopic terms, Russell-Saunders coupling, spin-orbit coupling, Racah parameters, Tanabe-Tsugano diagrams);	Understand and use of the electronic transitions of metal complexes
IR spectroscopy of transition metal complexes (focusing on metal–other atoms vibrations in the far IR region);	Understand the data obtained for IR spectra of inorganic molecules
Solution NMR spectroscopy of transition metal complexes (focusing on the direct detection of NMR-active nuclei other than 1H, 13C, 15N and 31P);	Use of spectroscopic techniques to derive the structure and to understand the properties of transition metal complexes.
PART 3: Introduction to Electron Microscopy (5 h including 1 h of test)	
Basics of Electron Microscopy	Understand the principles of electron microscopy. Learn about the history and development of electron microscopes.
Types of Electron Microscopes: SEM and TEM	Differentiate between Scanning Electron Microscopy (SEM) and Transmission Electron

	Microscopy (TEM). Understand the unique applications of each type.
Fixation and Dehydration Techniques	Learn the methods of sample fixation and dehydration to prepare biological and material samples for electron microscopy.
Embedding and Sectioning	Understand the processes of embedding samples in resin and sectioning them into thin slices suitable for TEM analysis.
Staining and Coating	Learn about different staining techniques for TEM and coating methods for SEM to enhance image contrast.
Operating Procedures and Safety	Understand the standard operating procedures for SEM and TEM and learn about safety measures to protect samples.
Materials Science Applications	Learn about the applications of electron microscopy in materials science, including the analysis of metals, polymers, and nanomaterials.
Advanced Techniques	Understand advanced techniques such as cryo-electron microscopy and electron tomography.
Case Studies and Real-World Examples	Review case studies and real-world examples to understand the practical applications and impact of electron microscopy in various fields.

CH451: PRACTICAL SKILLS DEVELOPMENT (SEMESTER I)

Staff: Dr Mihai Lomora (coordinator), Dr Eddie Myers, Dr Laura Cunningham

The purpose of this 5-credit module is for you to become familiar with essential safety and key aspects of experimental research design, along with practical academic, industry, and presentation skills. In addition, this module will serve as a support to prepare you for CH4101. You will complete most of CH451 within the first 3 weeks, followed by a presentation skills tutorial in week 11 of semester I, as a preparation support for the final CH4101 presentation. This module has five components (Table 1) as detailed below.

Table 1. CH451 module components

#	Component	Description
1	Health & Safety [a)] (week 1)	Health and safety is paramount to research. Attend the H&S briefing, prepare your project risk assessment (PRA) and a standard operating procedure (SOP) – see details below.
2	Academia, Funding & Scholarships [b)] (week 1)	Gain a comprehensive understanding of what academic research involves (day-to-day, and long term) and what it takes to succeed. Understand some of the major considerations when deciding to pursue academic research, identify how and when to apply for master's or PhD opportunities, and understand the prerequisites for applying. An honest discussion of the highlights and challenges of PhD will take place, and there will be the opportunity to ask questions.
3	Industry Landscape in Ireland & Top Tips on Landing a Job[b)] (week 2)	Gain insights into Ireland's industry landscape, particularly in the chemical and pharmaceutical sectors. Learn how to find industry positions, apply for jobs, and understand the skills employers seek in ideal candidates. Discover how industry experiences can shape career paths through personal stories.
4	Experimental Design[c)] (week 3)	By week 3, you should already get an idea about your host laboratory and the main aim of your research project. Scientific research is about (dis)proving hypotheses. When correctly performed, experiments can be used to test a hypothesis. A properly designed experiment includes controls. This section will deal with the research methodology to formulate research question/hypothesis, objectives, methodology, data, and analysis. This section is designed to assist you with the CH4101 final year project and as a skill for future research endeavours and career.
5	Presentation Skills (week 11)	You should know by now how to prepare a presentation in Microsoft PowerPoint using the skills developed in CH3101. This section is designed to tune these skills further and assist to develop your presentation on a specific scientific topic.

a) At the end of component 1 you will be requested to submit via Canvas a Project risk assessment & a SOP.

b) At the end of component 2 & 3 you will be requested to write and submit via Canvas a Personal Statement geared towards an application for funding a research project with feedback from the supervisor.

c) At the end of component 4 the following will be requested:

1) A first submission (by week 4) of a document containing the introduction with the current state of the art in the field, aim & objectives, and timeline in relation to the CH4101 final year project. Feedback will be given by the supervisor and during the first meeting with the second reader.

2) A second submission (by week 10) consisting of the experimental design, methodology and training received as part of the CH4101 final year project. Feedback will be given by the supervisor and during the second meeting with the second reader.

Note: Exact deadlines and evaluation criteria for the requested submissions will be confirmed in due course.

Important aspects related to Health and Safety
Health and safety is essential when designing and performing experiments, and handling, analysing, storing or disposing of chemicals. You should strive to be aware of all possible ways your work could adversely affect you, your colleagues and the environment. Take steps to prevent or mitigate that impact.

You will be assessed on the following:

A. Participation in the Health and Safety Briefing at 2-4 pm, Monday 9th September 2024 (venue TBA)

B. Preparation of a project risk assessment by using the template provided and in consultation with your supervisor. The completed form is signed by you and your supervisor and sent to the Health and Safety Officer (Dr. Myers) before experiments begin.

C. Preparation of a standard operating procedure (SOP) for the use of a chemical or the performance of a technique that is relevant to your project. This SOP will be added to the School's health and safety documentation, which will be available to other researchers.

D. Identification and documentation of the health and safety risks of each experiment before the experiment is performed. This documentation will be made available to your second assessor during scheduled meetings or be presented to the School's Health and Safety Officer upon request during lab audits.

General Health and Safety Rules

- Never work alone
- Laboratory work is within core hours, 9 am – 6 pm.
- Protective clothing, safety glasses and coat, must be worn in the laboratory
- No food or drink is permitted in the laboratory
- Headphones/earbuds are not permitted in the laboratory

Failure to adhere to the general rules will lead to disciplinary action. Repeated and/or blatant disregard for health and safety will result in dismissal from the research laboratory.

CH429: PHYSICAL CHEMISTRY (SEMESTER II)

Staff: Prof. Henry Curran (coordinator), Dr Chong-Wen Zhou

1. Chemical Kinetics
2. Statistical Thermodynamics
3. Quantum Mechanics

1. Chemical Kinetics

Students will be able to:

- Derive the rate law for a first and second order reaction and from that determine the half-life for a reaction and the rate of reaction.
- Determine the kinetics for an elementary reaction.
- Explain the kinetics associated with flow reactors, jet-stirred reactors and shock tubes.
- Understand how the rate constant of a reaction varies with temperature and derive the frequency A-factor and activation energy of a reaction given the rate constant and different temperatures.
- Appreciate and understand the dependence of kinetics on thermodynamics of reactants and products.
- Understand Photochemical Kinetics and its application to real world problems.
    - Understand Photolytic activation and flash photolysis
    - Understand fast reactions and how these can be studied
- Theories of reaction rates
    - Understand and apply Simple Collision Theory

2. Statistical Thermodynamics

- Know that the Boltzmann distribution that gives the number of molecules in each state of a system at any temperature is given by the equation: $N_i = Ne^{-E_i/kT}/q$
- The partition function is defined as: $q = \sum_i e^{-E_i/kT}$ and is an indication of the number of thermally accessible states at the temperature of interest.
- The molecular partition function is the product of the contribution from translation, rotation, vibration, electronic and spin distributions: $q = q^T q^R q^V q^E q^S$
- The translational partition function is: $q^T = (2\pi mkT)^{3/2}V/h^3$
- The vibrational partition function is: $q^V = 1/(1-e^{-h\omega/kT})$
- The rotational partition function is: $q^R = kT/\sigma hB$, where $\sigma = 1$ for an unsymmetrical linear rotor and $\sigma = 2$ for a symmetrical linear rotor.
- The electronic partition function is: $q^E = 1$ for closed-shell molecules with high-energy excited states.
- The internal energy is: $U = U(0) + E$, with $E = (NkT^2/q) \times$ slope of q plotted against T.
- The Boltzmann formula for the entropy is $S = k \ln W$, where W is the number of different ways in which the molecules of a system can be arranged while keeping the same total energy.
- The standard molar Gibbs energy is: $G_m^\circ - G_m^\circ(0) = -RT\ln(q_m^\circ / N_A)$

3. Quantum Mechanics

Students will gain an appreciation of

- fundamentals of quantum mechanics - quantization, uncertainty principle, the Schrodinger equation and its application to particle in a box and the rigid rotator
- the hydrogen(ic) atom – solutions of the Schrodinger equation, spectrum of the hydrogen atom
- application of quantum mechanics to multielectron atoms
- application of quantum mechanics to molecular structure
- electronic structure calculations – Hartree-Fock, post-HF methods, semi-empirical calculations, and density functional theory

CH432: BIOPHYSICAL CHEMISTRY (SEMESTER II)

Staff: Dr David Cheung (coordinator), Dr Mihai Lomora

1. Molecular Driving Forces
2. Analysis of Biomaterials

1. Molecular Driving Forces (12 hours, DC)

This block of lectures will explore how the behaviour of chemical and biological systems can be understood from simple physical principles. It will cover the following topics:

- Entropy and free energy
- Interfaces, wetting, and capillarity
- Phase transitions and phase separation
- Co-operativity
- Adsorption, binding, and catalysis

2. Analysis of Biomaterials (12 hours, ML)

The course outline and learning outcomes that will be assessed from this topic will comprise of:

- General overview of biomaterials: main types (polymers, metal/metal oxides, ceramics, composites) and specific characteristics, key bulk & surface properties
- State-of-the-art characterization techniques generally used for the physical and chemical analysis of biomaterials. The general operation principles, sample preparation, and instrumental technical details accompanied by real-world examples of analysed biomaterials will be covered for the following techniques:
  Stopped Flow Spectroscopy, ***Electronic and Vibrational Circular Dichroism*** *(eCD, vCD),* ***Polarimetry****,* ***Ramachandran plots****,* ***Fluorescence Microscopy, Confocal Microscopy, Fluorescence Lifetime / Imaging:*** *Fluorescence Correlation Spectroscopy (FCS), Fluorescence Cross-correlation Spectroscopy (FCCS), Fluorescence Lifetime Correlation Spectroscopy (FLCS), Fluorescence Lifetime Imaging Microscopy (FLIM), Förster Resonance Energy Transfer (FRET),* ***Super Resolution Microscopy:*** *Stimulated Emission Depletion Microscopy (STED),* ***Electron Microscopy:*** *Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM), Environmental SEM (ESEM),* ***Scanning Probe Microscopy (SPM):*** *Scanning transmission microscopy (STM), Atomic Force Microscopy (AFM),* ***Contact Angle, Dynamic / Static Light Scattering*** *(DLS, SLS), and* ***Nanoparticle Tracking Analysis*** *(NTA)*

CH438: BIOORGANIC CHEMISTRY (SEMESTER II)

Tutors: Prof. Peter Crowley (coordinator), Dr Binh Mai.

Sections:

1. Supramolecular Protein Chemistry – Prof Crowley
2. Stimuli-responsive Polymers – Dr Binh Mai

1. Supramolecular Protein Chemistry (12 h)

Learning outcomes:

- Proteininteractions and molecular recognition
- Macrocycles, calixarenes, cucurbiturils, cyclodextrins
- Supramolecular ligands for protein recognition and assembly
- The chemistry of the cationic residues Arg and Lys
- Methods to study protein interactions (*e.g.* X-ray, NMR, ITC)

2. Stimuli-responsive Polymers (12 h)

Learning outcomes:

- Fundamental definitions in polymer science
- Characterization of polymers (e.g. NMR, FT-IR, SEC, MALDI-TOF) and polymer nanoparticles (e.g. DLS, Electron Microscope)
- Polymerization techniques (coordination, ionic, radical polymerization)
- Advanced polymer chemistry (Living Radical Polymerization)
- Thermo-responsive polymer and the principles to design stimuli-responsive polymer

CH445: ADVANCED INORGANIC CHEMISTRY (SEMESTER II)

Staff: Dr Pau Farras (coordinator), Dr Constantina Papatriantafyllopoulou

1. Energy and respiration in biological systems (Dr Pau Farras)
2. Molecular Magnetism (Dr Constantina Papatriantafyllopoulou)
3. Porous Materials (Dr Constantina Papatriantafyllopoulou)

This module will look over contemporary chemistry, with examples of inorganic chemistry which aim to solve some of the current societal challenges. The content of this module has direct relationship with the Sustainable Development Goals (SDG):

- SDG2: No Hunger
- SDG6: Clean Water and Sanitation
- SDG7: Affordable and Clean energy
- SDG11: Sustainable Cities and Communities
- SDG13: Climate Action

1. Energy and respiration in biological systems (12 lectures + 2 tutorials, PF)

The students will be introduced to the synergy between natural and artificial systems for the design of novel metal-based devices to tackle the issues related to renewable energies.

The learning outcomes that will be assessed will include:

- Correlation between basic electron transfer theories with real biological systems such as proteins.
- Photosynthesis and mechanisms of energy transfer.
- Oxygen metabolism and fuel cells.
- Nitrogen fixation and the future of fertilisers.

2. Molecular Magnetism (6 lectures + 1 tutorial, CP)

The learning outcomes that will be assessed are:

- The student being able to understand basic concepts and definitions in molecular magnetism (magnetization, magnetic susceptibility, spin), and recognize the different types of magnetic behaviour.
- The student being able to predict all the possible spin states for a metal compound.
- The student being able to describe and understand the mechanisms of magnetic interactions.
- The student being able to understand the single molecule magnetism behaviour and its potential use in technological applications (information storage devices, quantum computing).

3. Porous Materials (6 lectures + 1 tutorial, CP)

This lecture series will deal with the synthesis, properties and applications of porous materials. Specifically, the following topics will be covered:

- classification of porous materials;
- general features of main categories of porous materials, including zeolites, activated carbon, carbon nanotubes, mesoporous silica, mesoporous alumina, etc;
- metal-organic frameworks: synthesis, properties and applications (drug delivery, gas storage/separation, catalysis, sensing, etc)

Continuous assessment in module CH445

The continuous assessment will be in the form of in-class tests during the teaching semester that will be graded. There will be tests in the week of February 6th and in the week of March 13th. The continuous assessment will contribute 20 % of the overall grade for the module.

CH446: BIOINORGANIC AND INORGANIC MEDICINAL CHEMISTRY (SEMESTER II)

Staff: Dr Andrea Erxleben (coordinator), Dr Stanislas Von Euw

Topics

1. Metals in Medicine (Dr Andrea Erxleben)
2. Biomineralisation (Dr Stanislas Von Euw)

1. Metals in Medicine [12 lectures + 2 tutorials]

The learning outcomes that will be assessed will include:

- The student being able to describe the relevance of various metals in medicine. Metals covered will include: Pt, Ru, Ga, Au, Gd and various radioactive metals (e.g. Tc).
- The student being able to describe and understand the chemistry of antitumour active platinum compounds with regard to the synthesis of cis- and transplatin, coordination chemistry of Pt, trans-effect, mechanism and kinetics of ligand substitution, solution behaviour of cisplatin, reaction of cisplatin with DNA, nucleobases and amino acids, structure-activity relationships for Pt drugs, Pt NMR.
- The student being able to understand and explain aspects of the coordination chemistry of Ru, Ga, and Au relevant to the biological behaviour of these metals
- The student being able to understand and explain the function of photosensitizers in photodynamic tumour therapy.
- The student being able to understand and explain the study of covalent and non-covalent interactions between metal complexes and DNA.
- The student being able to understand and describe the generation and selection criteria of therapeutic and diagnostic radionuclides, the synthesis of radiopharmaceuticals and the function of radiosensitizers.
- The student being able to understand and explain the choice of metals and ligands suitable for MRI contrast agents.

2. Biomineralisation [12 lectures + 2 tutorials]

The students will be introduced to the mechanisms of biomineralization. A particular emphasis will be given to calcified tissues (bone, mollusc shells) since their hierarchically-organized structures provide design principles for the fabrication of advanced materials.

The learning outcomes that will be assessed will include:

- The student being familiar with the concepts of biomineralization.
- The student being familiar with a number of materials characterization techniques used to investigate the growth of inorganic crystals in synthetic and biological systems.
- The student being able to describe and identify the different pathways to crystallization associated with non-classical crystal growth.
- The student being able to explain the different bio-inspired mineralization processes.

CH4113: ORGANIC CHEMISTRY (SEMESTER II)

Staff: Dr Eddie Myers (coordinator), Prof. Paul Murphy

1. Pericyclic and Radical Reactions (12 h)
2. Selectivity in Organic Synthesis (12 h)

1. Pericyclic and Radical Reactions (12 h)

Students will be assessed on the following learning outcomes:

- The ability to classify a pericyclic reaction as either a cycloaddition, an electrocyclic reaction, a sigmatropic rearrangement or a group-transfer reaction.
- The ability to predict the sense of a pericyclic reaction (suprafacial/antarafacial and disrotatory/conrotatory) under a certain set of reaction conditions (thermal/photochemical) based on the Woodward–Hoffman Rules.
- The ability to draw a set of π-based molecular orbitals for any conjugated molecule, to assign electrons to these orbitals, to identify the HOMO and LUMO orbitals and to use the resulting information to predict the sense of a pericyclic reaction under thermal or photochemical conditions.
- To understand the concept of stereospecificity pertaining to pericyclic reactions and to be able to predict the diastereoselectivity of a pericyclic reaction.
- The ability to use structural features to predict the relative rate and regioselectivity of pericyclic reactions.
- The ability to draw radical reaction mechanisms by using single-headed (fishhook) arrows.
- To understand and distinguish radical stability and reactivity.
- To understand the major types of reactions and processes involving radicals, such as fragmentation of weak bonds to form radicals, atom abstraction reactions, the addition of radicals to alkenes, and radical-radical combination and disproportionation.
- To understand radical chain processes and their use in the formation of rings and polymers
- To understand electron paramagnetic resonance as an analytical method for the study of radicals
- To have an appreciation for the role of radical reactions in biology and chemical biology.

2. Selectivity in Organic Chemistry (12 h)

The learning outcomes that will be assessed will include evaluation of student's knowledge and understanding of important reactions in organic synthesis and factors which influence those such as for those mentioned below:

- Chemoselective reactions of carbonyl compounds with various reducing reagents.
- Chemoselective reactions of alcohols and alkenes with oxidising agents
- Stereoselective olefination (alkene forming reactions)
- Enantioselective oxidation and reduction
- Stereoselective substitution reactions (basis in SN1, SN2 reactions)
- Regioselective reactions with carbohydrates/cyclic epoxides
- Bioorthogonal reactions

CH4101: RESEARCH INVESTIGATION

Coordinator: Dr C. Papatriantafyllopoulou

All students will undertake a research investigation. Information on the research project topics are given in this booklet. Students will submit their preferences by 12 noon on Friday 15th July 2022 and assignments will then be based on 3rd year Chemistry grades.

Learning outcomes from this module are provided below:

Students will manage their own learning.
Students will apply the basic knowledge gained earlier in the programme in order to consolidate and extend their knowledge and understanding of chemistry.
Students will become integrated into a scientific research team and develop teamwork skills.
Students will also develop skills such as finding data or information from the literature, to organise and summarise this and to present the outcomes of their investigations, placing it in context.

More specifically students will:

1. Establish or become aware of the state of the art in assigned topics
2. Critically analyse data or facts obtained from library and/or laboratory work
3. Use the facts or data obtained by this independent investigation to challenge current teaching and/or myths/hyperbole and/or to provide new insights and/or advance a topic in Chemistry
4. Demonstrate a greater understanding and knowledge within Chemistry as a result of their independent investigation
5. Demonstrate competence in recording, reporting & presenting the outcomes of their independent investigative work
6. Participate in the research team activities
7. Be able to carry out and report their research in an ethical manner

SCHEDULE FOR RESEARCH INVESTIGATION MODULE

- The laboratories will be open for the research from **Monday 9th September 2024** until **Friday 22nd November 2024.**

  For health and safety reasons, undergraduates are restricted in the laboratory between 9am-6pm on Monday-Friday and should never work alone.

  Chemistry students are expected to work ~25h per week generating data on their project in this period.

- Students will keep a lab notebook to document their experiments, observations, and provide a preliminary interpretation of the results, as well as include information about the experiments risk assessment. *An electronic copy of the lab notebook will be submitted to your supervisor no later than* ***Monday 9th December 2024 by 15.00*****.**

- Students are strongly encouraged to keep a research journal. This will be beneficial for research planning and goals achievement. It will provide evidence about the project/student's progress in a timely manner and can act as a self-assessment tool. An electronic copy of the research journal template can be downloaded from Canvas. Copies of the research journal will be submitted to supervisor *no later than* ***Monday 9th December 2024 by 15.00*****.**

- Students are assigned a second reader of their project reports. Students should meet their second reader twice during the project to discuss their progress. Meetings will be held on ***9th October*** and ***20th November 2024***. Students will confirm the time and venue of the meeting with their second reader. PowerPoint slides will be submitted to the second reader at least 3 days in advance of each meeting.
  Meeting 1 agenda: a brief literature review, project aim and preliminary results.
  Meeting 2 agenda: research update and dissertation outline.

- Students are assigned a third reader of their project reports. The role of the third reader will be to assess the quality of the report according to the marking scheme on page 25.

- Upload electronic copy of the project thesis is required no later than ***Monday 9th December 2024*** **by 15.00**– *Marks will be deducted for late submission.*

- Oral and poster presentations on projects will take place in the week of **16th December 2024**. The oral presentations will be assessed by the academic staff attending. The poster presentations will not be graded. Students will have the opportunity to share their efforts and results with their fellow students and academic staff. It will be a part of a celebratory research day marking the completion of the research projects.

- Students can revise the project report taking on board the comments raised by the 1st and 2nd reader and the academic staff attending the project presentation. An electronic copy of the revised report is required to be uploaded no later than one week after the date of presentation.

FEEDBACK ON REPORTS

Students should arrange an appointment with their supervisors to obtain feedback on a draft of the write-up of the research report. Please provide a timely draft to your supervisor in advance of this meeting (at least one week in advance) and please confirm the time and date of this meeting with your project supervisor in advance.

RESEARCH JOURNAL TEMPLATE

WEEK 1 (9/9/2024)	
Goal(s)/associated tasks:	
Completed tasks:	
Reflective entry:	

An electronic copy of the template can be downloaded from Canvas

GUIDELINES FOR STUDENTS IN WRITING A SYNTHESIS PROJECT REPORT

1. Title of Project

2. Summary or Abstract
A concise summary (up to 350 words) of what has been achieved. This should be explicit and reference should be made to work/experiments carried out and the results. Highlights from the research should specifically be included. A graphic is recommended to support this abstract.

3. Introduction
Approximately 4-8 pages (A4, typed, one and a half or double line spacing, margins approx 1", font such as Times and font size 12). Structure diagrams or schemes can be drawn with ChemDraw available for all students. The introduction should include background to the project, explaining the reasons for undertaking the work and include a project plan. In the case of synthetic projects for example, this could show a scheme. References must be included and usually are numbered in sequence as they are found in text with a superscript and the full reference listed at the end of the report.[1-3] Compounds should be numbered (**in bold**) as they appear in schemes. The final section of the introduction should outline the aims of the project. The final sentence or paragraph should summarise what has been achieved.

4. Results and Discussion

Students are advised to give a concise presentation of results presented first followed by a discussion of their significance (novelty of method?, novel mechanism?). Please also provide any relevant figures or schemes or tables that are needed to efficiently and clearly present your results.

In synthetic projects, there is no need to provide mechanisms for all reactions (although you will be expected to be able to discuss these during the oral assessment). Please only discuss a mechanism if an unexpected product is obtained or if this is central to the project objective.

When relevant there can be a description of the key characterisation data that supports a structural assignment, a brief description of how the reactions were carried out and yields can be given etc.

Example from a synthesis report: "The bromide derivative (**10**) was obtained (65%) after treatment of penta-O-acetyl-α-D-glucopyranose with hydrogen bromide in acetic acid. The ^{1}H-NMR spectrum of **10** had signals at δ 6.30 (1H, d, *J* 4.0 Hz, H-1), 4.80-3.50 (6H, ms, H-2–6) and 2.00-2.10 (12H, 4 x s, CH_3C=O), which were in excellent agreement with literature data.[4]" Tables can be used and diagrams/reaction schemes should be included and numbered etc. (Scheme 1, Fig. 1, Table 1).

Compounds should be numbered in order of appearance in schemes etc. If NMR is not relevant, then give X-ray or other spectroscopic data or analytical data to support your assignments.

5. Conclusions
Please include a conclusions section, summarizing briefly the main findings of the project.

6. Experimental
Description of experiments should be given in detail sufficient to enable experimental workers to repeat them.

For synthesis projects include full characterisation, yields, m.pt., R_f, NMR data, IR data, $[\alpha]_D$, microanalysis (for new compound), mass data and their assignments should be included). If a compound is not new, please include a citation to where it has been characterized previously and include some characterization data (e.g. ^{1}H-NMR, IR, LRMS and alpha-D) and state that the data is in good agreement with that described previously. You may include a general experimental section if this is relevant.

Typical experimental procedure (for a synthesis project) for a new compound and assignment of analytical data:

***N*-(2,3,4,6-Tetra-*O*-acetyl-(β-*D*-glucopyranosyl)-5-ethylthiophene-2-carboxamide 9** The reaction of 5-ethylthiophene-2-carboxylic acid (0.23 g, 1.44 mmol) as described for 3-bromothiophene-2-carboxylic acid gave a mixture of anomers (0.64 g, 91 % yield, α:β, 1:16). The residue was recrystallised from EtOAc and cyclohexane to afford β-anomer **9** as a colourless crystalline solid (0.42 g, 51%) and as an adduct with EtOAc

(1:1); mp 64-66 °C; $[\alpha]_D$ +12 (*c* 8.0, $CDCl_3$); ^1H NMR (300 MHz, $CDCl_3$) δ 7.33 (1H, d, *J* 3.9 Hz, aromatic H), 6.84 (1H, d, $J_{NH,H1}$ 9.3 Hz, NH), 6.77 (1H, dd, *J* 3.9 Hz, *J* 0.9 Hz, aromatic H), 5.37 (2H, 2 x overlapping t, *J* 9.3 Hz, H-1,3), 5.10 (1H, t, *J* 9.3, H-4), 5.03 (1H, t, *J* 9.3 Hz, H-2), 4.34 (1H, dd, $J_{6a,6b}$ -12.5 Hz, $J_{6a,5}$ 4.2 Hz, H-6a), 4.09 (1H, dd, $J_{6b,6a}$ -12.5 Hz, $J_{6b,5}$ 2.1 Hz, H-6b), 3.88 (1H, ddd, $J_{5,4}$ 9.9 Hz, $J_{5,6a}$ 4.2 Hz, $J_{5,6b}$ 2.1 Hz, H-5), 2.86 (2H, q, *J* 7.5 Hz, CH_2CH_3), 2.08, 2.04 (2s), 2.03 (each 3H, each s, each CH_3), 1.32 (3H, t, *J* 7.5 Hz, CH_2CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ 171.5, 170.7, 169.9, 169.6 (each ester C=O), 161.8 (amide C=O), 154.9, 134.3 (each aromatic C), 129.5, 124.6 (each aromatic CH), 78.9, 73.6, 72.6, 70.7, 68.3 (each CH), 61.7, 23.8 (each CH_2), 20.6, 20.7, 15.7 (each CH_3); ESI-LRMS *m/z* 486 $[M+H]^+$, 324, 271, 169; ESI-HRMS (*m/z*) calcd for $C_{21}H_{28}NO_{10}S$ 486.1434, found *m/z* 486.1448 $[M+H]^+$. Anal Calcd for $C_{25}H_{35}NO_{12}S$ (EtOAc adduct): C, 52.35; H, 6.15; N, 2.44; S, 5.59. Found: C, 52.22; H, 6.09; N, 2.49; S, 5.92.

Include the name of the compound, if possible. Many compounds can be named by checking for related compounds in SciFinder and using names provided in SciFinder abstracts as guidelines. Chemdraw can also be helpful in naming. Please consult your supervisor for advice on preparation of the experimental section. This can vary significantly between research areas.

Note: You can use Reaxys (www.reaxys.com) or SciFinder to search for compounds to determine whether they are new or known. If a compound is known then a citation should be provide. If analytical data is in agreement with data reported previously then this should be stated. Do include melting points and alpha D data if relevant and do state the literature data for these, if relevant.

7. References (Please use a standard style such as the one (RSC) outlined below).

1. I. Fleming, *Frontier Orbitals and Organic Chemical Reactions,* Wiley, Chichester, 1976, p. 55.
2. A. J. L. Beckwith and K. U. Ungold, in *Rearrangements in Ground and Excited States,* ed. P. de Mayo, Academic Press, New York, 1980, vol. 1, p. 161.
3. P. D. Cunningham, N. W. A. Geraghty, P. J. McArdle, P. V. Murphy and T. J. O' Sullivan, *J. Chem. Soc., Perkin Trans. 1*, 1997, 1.
4. H. Kessler and M. Hoffmann, *J. Am. Chem. Soc.* 1994, **118**, 10156.
5. X. Y. Smiths, *Journal of Flame,* 2000, **22**, 10157.

Reference 1 is a typical book, Reference 2 is typical for a chapter in an edited book. References 3 and 4 are typical journal references.

8. Appendix

You should include any relevant spectra, chromatograms etc. For example for projects using organic synthesis you may include ^1H and ^{13}C NMR spectra for any new compounds as evidence of homogeneity of purity of compounds you prepare. You may include a **compound characterization checklist** in your report. This corresponds to a table where you indicate the analysis you obtained on each compound.

9. Project risk assessment

Please include your project risk assessment as this will be evaluated as part of the project work. This should be signed by the student and supervisor and have identified major hazards assocated with project work.

10. Plagiarism. The thesis should be written in your own words and not copied from any reviews, internet or AI applications. If reproducing any figures from the literature in the thesis then please obtain copyright permissions and cite the original article. Obtaining copyright permissions can usually be done online where the article is originally published. Plagiarism must be avoided. See NUI Galway guidelines on plagiarism at http://www.su.nuigalway.ie/site/view/313/. Action will be taken by the examiners when plagiarism is found to occur.

Grading of project and the write-up will be based on strict adherence to guidelines provided herein.

The number of total pages does not normally need to exceed 35 pages. The student is recommended to focus on the quality of their report.

GUIDELINES FOR THE PROJECT REPORT (Measurement or Modelling Projects)

1. Title of Project: (Name, supervisor etc.)

2. Summary or Abstract

A concise summary (up to 350 words) of what has been achieved. This should be explicit and reference should be made to work/experiments carried out, results obtained, and the significance of these results. Highlights from the research should be specifically included. Inclusion of a graphic is recommended.

3. Introduction

Approximately 4-8 pages (A4, typed, one and a half line spacing, margins approx 2.5 cm, font such as Times and font size 12). Structure diagrams or schemes can be drawn with ChemDraw available for all students. The introduction should include background to the project, explaining the reasons for undertaking the work and include a project plan. References must be included and usually are numbered in sequence as they are found in text with a superscript and the full reference listed at the end of the report.[1-3] The final section of the introduction should outline the aims of the project. The final sentence or paragraph should summarise what has been achieved. The introduction should be written in your own words and not copied from any reviews or internet. If reproducing any figures from the literature in the thesis then please obtain copyright permissions and cite the original article. This can usually be done online where the article. Plagiarism must be avoided. See NUI Galway guidelines on plagiarism at http://www.su.nuigalway.ie/site/view/313/

4. Experimental

Description of experiments should be given in detail sufficient to enable experimental workers to repeat them. Include full details of the samples you studies, where they were obtained, how stored and handled. Include full details of the instrumentation and software used. Explain clearly how you collected you data and what instrumental parameters were used.

All the experimental data and procedures should reference the appropriate pages in your laboratory notebook which should be submitted to the supervisor with the final draft for cross referencing purposes.

Typical experimental procedure (for an analytical project):

Instrumentation and data collection: Raman measurements were performed in triplicate at room temperature using an Avalon Instruments Raman spectrometer with 785 nm excitation. A laser power of ~70 mW at the sample was used and spectra were collected with a resolution of 8 cm^{-1} and a typical exposure time of 10 s. For solution samples, stainless steel 96-well plates were used and multiple spectra were collected from a 3 × 3 grid (0.5 mm spot spacing) from which a single averaged spectrum was generated for data analysis. Fluorescence measurements were made at 25°C with a Cary Eclipse (Varian) fluorimeter using procedures previously described. Yeastolate samples were randomly removed from storage, defrosted at room temperature and allowed to reach room temperature, and handled using aseptic techniques. For each solution, 1 ml was pipetted into a cuvette and sealed before allowing to thermally equilibrate for several minutes prior to measurement. Spectral SERS data was pre-processed to reduce the influence of baseline drift, scatter effects, and uncontrolled fluctuations. Spectra containing cosmic interference were discarded prior to averaging of the spectra. The average spectrum was then treated with a multiplicative scatter correction, then an asymmetric weighted least squares algorithm to remove baseline offsets before finally applying a background correction using an orthogonal projection procedure. For SERS-ROBPCA analysis, the first derivative (SavGol) method was then implemented to further reduce measurement/instrumental effects and accentuate analyte signals. For EEM-MROBPCA analysis, Rayleigh and Raman scatter were removed from EEM data by replacing with a curve fit, connecting points either side of the bands using imputation. All calculations were performed using MATLAB ver. 7.4, PLS_Toolbox 4.0, and in-house-written toolboxes.

Please consult with your supervisor for advice on preparation of the experimental section. This can vary significantly between research areas. It is good practice to look at the style and content of peer-reviewed journals to assist in preparing your project.

5. Results and Discussion
Students are advised to give a concise presentation of results presented first followed by a discussion of their significance (novelty of method?, novel data?). In modelling projects, there is no need to provide detail of any code used (this can be included in an appendix).
In analytical type projects there is no need to include every spectrum etc., show an indicative or important example then summarise the important results in overlay plots or tables. If you have a lot of important data place it in an appendix with a brief description of the data. You can then refer to this appendix in your text. When relevant there should be a comparison between your data/results and relevant examples from the literature, *e.g.* are your spectra the first to show a new species? Is your data better quality than what's been published? If so, how so? Look at peer-reviewed papers for examples of how this is done professionally.

6. Conclusions
Please include a conclusions section (1-2 pages), summarizing your main achievements.

7. References (Please use a standard style such as the one outlined below).
[1] J. R. Lakowicz, Principles of Fluorescence Spectroscopy, 3rd Edition ed., Springer, New York, 2006.
[2] T. Cartwright, G. Shah, Culture media, in: J.M. Davis (Ed.) Basic Cell Culture, Oxford University Press Inc., New York 2002, pp. 69-106.
[3] P. W. Ryan, B. Li, M. Shanahan, K. J. Leister, A. G. Ryder, Prediction of Cell Culture Media Performance Using Fluorescence Spectroscopy, *Anal. Chem*., 82 (2010) 1311-1317.
[4] PLS_Toolbox, ver. 2.0, Eigenvector Research Inc., 3905West Eaglerock Drive,Wenatchee,WA.

Reference 1 is a typical book, Reference 2 is typical for a chapter in an edited book. Reference 3 is a typical journal reference, and 4 is for referencing software.

8. Appendix
In addition to the above you will need to include your project research assessment. You should include any relevant collections of spectra, modelling code, repeat experiments etc. here.

9. Project risk assessment
A risk assessment has to be carried out for all projects, including theoretical or computer-based projects. In certain cases, no risks may be identified (e.g. computational projects) and this can be stated on the risk assessment form.

10. Plagiarism. The thesis should be written in your own words and not copied from any reviews or internet or AI applications. If reproducing any figures from the literature in the thesis then please obtain copyright permissions and cite the original article. Obtaining copyright permissions can usually be done online where the article is originally published. Plagiarism must be avoided. See NUI Galway guidelines on plagiarism at http://www.su.nuigalway.ie/site/view/313/. Action will be taken by the examiners when plagiarism is found to occur.

Grading of project and the write-up will be based on strict adherence to guidelines provided herein.

The number of total pages does not normally need to exceed 35 pages. The student is recommended to focus on the quality of their work and report.

GUIDELINES FOR STUDENTS IN WRITING A NON-LABORATORY BASED REPORT

In the event that a student is assigned to a research investigation where much of the work and obtaining data or facts is carried out in the library and/or by working with data available to the supervisor then there is scope to modify the structure of the report. It is advisable that the student discuss the structure of the write up with the supervisor. The following sections must still be included in the report.

1. Title of Project: (see below for format which should be used)

2. Summary or Abstract
A concise summary (up to 350 words) of the objectives, findings and conclusions. Please include any particular highlights which emerged from the investigative work.

3. Introduction
This should be typed, one and a half or double line spacing, margins approx 1", font such as Times and font size 12). Structure diagrams or schemes can be drawn with ChemDraw available for all students. The introduction should include background to the investigation, explaining the reasons for undertaking the work and include objectives. References must be included and usually are numbered in sequence as they are found in text with a superscript and the full reference listed at the end of the report.[1-3] Compounds should be numbered (**in bold**) as they appear in schemes. The final section of the introduction should outline the aims of the investigation. The introduction should be written in your own words and not copied from any reviews or the internet. Plagiarism must be avoided. See NUI Galway guidelines on plagiarism at http://www.su.nuigalway.ie/site/view/313/ and the appropriate section in this booklet.

4. Presentation and Discussion of findings

Students are advised to detail their findings of their investigative work which is based on data available to the host supervisor and as a result of library and literature investigations. This should be followed by a discussion of their significance (novelty of method?, novel mechanism?). Please also provide any relevant figures or schemes or tables that are needed to efficiently and clearly present your results. Compounds should be numbered in order of appearance in schemes etc.

5. Conclusions
Please include a detailed conclusions section.

6. References (Please use a standard style such as the one (RSC) outlined below).
1. I. Fleming, *Frontier Orbitals and Organic Chemical Reactions,* Wiley, Chichester, 1976, p. 55.
2. A. J. L. Beckwith and K. U. Ungold, in *Rearrangements in Ground and Excited States,* ed. P. de Mayo, Academic Press, New York, 1980, vol. 1, p. 161.
3. P. D. Cunningham, N. W. A. Geraghty, P. J. McArdle, P. V. Murphy and T. J. O' Sullivan, *J. Chem. Soc., Perkin Trans. 1*, 1997, 1.
4. H. Kessler and M. Hoffmann, *J. Am. Chem. Soc.* 1994, **118**, 10156.
5. X. Y. Smiths, *Journal of Flame,* 2000, **22**, 10157.

Reference 1 is a typical book, Reference 2 is typical for a chapter in an edited book. References 3 and 4 are typical journal references.

Grading of project and the write-up will be based on strict adherence to guidelines provided herein.

ASSESSMENT OF THE RESEARCH INVESTIGATION

	Areas where the project is assessed	Mark (out of 100)	Weight	Grades awarded must be justified below
Completed by 3rd Reader	Style, appearance, organisation and English usage. Organisation of data/results	0	5.0%	
Completed by 3rd Reader	Clarity of introduction - appropriateness of references - setting the project in context	0	5.0%	
Completed by 3rd Reader	Results, discussion and experimental	0	20.0%	
Completed by 3rd Reader	Conclusions, suggestions for future work	0	5%	
	Computed grade for the report by the 3rd Reader	0	out of 35	
	Computed grade for the report by the 2nd Reader (see marks on right)	0	out of 35	
	Average grade/35 for the report based on 1st and 2nd Reader	0	out of 35	
Completed by 2nd Reader	**2nd Reader assessment after two meetings with the student.** How well prepared was the student for the meetings? How competent were they in discussing their project and in their ability to answer questions raised by the second reader?	0	5%	
Completed by Supervisor	**Supervisor's evaluation of standard of research work and student's productivity:** Was the recording of data, spectra, laboratory book etc. to a high standard? Consider the standard of the experiments carried out during the course of the work. Quality and quantity of results/data/outputs generated in the time available. Consider the development of team work skills and the level of difficulty of the project in terms of generating results.	0	25.0%	
Completed by Supervisor	**Supervisor's assessment of intellectual contribution to the project:** for example, assess the student's independence and ability to address problems or challenges that arose during the project work, or to learn from their mistakes or from experiments they carried out that were not very successful.	0	10.0%	
	Computed Grade for project performance	0	out of 35	
agreed mark from those present at the presentation	**Oral Presentation:** Organisation & delivery, slide quality, & answering of questions weighted equally	0	25.0%	
	Originality/Plagiarism. Any concerns?		y/n	
	Research journal		y/n	
	Submission of revised report		y/n	
	Poster presentation		y/n	
	Final Grade	0		

2nd Reader

	Areas where the project is assessed	Mark	Weight	Grades awarded must be justified below
Completed by 2nd Reader	Style, appearance, organisation and English usage. Organisation of data/results	0	5.0%	
Completed by 2nd Reader	Clarity of introduction - appropriateness of references - setting the project in contex	0	5.0%	
Completed by 2nd Reader	Results, discussion and experimental	0	20.0%	
Completed by 2nd Reader	Conclusions, suggestions for future work	0	5%	
	Computed grade for the report by the 2nd Reader	0	out of 35	

ACADEMIC INTEGRITY AND PLAGIARISM

Plagiarism is the act of copying, including, or directly quoting from the work of another, without adequate acknowledgement, in order to obtain benefit, credit or gain. Plagiarism can apply to many materials, such as words, ideas, images, information, data, approaches or methods. Sources of plagiarism can include books, journals, reports, websites, essay mills, another student, or another person.

Self-plagiarism, or auto-plagiarism, is where a person re-uses work previously submitted to another course within the University or in another Institution or even a journal. Plagiarism can also involve overly relying on a source – even if it is referenced correctly.

All work submitted by students is accepted on the understanding that it is their own work and contains their own original contribution, except where explicitly referenced using the accepted norms and formats of the appropriate academic discipline. Students are required to sign an affidavit to confirm the above for all submissions in fourth year chemistry.

University of Galway applies a penalty grid to plagiarised submissions. All relevant information can be found at: www.nuigalway.ie/plagiarism. This penalty grid is University policy, and no exceptions will be made.

Supervisor responsibilities
Supervisors will encourage students to uphold standards of academic integrity and avoid plagiarism during all meetings where preparation of project reports etc. are being discussed.

Module coordinator responsibilities
The module coordinator will check all submissions using Turnitin. In cases of academic misconduct or plagiarised work, the module coordinator will apply the required penalties to the submitted work where the case is straightforward, interview the student where there is substantial plagiarism or suspected academic misconduct, and/or refer the case to the School Academic Integrity Advisor (AIA) where necessary (e.g. cases of intentional academic misconduct). Any academic misconduct or plagiarism will be recorded in the Academic Misconduct Register managed by the Academic Integrity Officer.

Where intentional academic misconduct is at issue, the AIA will interview the student and investigate the case. If intentional misconduct is determined, the penalty is determined by the AIA and the case recorded in the Academic Misconduct Register or the case may be referred to the Academic Integrity Officer for further investigation.

Student responsibilities
The *final project report* will be submitted electronically through Canvas and Turnitin. All students will be given access to their own Turnitin report. In cases of any plagiarised submission, students will be obliged to formally meet with the module coordinator to discuss the submission under question. In cases of plagiarised submissions, the AIA will be contacted and the formal process will be carried out according to University policy QA220 (see Appendix).

Academic Integrity Advisor
The Academic Integrity Advisor for the School of Biological and Chemical Sciences is Dr Michelle Kilcoyne (michelle.kilcoyne@universityofgalway.ie).

AFFIDAVIT

Student Declaration on Plagiarism, Collusion or Copying

This declaration is to be completed and signed by the **student**. It must be included in the essay, first and final draft of the project reports.

I declare that this material, which I now submit for assessment, is my own work and that any assistance I received in its preparation is fully acknowledged and disclosed in the document. To the best of my knowledge and belief, all sources have been properly acknowledged, and the assessment task contains no plagiarism.
I understand that plagiarism, collusion, and/or copying are grave and serious offences and am aware that penalties could include a zero mark for this assessment, suspension or expulsion from NUI Galway. I have read the NUI Galway code of practice regarding plagiarism at www.nuigalway.ie/plagiarism.
I acknowledge that this assessment submission may be transferred and stored in a database for the purposes of data-matching to help detect plagiarism. I declare that this document was prepared by me for the purpose of partial fulfilment of requirements for the programme for which I am registered with the AUA. I also declare that this assignment, or any part of it, has not been previously submitted by me or any other person for assessment on this or any other course of study or another college.

_____

Student Name

_____ _____

Student Signature Date

IMPORTANT:

Please sign and return to School Office (Karen.kelly@universityofgalway.ie) by Wednesday 11th September 2024

Treatment of Personal Data*

I am aware that if I submit a medical certificate/letter regarding absences and/or any other personal information, this information may be shared with staff of the University and examiners for purposes related to assessing and maximizing my academic performance.

Signature _____

* *If you have issues which you would prefer to remain confidential to the recipient it must be clearly stated. Be aware this will limit the School's ability to react to or consider such information when assessing performance.*

APPENDIX

Ollscoil na Gaillimhe
University of Galway

QA220 Academic Integrity Policy

Date: 16 June 2022

Revision: 1 Sep 2024

Policy Owner: Deputy President and Registrar

Approving Committee: Academic Council

1.0 Purpose

To set out the code of practice for dealing with instances where students breach academic integrity by engaging in academic misconduct. This applies to both current students and those who have already graduated or left the University.

2.0 Description

Academic misconduct is any attempt to gain or help others gain an unfair academic advantage.

As the National Academic Integrity Network (NAIN) outline in their Academic Integrity Guidelines:

"Academic misconduct can be either intentional or inadvertent. It can be committed in a variety of ways (including, but not exclusive to, the following):

- Submitting work as your own for assessment, which has, in fact, been done in whole or in part by someone else or submitting work which has been created artificially, e.g., by a machine or through artificial intelligence. This may be work completed for a learner by a peer, family member or friend or which has been produced, commercially or otherwise, by a third party for a pre-agreed fee (contracted); it may be work in which the learner has included unreferenced material taken from another source(s) (plagiarism); it may be use of a ghost writer to carry out assessed work which is then submitted as the learner's own work; it may be using a previous assignment as submitted by a peer claiming it to be your work; it may be that references have been falsified to give credibility to the assignment and to show evidence of research; it may be a claim for authorship which is false;
- Cheating in exams (e.g., crib notes, copying, using disallowed tools, impersonation);
- Cheating in projects (e.g., collusion; using 'essay mills' to carry out the allocated part of the project);
- Selling or simply providing previously completed assignments to other learners;
- Misrepresenting research (e.g., data fabrication, data falsification, misinterpretation);
- Bribery, i.e., the offering, promising, giving, accepting or soliciting of an advantage as an inducement for an action;
- Falsification of documents;
- Improper use of technology, laboratories, or other equipment;
- Helping a peer to do their assignment which develops into the helper doing some or all of the assignment; and
- Sharing or selling staff or institutional intellectual property (IP) with third parties without permission."

Ollscoil na Gaillimhe
University of Galway

Some additional examples of academic misconduct are:

- Self-plagiarism where you submit work which has previously been submitted for a different assignment without permission/acknowledgement.
- Posting advertisements for services which encourage contract cheating either physically or virtually.
- Submitting all or part of an assessment item which has been produced using artificial intelligence (e.g. Google Translate or other machine translation services/software, generative AI, etc.) and claiming it as your own work.

Academic misconduct can arise through poor academic practice or ignorance of accepted norms of the academic discipline. Schools should ensure that programmes incorporate education around good academic practice for students at all levels.

The penalties associated with academic misconduct are detailed in Appendix 1 and will be made available to all students.

2.1 Terms

2.1.1 Academic Integrity Officer

The Academic Integrity Officer is a central role responsible for educating staff and students on academic integrity, supporting Academic Integrity Advisors, and investigating cases of academic misconduct. The Academic Integrity Officer (or designated staff within the Academic Integrity Office) is a Designated Authority as described in the Student Code of Conduct and has the responsibility and authority for dealing with suspected and reported cases of Academic Misconduct.

2.1.2 Academic Integrity Advisors

Each School will appoint at least one Academic Integrity Advisor (AIA), who is normally a member of academic staff. These advisors are Designated Authorities, as described in the Student Code of Conduct, and have responsibility and authority for dealing with suspected and reported cases of Academic Misconduct. The main role of the Academic Integrity Advisor is to provide advice to those teaching in their school on academic integrity, hold Courageous Conversations (described below) with students and aid the Academic Integrity Officer in investigating cases of academic misconduct when needed.

A list of the current Academic Integrity Advisors will be maintained and made available to all academic staff of the University.

2.1.3 Academic Misconduct Register

When students have been found to have engaged in inadvertent misconduct or intentional academic misconduct as part of the process outlined in this policy, their name is entered on the Academic Misconduct Register. This Academic Misconduct Register will be managed by the Academic Integrity Officer and appropriate access will be provided to the Academic Integrity Advisors.

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2.1.4 Standard of Proof

When dealing with academic misconduct, the accepted standard of proof is that the decision maker is satisfied that it is more likely than not that academic misconduct has taken place.

2.1.5 Student Conversations

There are three conversations a student may be invited to have regarding a case of academic misconduct:

1) a conversation with a member of the teaching staff,
2) a Courageous Conversation with an Academic Integrity Advisor,
3) or a conversation with the Academic Integrity Officer.

During the Courageous Conversation or the conversation with the Academic Integrity Officer the student may choose to bring a student colleague of the student's choice or a Students' Union representative (but not any other person or body unconnected with the University). This person may not participate in the interview. The primary purpose of this support person is as a support to the student, not to speak on the student's behalf. It is not appropriate for a member of University staff to attend a student conversation/interview as the student's support person. The University of Galway email address and phone number of this support person will need to be provided to the meeting organiser in advance of meeting. The Academic Integrity Advisor may invite another member of staff to join them, but not the member of the teaching staff who reported the case. Students will be notified of any scheduled conversation via their University of Galway email address. It is expected that the student will check their University of Galway email regularly. Students may request, via email, 5 working days' notice for any such conversation if they need such notice for scheduling requirements.

2.1.6 Misconduct During Official University Exams

If anyone suspects that academic misconduct has taken place during an official exam scheduled as part of the University exam timetable from the Exams Office, then this falls under the Examinations Security Group and the policy QA230 Procedures for dealing with breaches of Examination Regulations should be followed.

2.1.7 Misconduct in Research Degrees

While the Academic Integrity Policy and the outcomes detailed in Appendix 1 are primarily designed to manage academic misconduct in modules that are assessed for a numerical mark, some cases of academic misconduct appropriate for investigation under this policy may occur in assessments for research degrees where a numerical mark is not awarded. In such cases where academic misconduct is found to have occurred, outcomes from Appendix 1 may be decided (or appropriately adapted), as may recommendations available to examiners of research degree theses (see QA245 University Guidelines for Research Degree Programmes). It may also be appropriate for such cases to be investigated under QA514 Research Integrity Policy instead of or in addition to the Academic Integrity Policy.

2.1.8 Graduates of University of Galway

If any student who has already graduated from University of Galway is suspected of academic misconduct during their time as a student at University of Galway, the case should be immediately referred to the Academic Integrity Officer. The Academic Integrity Officer will investigate as outlined below in Section 2.2.3. If the Academic Integrity Officer determines that academic misconduct has

taken place, the case should be presented to the relevant Executive Dean to determine the appropriate outcome from those outlined in Appendix 1.

2.1.9 Maintaining a Safe Learning Space

The University may choose to actively block online resources from campus wired and WiFi networks. Such blocks may be of a temporary or permanent nature and may include (but not be limited to): websites, file sharing sites, torrent sites, cloud-based storage sites and live chat sites, where such online resources are deemed to support or facilitate academic misconduct. University of Galway also states clearly that advertising of any services that promote academic misconduct is in violation of this policy and they may choose to remove any physical advertising for services on campus that they believe expose students to the risk of contract cheating.

2.2 Process for Suspected Academic Misconduct

2.2.1 Teaching Staff Member Suspects Academic Misconduct

A member of teaching staff who suspects academic misconduct should first consider if they believe this is a case of inadvertent misconduct or intentional academic misconduct of any other kind.

Inadvertent Misconduct

If it is believed by the teaching staff member, based on the evidence, that this is a case of inadvertent misconduct, then the member of teaching staff will notify the student via email and will require the student to complete academic integrity training and may additionally choose any of the following:

- Zero marks in relation to a specific component of assessment task
- Resubmit the work for the full range of marks available
- Reduction in marks for the assessment by stated amount
- Student repeats and resubmits assessment task for a mark of no more than 50%

In addition, study skills training is highly recommended.

Following the assignment of an outcome the member of the teaching staff will enter the case on the Academic Misconduct Register as a case of inadvertent misconduct with the following supporting information:

- date of submission and discovery of inadvertent misconduct,
- a description of the assignment involved including the value of the assignment
- an explanation of why inadvertent misconduct was suspected,
- the year of the suspected student, and
- the outcome assigned to the student.

This is not considered an instance of intentional academic misconduct. A single entry of inadvertent misconduct on the Academic Misconduct Register will not be considered a “first offence” in the process that follows. Repeated entries on the Academic Misconduct Register for inadvertent misconduct will be considered by the Academic Integrity Officer and may result in a designation of “first offence” for intentional academic misconduct if the Academic Integrity Officer determines that the nature of the repetition warrants this.

If at any point later in the process the case is returned to the teaching staff member when sufficient evidence of intentional academic misconduct was not found, then the teaching staff member is welcome (if they wish) to still determine inadvertent misconduct and choose an outcome from the options above.

Intentional Academic Misconduct

In all other cases, when intentional academic misconduct is suspected the member of the teaching staff should speak with an appropriate Academic Integrity Advisor, in confidence, about the case. The teaching staff member will provide the Academic Integrity Advisor with a short report of the incident including:

- a copy of the student work, including date of submission and discovery,
- any evidence for suspecting academic misconduct,
- the year of the suspected student and
- the value of the assignment in the module.

2.2.2 Academic Integrity Advisor Stage

From this point forward, this is the process followed regardless of whether the academic misconduct was referred to the Academic Integrity Advisor by a member of the teaching staff or from another source.

First Offence

The Academic Integrity Advisor will first check if this student has already had a case of intentional academic misconduct on the Academic Misconduct Register. If they have, (in other words they have already engaged in intentional academic misconduct at University of Galway), the case is immediately referred to the Academic Integrity Officer for investigation.

Courageous Conversation (CC)

If the student is not on the Academic Misconduct Register for intentional academic misconduct (in other words this is a suspected first instance of intentional academic misconduct) then the Academic Integrity Advisor will initiate the Courageous Conversation process. (Courageous Conversations were developed in the University of New South Wales and described in this article by Prof. Cath Ellis). The Academic Integrity Advisor will email each student involved, outline the academic misconduct suspected and offer the option to admit to the academic misconduct sharing all details that they can about the misconduct via email or to participate in a Courageous Conversation. If the student admits to the intentional academic misconduct via email, then the Academic Integrity Advisor will respond via email notifying the student of the associated outcome (in accordance with Appendix 1). The Academic Integrity Advisor will also notify the lecturer of the admission and outcome via email.

The Courageous Conversation is an open discussion between the Academic Integrity Advisor and the student before any formal investigation has taken place. During the Courageous Conversation, the Academic Integrity Advisor will

- Share the details of the alleged misconduct with them again.
- Let the student know that academic misconduct is taken very seriously by the University but a full admission of misconduct at this point in the process means that the most serious outcomes recommended for this category of breach will not apply.

- If they have engaged in intentional academic misconduct, the student is encouraged to share the details of this misconduct with the Academic Integrity Advisor at this stage. If they do so, there will be no formal investigation as long as they share all the details related to the incident. If at any point, it emerges that the student was not fully compliant with this requirement then they may still need to go through a full investigation.
- If an Academic Integrity Advisor suspects a case of academic misconduct in their own module, they should not hold a Courageous Conversation with their own student. In those circumstances, they should seek the assistance of an AIA in a related discipline or contact the Academic Integrity Office for advice.

CC Outcome: Student Admits to Intentional Academic Misconduct

If the student admits to intentional academic misconduct, the Academic Integrity Advisor determines the outcome for the intentional academic misconduct (in consultation with the Academic Integrity Officer, if necessary) according to Appendix 1.
The Academic Integrity Advisor then records the instance of intentional academic misconduct on the Academic Misconduct Register including:

- the report from the teaching staff member,
- their own summary of the Courageous Conversation,
- a summary of any additional discussion between themselves and the Academic Integrity Officer,
- the summary of the points assigned to determine the level of academic misconduct using Appendix 1 with accompanying relevant details if needed, and
- the outcome determined.

The Academic Integrity Advisor informs the student and the teaching staff member in writing via email of the result of the Courageous Conversation and the outcome determined.

CC Outcome: Student Does Not Admit to Intentional Academic Misconduct

If the student does not admit to intentional academic misconduct, then the Academic Integrity Advisor must decide if they still suspect intentional academic misconduct has taken place.

AIA Does Not Suspect Intentional Academic Misconduct

If the Academic Integrity Advisor is satisfied that intentional academic misconduct has not taken place following their Courageous Conversation with the student, then the Academic Integrity Advisor responds to the student and the teaching staff member via email, shares their conclusion and briefly provides their reasoning for this conclusion. At this point, the teaching staff member may still determine inadvertent misconduct, if appropriate, and choose an outcome from those available for inadvertent misconduct, above.

AIA Suspects Academic Misconduct

If the Academic Integrity Advisor still suspects that intentional academic misconduct has taken place following their Courageous Conversation with the student, then the Academic Integrity Advisor refers the case to the Academic Integrity Officer for a formal investigation and informs the student and teaching staff member via email that this step has been taken. The Academic Integrity Advisor will provide the Academic Integrity Officer with

- the report from the teaching staff member,

- their own summary of the Courageous Conversation,
- a summary of any additional discussion between themselves and the Academic Integrity Officer.

The Academic Integrity Advisor will assist with the ensuing investigation when needed as requested by the Academic Integrity Officer.

If the student fails to respond to the Courageous Conversation invitation within a reasonable timeframe (usually five working days) or does not attend a scheduled Courageous Conversation, the Academic Integrity Advisor should make and issue a decision based on the available evidence.

2.2.3 Academic Integrity Officer Investigates

The Academic Integrity Officer receives cases from Academic Integrity Advisors but also potentially from other sources. If a case is presented to the Academic Integrity Officer from anywhere other than an Academic Integrity Advisor, they may first refer the case to the relevant Academic Integrity Advisor if they deem this appropriate. If the Academic Integrity Officer does not refer such a case to an Academic Integrity Advisor, then they will proceed with an investigation themselves.

The Academic Integrity Officer will initiate an investigation to determine whether intentional academic misconduct has taken place. If intentional academic misconduct has taken place, then the investigation will look to determine the extent or level of the academic misconduct.

This investigation process may include (but is not limited to):

- An interview with the student or students involved. At this interview, the Academic Integrity Officer may invite another member of staff to join them and the student may have a support person with them as described under Section 2.1.5 Student Conversations above.
- An interview with the teaching staff member who referred the case.
- An interview with the Academic Integrity Advisor who referred the case.
- An investigation of any documents, files, or other resources relevant to the case and their associated metadata.

Based on the investigation the Academic Integrity Officer will determine whether it is more likely than not that intentional academic misconduct has taken place.

Intentional Academic Misconduct Not Found

If the Academic Integrity Officer finds it more likely than not that intentional academic misconduct has not taken place following their investigation, then the Academic Integrity Officer responds via email to the student, the Academic Integrity Advisor and the teaching staff member, shares their conclusion and briefly provides their reasoning for this conclusion.

Intentional Academic Misconduct Has Taken Place

If the Academic Integrity Officer finds it more likely than not that intentional academic misconduct has taken place following their investigation, the Academic Integrity Officer determines the level of academic misconduct and associated outcome according to Appendix 1. This may involve the appropriate Executive Dean making the decision on the case in certain major cases of academic misconduct as per the details provided in Appendix 1.

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The Academic Integrity Officer then records the instance of intentional academic misconduct on the Academic Integrity Register including:

- the report from the teaching staff member,
- any information/reports provided by the Academic Integrity Advisor,
- a summary of any additional discussion about the case,
- a summary of the investigation and its conclusions,
- the summary of the points assigned to determine the level of academic misconduct using Appendix 1 and any other relevant details, and
- the outcome determined.

The Academic Integrity Officer informs the student, the relevant Academic Integrity Advisor and the teaching staff member via email of the conclusion of the investigation and the outcome determined.

If at any stage the Academic Integrity Officer believes an outcome is incommensurate with the offence, the Academic Integrity Officer may choose to adjust the outcome. If at any stage the member of the teaching staff is informed that intentional academic misconduct has not been found to have taken place, they may still determine inadvertent misconduct and assign any of the initial outcomes available to them.

2.2.4 Protection and Confidentiality

If any member of the University community should become aware of potential academic misconduct through observation or information they receive, and if the process outlined previously has not addressed how they should proceed, then they should contact the relevant Academic Integrity Advisor or Academic Integrity Officer to make them aware of the situation. This information will be treated with confidentiality and the University will do its best to ensure that there are no negative consequences for the person who brings this information forward. However, if the person reporting misconduct should be implicated in academic misconduct themselves in any way, they will still be subject to the policy outlined here. The Academic Integrity Advisor (in consultation with the Academic Integrity Officer, if necessary) or the Academic Integrity Officer will determine how best to proceed according to the process outlined above.

2.2.5 Timeline

The intention of everyone involved in enacting this policy should be to implement each step in as timely a manner as possible. It is understood that cases will have unique characteristics and that as a result they may differ in the time taken to process. Each party in the process (teaching staff member, Academic Integrity Advisor, Academic Integrity Officer, Executive Dean) is urged to ensure that their portion of the process is completed in as short a period as possible. In the case where academic misconduct is determined after an exam board has taken place, an outcome can still be assigned and post-board changes can be used to adjust a grade if necessary.

2.2.6 Appeal Process

Confirmed breaches of academic integrity should be appealed under the Academic Integrity Policy and not QA235 Discussion, Checking and Appeal of Examination Results. An appeal must be lodged within ten working days of the date of the email communicating an outcome to the student. Details of the relevant appeal process and timelines will be included in the written communication to the student. There is at most one appeal allowed and the subsequent decision is final. Note that once a

decision is appealed it is possible that a different (and potentially more serious) outcome may be determined if further information is revealed as part of the appeal process.

- A decision of inadvertent misconduct may be appealed to the relevant Academic Integrity Advisor.
- A decision at the Courageous Conversation stage may be appealed to the Academic Integrity Officer but the student should be aware that this may initiate a full investigation into the matter.
- A decision of the Academic Integrity Officer may be appealed to the appropriate Executive Dean when the Executive Dean was not involved in the initial decision and outcome.
- A decision of the Executive Dean may be appealed and it will be assigned to an Executive Dean who did not determine the previous outcome.

2.2.7 Process for Assuring Consistency

The Academic Integrity Officer will conduct an annual review of academic misconduct cases across the whole university. They will pull a random selection of approximately ten cases each of inadvertent misconduct and intentional academic misconduct from the Academic Misconduct Register and review the cases to ensure policy has been followed. If they find inconsistencies, then they will follow up with the appropriate teaching staff member and/or Academic Integrity Advisor and consider whether further training should be needed.

3.0 Policy Review Process

The policy will be reviewed annually by the T&L committee and any changes needed will be implemented as soon as possible.

4.0 Acknowledgements

This policy has benefitted greatly from the international expertise that exists in the area of academic integrity. We are very grateful to Irene Glendinning, Thomas Lancaster, Cath Ellis, Kane Murdoch, Caroline Campbell, and Nick Milne for the time they have taken to share their experiences, listen to our questions and recommend ways in which we could address our concerns. We thank Kelly Ahuna and Loretta Frankovitch for sharing details of their remediation process and how their Office of Academic Integrity at the University of Buffalo works. We are grateful to

- Deakin University for allowing us to adapt their points and outcomes process to meet our needs
- University of New South Wales for developing the Courageous Conversations process and sharing so that others could incorporate this into their own approach.
- Victoria University for demonstrating how to create a policy that is readable and easily accessible for students online.
- National Academic Integrity Network (NAIN) for their development of the Academic Integrity Lexicon and Guidelines as well as their willingness to talk to us about the process we were undertaking and provide guidance particularly situated in the Irish context.

Although we cannot list them all, we owe a great deal to the international academic integrity community as a whole who have been so welcoming to us during this process. For the many ideas

and thought provoking questions that have no doubt influenced this policy we thank you. Any errors and mistakes are entirely our own.

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QA220 Appendix 1: Outcomes for Student Breach of Academic Integrity

Revision: 1 Sep 2023

This appendix is pursuant to the Academic Integrity Policy. The outcome for misconduct will be determined by:

a. Calculating the points for the conduct of the student.
b. Calculating the points for the context of the misconduct (from each section of the table).
c. Adding the points together from the conduct and context.
d. Deciding the appropriate outcome based on these factors, which may be mitigated if there are compassionate or compelling circumstances.

Example of calculation:

	Points
Points for Conduct:	
Points for Context: Level of Student	
Points for Context: Previous Misconduct	
Points for Context: Intention to Hide Breach	
Total	

Points:

Conduct by student (add points from one of the eleven sections)		Points applied depending on seriousness Less serious More serious				
Plagiarism	1. Up to two plagiarised passages or components constituting up to 5% of the assessment task.	2				
	2. As in Clause 1 but with critical aspects* plagiarised 3. Up to four plagiarised passages or components constituting up to 20% of the assessment task.		4			
	4. As in clause 3 but with critical aspects* plagiarised. 5. Between 20% and 50% of the assessment task plagiarised.			6		

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Conduct by student (add points from one of the eleven sections)		Points applied depending on seriousness Less serious				More serious
	6. As in clause 5 but with critical aspects* plagiarised. 7. More than 50% of the assessment task plagiarised.				8	
Contract Cheating	8. Asking someone else to complete all or part of an assignment on the student's behalf. 9. Offering to write all or part of an assignment for a student.				8	
	10. Submitting all or part of an assessment item which has been produced for the student and claiming it as the student's work. 11. Producing all or part of an assignment for a student. 12. Distributing their own assessment work for personal gain, either directly or through a third party, which could facilitate a breach of academic integrity.					16
Use of Artificial Intelligence	13. Submitting all or part of an assessment item which has been produced using artificial intelligence (e.g. Google Translate or other machine translation services/software, generative AI, etc.) and claiming it as the student's work.			7		
Collusion	14. Up to two passages or components constituting up to 5% of the assessment task.	2				
	15. As in clause 14 but with collusion in critical aspects* 16. Up to four passages or components constituting up to 20% of the assessment task.		4			
	17. As in clause 16 but with collusion in critical aspects* 18. Between 20% and 50% of the assessment task.			6		
	19. As in clause 18 but with collusion in critical aspects* 20. More than 50% of the assessment task				8	

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Conduct by student (add points from one of the eleven sections)		Points applied depending on seriousness Less serious				More serious
Non-compliance with assessment or examination instructions or requirements (for exams not part of the official university exam schedule from the Exams Office)	21. Unauthorised possession of aids or information in examination without use. 22. Failure to comply with directions about the assessment or examination (e.g.: speaking during examination)	2				
	23. Unauthorised aids or information used in examination. 24. Spoken or other communication between student and any unauthorised person during the examination related to the content of the examination.			6		
	25. Providing a copy of exam questions or content, or an assessment task that is to be completed under secure conditions, to another person 26. Providing restricted information to another person relating to assessment without the approval of the examination supervisor or module owner.				8	
	27. Receiving restricted information from another person relating to assessment without the approval of the examination supervisor or module owner.					16
Impersonation (for assessment/exams not part of the official university exam schedule from the Exams Office)	28. Asking another person to take the student's place for an examination or other assessment task.				8	
	29. Allowing another person to complete the examination or assessment task in the student's place. 30. Impersonating another student in an examination or assessment task.					16
Fraud	31. Creating or providing false documentation, in relation to assessment requirements or deadlines or special consideration,				8	

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Conduct by student (add points from one of the eleven sections)		Points applied depending on seriousness Less serious More serious				
	including falsifying assessment task submission receipts and medical certificates.					
	32. Creating or providing false documentation, in relation to: a. Admission to the University, including providing false academic records b. Assessment outcomes c. Academic progress					16
Reuse of previous work	33. Submitting work previously submitted for assessment in any other unit or course, without permission.	2				
Use of file-sharing sites	34. Uploading any content (assessment, notes, slides, etc.) from a module at the University to a third-party site regardless of whether there was any visible benefit to the student involved.		4			
Promoting ways to breach academic integrity	35. Sharing information with other students about ways to breach academic integrity or facilitating a breach of academic integrity other than through distribution of their own work. (See 12 above)					10
Other breaches of academic integrity	36. Calculated relative to issues of similar significance above.	As appropriate (2-16)				

* Critical aspects are key ideas central to the assignment.

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Context (add points from all three sections)		Points applied depending on seriousness Less serious				More serious
Level of Student Experience	37. Students in their first year of an undergraduate degree, first year of a discipline, or first year at an Irish (or comparable) university at either undergraduate or postgraduate level	1				
	38. Students in their second year of undergraduate.			3		
	39. Students in their third or more year of undergraduate degree or postgraduate students (other than those accounted for in 37 above)					5
Previous breaches of academic integrity, allowing for time for appropriate skills development	40. First breach	1				
	41. Second breach				4	
	42. Third or subsequent breach					5
Intention to hide the breach of academic integrity	43. No evidence of deliberate action to hide the breach of academic integrity once the breach had been reported to the AIA.	0				
	44. Evidence of deliberate action to hide a breach of academic integrity in relation once the breach had been reported to the AIA.					6

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Outcomes

Points	Outcomes
1-4	Completion of academic integrity training and an entry on the Academic Misconduct Register
5-8	Completion of academic integrity training, entry on the Academic Misconduct Register and any of the following: • Zero marks in relation to a specific component of assessment task • Assignment marked but with plagiarised sections treated as direct quotes • Resubmit the work for the full range of marks available • Reduction in marks for the assessment by stated amount • Student repeats and resubmits assessment task for a mark of no more than 50% In addition, study skills training is highly recommended.
9-12	Completion of academic integrity training, entry on the Academic Misconduct Register and any of the following: • Reduction in marks for the assessment by stated amount. • Zero marks in relation to a specific component of assessment task • Student repeats and resubmits assessment task for a mark of no more than 50% • Resubmission of the task but with a different topic In addition, study skills training is highly recommended.
13-15	Completion of academic integrity training, entry on the Academic Misconduct Register and any of the following: • Zero marks in relation to a specific component of assessment task • Zero marks for the assessment task • Zero marks for the module† In addition, study skills training is highly recommended.

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Points	Outcomes
16-20	Completion of academic integrity training, entry on the Academic Misconduct Register and any of the following: • Zero marks for the assessment task • Zero marks for the module† • Suspension from the programme or University for a semester with an automatic right of return† • Exclusion from the programme or University for up to 2 semesters with no automatic right of return (student must apply to be re-admitted)† In addition, study skills training is highly recommended.
21+	Completion of academic integrity training, entry on the Academic Misconduct Register and any of the following: • Zero marks for the module† • Suspension from the programme or University for a study period with an automatic right of return† • Exclusion from the programme or University for up to 3 study periods with no automatic right of return (student must apply to be re-admitted)† • Permanent exclusion from the programme† • Expulsion from the University with no opportunity for readmission to a University of Galway programme, including termination of higher degree by research candidature† • Degree not awarded† • Recommendation to Academic Council that the degree be rescinded† In addition, study skills training is highly recommended.

†These outcomes can only be imposed by the Executive Dean upon a recommendation from the Academic Integrity Officer.

Weight of the assignment within a module may be considered when choosing the outcome from the range provided.

In cases where academic misconduct is found to have occurred in assessment for a research degree, outcomes listed above may be decided (or appropriately adapted), as may recommendations available to examiners of research degree theses (see QA245 University Guidelines for Research Degree Programmes).

This approach is adapted from Deakin University's 'Schedule A: Outcomes for student breach of academic integrity' which was itself developed from 'Benchmark Plagiarism Tarriff' by Peter Tennant and Gill Rowell, plagiarismadvice.org