



**Swansea University
Prifysgol Abertawe**

FACULTY OF SCIENCE AND ENGINEERING

**POSTGRADUATE RESEARCH DEGREE
STUDENT HANDBOOK**

**EngD in MATERIALS, MODELLING
AND MANUFACTURING
(FHEQ Level 8)**

**SUBJECT SPECIFIC
PART TWO OF TWO
MODULE AND COURSE STRUCTURE
2024-25**

DISCLAIMER

The Faculty of Science and Engineering has made all reasonable efforts to ensure that the information contained within this publication is accurate and up-to-date when published but can accept no responsibility for any errors or omissions.

The Faculty of Science and Engineering reserves the right to revise, alter or discontinue degree programmes or modules and to amend regulations and procedures at any time, but every effort will be made to notify interested parties.

It should be noted that not every module listed in this handbook may be available every year, and changes may be made to the details of the modules. You are advised to contact the Faculty of Science and Engineering directly if you require further information.

ACADEMIC YEAR 2024-2025

Full semester and term dates are available [here](#).

IMPORTANT INFORMATION ON ACADEMIC INTEGRITY

Swansea University and the Faculty of Science of Engineering takes any form of **academic misconduct** very seriously. In order to maintain academic integrity and ensure that the quality of an Award from Swansea University is not diminished, it is important to ensure that all students are judged on their ability. No student should have an unfair advantage over another as a result of academic misconduct - whether this is in the form of **Plagiarism, Collusion** or **Commissioning**.

It is important that you are aware of the **guidelines** governing Academic Misconduct within the University/Faculty of Science and Engineering and the possible implications. The Faculty of Science and Engineering will not take intent into consideration and in relation to an allegation of academic misconduct - there can be no defence that the offence was committed unintentionally or accidentally.

Please ensure that you read the University webpages covering the topic – procedural guidance [here](#) and further information [here](#). You should also read the Faculty Part One handbook fully, in particular the pages that concern Academic Misconduct/Academic Integrity.

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WELCOME TO THE FACULTY OF SCIENCE AND ENGINEERING

Whether you are a new or a returning student, we could not be happier to be on this journey with you.

At Swansea University and in the Faculty of Science and Engineering, we believe in working in partnership with students. We work hard to break down barriers and value the contribution of everyone.

Our goal is an inclusive community where everyone is respected, and everyone's contributions are valued. Always feel free to talk to academic, technical and administrative staff - I'm sure you will find many friendly helping hands ready to assist you. And make the most of living and working alongside your fellow students.

During your time with us, please learn, create, collaborate, and most of all – enjoy yourself!

Professor David Smith
Pro-Vice-Chancellor and Executive Dean
Faculty of Science and Engineering



Faculty of Science and Engineering	
Pro-Vice-Chancellor and Executive Dean	Professor David Smith
Director of Operations	Mrs Ruth Bunting
Associate Dean – Education	Dr Laura Roberts
Postgraduate Research Lead	Professor Maurizio Piai
School of Engineering and Applied Sciences	
Head of School	Professor Serena Margadonna
School Education Lead	Professor Simon Bott
Head of Materials Science and Engineering	Professor Trystan Watson
Programme Director	Professor James Sullivan

CONTACTS

If you have any questions about the programme, please contact your supervisors or a member of the COATED Materials and Manufacturing Academy (M2A) Team (refer below).

Position	Name	Contact Details
Programme Director	Professor James Sullivan	j.h.sullivan@swansea.ac.uk
Programme Director	Professor David Penney	d.penney@swansea.ac.uk
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CDT Administrator and Academic Quality Officer	Rebecca White	r.j.white@swansea.ac.uk 01792 606520

COATED M2A OFFICE

For COATED M2A specific enquiries please email m2a@swansea.ac.uk. The COATED M2A Project Team are based in Room A201a, Engineering East, with exception of the Programme Directors. The team can help with ordering equipment for your project, printing posters for conferences, theme review and project related issues as well as being the contact for absences and booking of annual leave.

STUDENT SUPPORT

The Student Experience and Information Team are here to support you through your studies and to provide non-judgemental advice and guidance. If you have any questions relating to your academic or personal life you can contact the Team and chat through your support options.

The Team is available for in-person support meetings and can also be contacted via email (studentsupport-scienceengineering@swansea.ac.uk) or phone (+44 (0) 1792 295514). You can access their full contact details [here](#).

To visit the Team, you can attend either of the following Receptions:

- Reception in the Foyer of Engineering Central, [Bay Campus](#)
- Reception on the first-floor landing of the Wallace Building, [Singleton Park Campus](#)

Standard Reception opening hours are Monday to Friday from 9am to 5pm; however, this may vary at Christmas, Easter and during the Summer.

The current [FSE Student webpages](#) also contain useful information and links to additional resources:

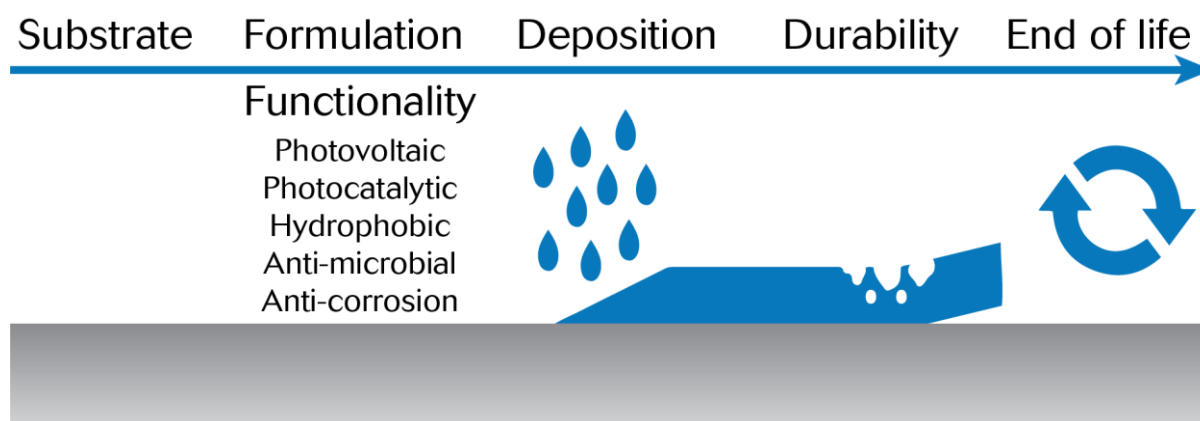


INTRODUCTION TO THE ENGD PROGRAMME

The Engineering Doctorate (EngD) in Materials, Modelling and Manufacturing at Swansea University is a professional four-year research degree undertaken in partnership between the University and a diverse range of organisations within the engineering sector. The Engineering and Physical Sciences Research Council (EPSRC) regard the EngD scheme as highly prestigious, and you will be referred to as a 'Research Engineer' (RE) to emphasise the professional nature of the degree.

Funding for those on the EngD is primarily via the **Engineering and Physical Sciences Research Council (EPSRC) Centre for Doctoral Training (CDT) in Functional Industrial Coatings**, a £7.2 million project funded by UK Government via UK Research and Innovation (UKRI). The CDT is focused on providing a total of 50 EngD REs during the lifespan of the grant with the technical and research excellence to develop and manufacture new functional industrial coatings and to gain the professional skills to become industry and academic leaders.

Coatings are abundant throughout day-to-day life and ensure the function, durability and aesthetics of millions of products and processes. The use of coatings is essential across multiple sectors including construction, automotive, aerospace, packaging and energy; however, today, there is a focus for them to be sustainably sourced and easily recycled. Projects supported by the CDT will cover everything from substrate and coating formulations through to corrosion performance and end of life.



The EngD will combine a challenging PhD-style research project/thesis conducted with industry together with activities comprising formal training (modules), informal training (for example, quarterly theme reviews) and organised events such as the COATED M2A Annual Conference to broaden your industrial experience.

TRAINING PROGRAMME STRUCTURE

The training element of the programme will consist both of formal training (via examined lecture courses) together with informal training.

1) FORMAL TRAINING

The training programme typically comprises of 170 credits with:

- 110 credits of technical training delivered primarily in year 1 to provide a technical foundation for the research project; and
- 60 credits of professional skills delivered across years 1-4 to facilitate progression into employment.

The functional coatings modules reflect the current areas of industrial demand, the focus of the EPSRC and recommendations of the Steering Committee. It should be emphasised that the EngD is a research degree and not a taught doctorate; however, to allow formal recognition of the training component, each section of the taught programme is examined and assigned credits. REs must successfully complete the 170 credits of training, passing each component with a mark of over 50%. Modules are assessed through a mixture of formal examinations, assignments and laboratory practicals.

Table 1 - portfolio of technical and professional skills modules

All modules are 10 credits unless specified. Refer to **Appendix 1** for descriptors of modules being taught in 2024/25.

Functional Coatings Technical Modules	Professional Skills Modules
EGTM38 Elements of Materials Selection* ^A	EGGM00 Ethics in Engineering
EGSM03 Literature Review of Industrial Problem (30 credits)	EGSM02 Interpersonal Skills for Engineers
EGSM06 ^A Deposition of Functional Materials by Printing and Coating	EGSM08 Economic Appraisal of Engineering Projects
EGSM11 Public Engagement and Science Communication	EGSM09 ^A Industrial Process Control and Optimisation
EGSM12 ^A Applied Instrumental and Analytical Techniques	EGSM10 Entrepreneurship for Research Engineers
EGTM101 ^A Application of Metallic Coatings	EGSM34 Leadership and Complexity Management
EGTM103 ^A Degradation of Materials	Responsible Research and Innovation**
EGTM104 ^A Organic Coatings	
EGTM98 ^A Electrochemistry	
EGTM99 ^A Functional Coatings	

Key

* EGTM38 is non-credit bearing and optional for Materials Engineering graduates.

** ‘Responsible Research and Innovation’ is non-credit bearing but compulsory for all.

^A These modules will not be running during the 2024/25 academic year.

Table 2 – year by year profile of modules and assessment methodologies

Year 1 – Total 120 credits

Functional Coatings Technical Modules		
EGSM03	Literature Review of Industrial Problem	Written report – individual (75%) & Viva (25%)
EGSM06	Deposition of Functional Materials by Printing & Coating	Examination (50%) – multiple choice & Coursework (50%) – technical report
EGSM12	Applied Instrumental and Analytical Techniques	Assignment (100%) – essay (3000 words)
EGTM101	Application of Metallic Coatings	Examination (100%)
EGTM103	Degradation of Materials	Coursework (50%) – questions & case studies and Online Multiple-Choice Questions/Canvas Test (50%)
EGTM104	Organic Coatings	Other (100%) – report
EGTM98	Electrochemistry	Examination (100%)
EGTM99	Functional Coatings	Assignment (100%) – 4-page report

Additionally, REs may take (optional for Materials Engineering graduates):

EGTM38 Elements of Materials Selection Non-credit bearing

Professional Skills Modules		
EGSM02	Interpersonal Skills for Engineers	Presentation (50%), Assignment (50%) – abstract & project plan; Group Work – practical (0%)
EGSM09	Industrial Process Control and Optimisation	Other (100%) – computer-based assignment
N/A	Responsible Research and Innovation	Non-credit bearing

Year 2 – Total 20 credits

Professional Skills Modules		
EGGM00	Ethics in Engineering	Assignment (80%) – essay (2000 words) & presentation (20%)
EGSM10	Entrepreneurship for Research Engineers	Other (100%) – Business model ‘lean canvas’ and 500-word reflection.

Year 3 – Total 10 credits

Functional Coatings Technical Modules		
EGSM11	Public Engagement and Science Communication	Other (100%) – attendance at the training session.

Year 4 – Total 20 credits

Professional Skills Modules		
EGSM08	Economic Appraisal of Engineering Projects	Other (100%) – computer based assignment
EGSM34	Leadership and Complexity Management	Coursework (100%) – case study analysis (1000 words) and presentation

Module Delivery

Modules are delivered in an intensive two-week format with three days of formal lectures in week one with the assessment at the end of week two. This intensive delivery has proved popular with past cohorts and permits attendance of industrial delegates to the courses. The exception to this is the 30 credit 'Literature Review' module that will be conducted & assessed over a longer period. Modules will typically run once per year.

If you fail to pass the module or miss the module through illness you will be required to take/re-sit the module at the earliest available opportunity.

The Academic Regulations for the [Degree of Professional Doctorate](#) outline that:

- Candidates are required to sit examinations at the time specified by the Faculty/School and/or to submit assignments by the specified deadlines. Failure to sit an examination or submit work by the specified date will result in a mark of 0% being recorded.
- The pass mark for all training modules shall be 50% and there shall be no condoned failures.
- Candidates shall be given one opportunity to redeem a failed training module. All failed training modules must be redeemed within the maximum period of candidature.
- Candidates who pass the training module at the second attempt/re-sit shall obtain an uncapped mark.
- Failure of a training module at the second attempt shall result in the Faculty/School recommending to the Progression and Awards Board that the candidate either:
 1. be required to withdraw from the programme;
 2. be required to withdraw from the programme and the University.
- Candidates who fail more than one training module shall be required to attend an interview with the programme director and Industrial/Professional representatives. If as a result of this interview the Faculty/School recommends that the candidate be withdrawn, the Progression and Awards Board will require the candidate to withdraw from the programme with immediate effect.

Chartered Engineering status

On completion of the EngD, you will have accrued 170 credits at FEHQ level 7. This fact should be beneficial in counting towards the further learning (beyond an undergraduate degree) required by Professional Engineering bodies for award of *Chartered Engineer* status. The modules have been designed with reference to the Engineering Council's UK-SPEC for Chartership to ensure that the training programme provides maximum benefit to you in terms of continuing professional development.

2) **INFORMAL TRAINING**

There will also be a component of **informal training**; this will include for example, production of quarterly reports, quarterly theme review presentations and an annual report. Such tasks will provide you with ample opportunities to improve your written and presentation skills. There will also be a range of other informal learning opportunities, for example, health and safety and equipment training and University on-line Canvas training where required. All REs must aim to participate in a minimum of one outreach event per annum. Such opportunities are compulsory but not credit bearing.

RESEARCH PROJECT/THESIS

A key element of the EngD is a four-year doctoral level research project, which is initially proposed by the industrial company in consultation with the COATED M2A Project team.

You will typically have one Industrial Supervisor and two Academic Supervisors. Additionally, we have a range of life/career mentors to aid and encourage continuing professional development opportunities to offer advice, training support and encourage the development of student led forums and activities.

You will undertake the research under the guidance of the Industrial and Academic Supervisors. The research will culminate in the production of a thesis at the end of the four years, which is then examined, in accordance with University regulations; typically, by one external examiner and defended in a viva examination. In addition, as part of the viva examination, you will be required to give a presentation to an open/invited audience including the internal and external examiners.

During the research project, you will normally make three presentations a year and a poster or platform presentation on your work at the COATED M2A Annual Conference. Furthermore, you will be encouraged to present at an international conference, to partake in the University's '3 Minute Thesis' and 'Research as Art' competitions' and to submit three to four papers to peer-reviewed upper quartile journals.

APPENDIX 1

FHEQ Level 7 Module Descriptors

Modules to be taught during the 2024/25 academic year are listed alphabetically by module code.

READING LISTS

Reading lists, where supplementary information is required for the module, are available on the course Canvas page and are also accessible via <http://ifindreading.swan.ac.uk/>. We do not expect you to purchase textbooks.

EGGM00 Ethics in Engineering	
Credits: 10 Session: 2024/25 Academic Year	
Pre-requisite Modules:	
Co-requisite Modules:	
Lecturer(s): External Provider	
Format:	20 hours lectures 80 hours private and directed study
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.	
Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus	
Lectures, Case studies and Small working groups, based at Bay Campus.	
Module Aims: This course is designed to provide students with a background to the complex ethical and professional issues that are found in engineering. The focus will be on relevant situations that the engineer/scientist may encounter in their career.	
Module Content: General engineering codes of Ethics Specific ASME code of ethics Risk and risk management for engineers Ethics and Leadership Integrity in Management Research ethics Ethical theories applied Case studies of a relevant workplace to clinical scientists and engineers (eg) a) Challenger disaster b) Pinto	
Intended Learning Outcomes: The student should have: - a critical and nuanced understanding of the subtleties and broader contexts of ethical issues in engineering. (M5) - An ability to evaluate and apply an ethical principles approach to ethical decision making and professionalism (M5) - A critical awareness of business ethics in a variety of engineering contexts (M5) The student should have an ability to: - Understand and critically analyse soft regulation (ie non legal) within relevant areas of engineering practise and apply them to effect leadership decisions. (M2) - Think critically and independently, locating their career experiences within the context of modern society. (M16) - present ethically justifiable analyses of governance considerations in engineering. (M5)	
Assessment:	Presentation (20%) Assignment 1 (80%)
Assessment Description: 1 x 2000 word essay	
Moderation approach to main assessment: Moderation by sampling of the cohort	
Assessment Feedback: Written, individual feedback on individual essay	
Failure Redemption: Candidates shall be given one opportunity to redeem a failed training module. All failed training modules must be redeemed within the maximum period of candidature.	
Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.	
The College of Engineering has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment	
This module is only available to students following the COATED/ M2A EngD scheme.	

EGSM02 Interpersonal Skills for Engineers

Credits: 10 Session: 2024/25 Academic Year

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof JH Sullivan, Prof DJ Penney, Prof G Williams

Format: 25 hours lectures and presentations
75 hours private and directed study and preparation of deliverables
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Continuous assessment of oral presentations, visual aids and paper abstract and project plan. Full participation in all aspects of the programme are considered necessary to complete the course.

Module Aims:

The module will cover both presentation and written skills required for successful communication in engineering.

Presentations: Guidelines on making format presentations, considering attention span, visual aids, style, content and balance to ensure a memorable outcome.

Preparation for one-on-one discussions, approaches to ensure successful meetings.

Body Language: The influence of body language in communication both in formal presentations and in small group discussions. How to read body language in others, and modify your own body position to aid communication.

Written: Guidelines on report preparation, including planning, structure and use of figures and tables. Preparation of an abstract, covering length, key issues and style for maximum effectiveness.

Each candidate will prepare a detailed project plan covering background to the research, the scheduling of practical and other work, and milestone deliverables. This plan will be produced following: (i) attendance at specialist lectures covering issues of good practice in the conduct of research eg safety, procedures for laboratory work and data reporting/analysis; (ii) discussion with academic and industrial supervisors regarding technical/commercial issues associated with the specific topic; (iii) a review of the formal course units covering technical issues, personal and professional development and research skills. The overall report must demonstrate that each student relates relevant aspects of the training courses to their industry oriented research project.

Module Content: Written: Guidelines on report preparation, including planning, structure and use of figures and tables. Preparation of an abstract, covering length, key issues and style for maximum effectiveness.

Oral: Guidelines on making format presentations, considering attention span, visual aids, style, content and balance to ensure a memorable outcome. Preparation for one-on-one discussions, approaches to ensure successful meetings.

Body Language: The influence of body language in communication both in formal presentations and in small group discussions. How to read body language in others, and modify your own body position to aid communication.

Approach: The programme involves formal training with guidance notes supported by a video-tape package on 'Speaking', and direct participation. Discussions of individual performance are undertaken on a group basis with a strong element of interactive participation.

Information retrieval and synthesis

Setting goals and defining deliverables

Managing research progress

Delegation of tasks

Cost and resources implications

Gantt charts

Thesis planning and writing

Inserting and formatting references

As well as project planning, this module includes a short course aiming to:

Identify and define transferable skills

Provide a rationale for skills via both research evidence and stated employer/sector needs.

Provide the opportunity to identify and practise skills needed by engineers, including: communication skills, group-work and team-work skills, negotiation skills and problem-solving skills.

Offer a self-perception inventory to identify and develop future employability skills.

Overview of Personal Development aspect:

1. To raise awareness of:

(a) Individual strengths and weaknesses

(b) Personal impact on others

(c) Interpersonal effectiveness.

2. To further develop personal effectiveness in leading and working with others.

3. To build the participants into a cohesive, achievement-focused team.

Syllabus:

Self Awareness - The Identification of individual strengths and weaknesses.

Interpersonal Effectiveness - Asking for and receiving feedback on the personal impact made on others.

Response-ability - Becoming more response-able. How to change beliefs and behaviours that do not empower the individual and other people.

Positive Influencing Skills - How to assert yourself and negotiate effectively in everyday work situations.

Action-Centred Leadership - How to lead and inspire a team.

Effective Teamwork - How to work effectively with others to achieve mutually agreed goals. Understanding what makes teams effective and how teams develop.

Self-Management - How to identify what matters most to you, and organise your life/work accordingly. The importance of vision, roles, goals and proactive planning.

Approach:

The programme will be a 3-day residential course which will include a number of leadership and team challenges, both in, and outdoors, with an emphasis on learning by experience and reflection. The exercises will be mentally, rather than physically challenging.

Assessment:

Self-assessment and feedback from both colleagues and the programme facilitators will lead to the preparation of an "Action and Development Plan" at the end of the programme. With guidance from the programme facilitators, this will include the actions to be taken to improve personal effectiveness, and the further areas for development that have been identified. The "Action and Development Plan" will be discussed after the course by the participants and their

mentors, to help the participants develop even further.

Intended Learning Outcomes: Competence Statements: After completing this module you should be able to demonstrate self-direction in solving problems, to act independently and professionally in planning tasks and presenting work, to develop your professional presenting skills and to be able to think quickly in unpredictable situations. In addition, you will have gained additional skill in presentation of technical work to a multidisciplinary audience. (M16 and M17)

Students will develop skills to plan a continually monitor a research project and be able to rapidly develop mitigation strategies to ensure projects are delivered enabling their personal responsibility to deliver projects (M16)

After completing this module you should be able to demonstrate:

The ability to plan a research project

A knowledge of and ability to use research information sources

An ability to plan and produce Gantt charts for project planning and time management

An understanding of skills required for team working, negotiation and problem solving

The ability to develop realistic plans with measurable goals to solve challenging, multidisciplinary engineering problems.

The necessary skills to write a scientific report containing appropriately formatted references. (M2 and M4)

Assessment: Presentation (50%)
Assignment 1 (50%)
Group Work - Practical (0%)

Assessment Description: Oral presentations

-prepared presentation on technical topic

-presentation on un-seen topic

Abstract Writing

Project Plan

Personal Development - team building

Moderation approach to main assessment: Moderation of the entire cohort as Check or Audit

Assessment Feedback: Feedback will be provided on written reports and immediately following verbal presentations

Failure Redemption: Candidates shall be given one opportunity to redeem a failed training module. All failed training modules must be redeemed within the maximum period of candidature.

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Failure to sit an examination or submit work by the specified date will result in a mark of 0% being recorded.

Practical work: Practical presentations to an audience on a variety of topics.

Full course notes are provided.

This module is only available to students following the COATED/M2A EngD / MSc by Research schemes.

EGSM03 Literature Review of Industrial Problem	
Credits: 30 Session: 2024/25 Academic Year	
Pre-requisite Modules:	
Co-requisite Modules:	
Lecturer(s): Prof JH Sullivan	
Format:	Meetings with supervisors
Delivery Method: Bi-weekly briefings on the progress of the review work. An initial lecture will introduce topics including English for academic purposes, searching for literature, relevant sources, writing journal style papers, referencing and presenting. These will be backed up by one-on-one meetings with a supervisor who will provide guidance and feedback on an ongoing basis. The project itself will be associated with the Research Centres within the College of Engineering	
Module Aims: The module involves the collation, refinement and critique of existing literature surrounding particular problem associated with the research topic elected by the student. The student will gain experience in working independently on a substantial, individually assigned task, using accepted literature review procedures. It will require and develop self-organisation and the critical evaluation of existing literature with a view to producing a comprehensive review of the current knowledge on the prescribed topic. Assessment of the literature review will be in the form of a 25 page review paper and a 30 min oral viva examination.	
Module Content: - The nature of the research project varies from one student to another. The allotted project will involve survey of literature. The literature review will be on students doctorate topic. - Each student will be provided with an individual supervisor. It is recommended that students meet their supervisors at least once a fortnight to discuss progress. - Briefings on literature reviewing, report preparation and presentation skills will be given. - A final report in the form of a Journal article (25 pages max) will be submitted for review before the end of May and final, "camera ready copy", taking account of reviewer's comments, must be submitted by the end of July - Each student will attend an individual 30 minute viva voce examination at the end of the project period with 2 members of academic staff. A suitable presentation (10 minutes) should be prepared.	
Intended Learning Outcomes: After completing this module you should be able to - formulate and plan an industrial related research project specifying the aims, objectives and realistic targets; (M5) - propose and monitor the various activities associated with the project; (M16) - identify and critically analyse a range of literature and information sources related to your research project (M4) - Develop a systematic knowledge of your research discipline through collation and discussion of the latest literature related to the Doctorate project (M1) - formulate and compose a journal article summarising your knowledge of the discipline through critical analysis of current literature. (M1) - compose an oral presentation (plus PowerPoint) on the findings of the review and defend it against critical appraisal; (M17)	
Assessment:	Written report - Individual (75%) Viva (25%)
Assessment Description: 25 page journal style review paper of current literature associated with research project	
Moderation approach to main assessment: Moderation by sampling of the cohort	
Assessment Feedback: Feedback will come from formative marking of the 25 page literature review and a feedback sheet regarding the viva.	
Failure Redemption: The students will be able to re-submit the report before the end of August of year one of their studies for re-evaluation	
Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.	
Only available to students completing the Engineering Doctorate Programmes with COATED/ the Materials and Manufacturing Academy. The students will submit a maximum of 25 pages in size 12 font. In addition, attendance at a viva examination at which the review results will be presented and the students knowledge will be assessed is a compulsory part of the assessment. The College of Engineering has a ZERO TOLERANCE penalty policy for late submission of coursework and continuous assessment.	

EGSM08 Economic Appraisal of Engineering Projects

Credits: 10 Session: 2024/25 Academic Year

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr M Evans

Format: Interactive seminar style lectures and practical laboratory computing.
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Formal lectures followed by an exercise to be carried out during the teaching week on Excel. This exercise relates to a hypothetical investment in plastic coating equipment for sheet steel manufacture.

Module Aims: Introduction to the financial appraisal of engineering projects including financial accounting, models of investment appraisal, risk and risk management, and capacity optimisation in the face of uncertainty. Coping with such uncertainty requires a basic understanding of techno - economic forecasting techniques.

Module Content: Introduction: Engineering projects defined, the importance of time emphasised and the reasons for investments in steel manufacturing outlined.

Accounting: Production costs, revenue, depreciation, tax laws and cash flows.

Techno - economic forecasting: Forecasting uncertain demand and other key economic variables using growth models, grey systems and intensity of use techniques.

Models of Investment Appraisal: Compounding, discounting, time value of money, payback, net present value, internal rate of return.

Risk and Risk Management: Types of risk, risk management options, risk assessment, sensitivity analysis, probabilistic risk assessment.

Capacity optimisation in the face of uncertainty: Genetic algorithms, RISKOptimiser.

Intended Learning Outcomes: Competence statements: After completing this module you should be able to systematically use the complex techniques to appraise investment projects in the engineering sector. Emphasis is placed on the risks associated with such projects and methods of coping with such risks. You will develop your assessment individually and develop an independent solution to complex investment problems using computer based assignments. (M2 and M3)

Specialist knowledge and understanding: The module will help you to build a thorough understanding of the conceptual basis on which the practice of corporate investment analysis is built, establishing the user need, assessing and forecasting the market and developing an implementation plan. (M1)

Solution of engineering problems: The module will give you the skills to incorporate the latest computer orientated tools for making informed financial decisions within an economic environment of great uncertainty and risk allowing you to make recommendations for investment strategy. (M5)

Technical and commercial leadership: The module will allow you to satisfy the very practical need that Engineers will be called upon to make informed financial decisions when acting as team members/managers of engineering projects. You will also gain an appreciation of the important relationships between customers and suppliers that help in making the correct business decision. (M16)

Assessment: Other (100%)

Assessment Description: Computer based assignment. Students will build an Excel model to assess the likely profitability and degrees of risk resulting from investing in a new coating line to produce organically coated sheet steel. All stated AHEP learning outcomes will be assessed using this assignment.

Moderation approach to main assessment: Moderation of the entire cohort as Check or Audit

Assessment Feedback: Students will receive feedback on their coursework, together with detail comments on omissions and errors made, within three weeks of submission

Failure Redemption: Students will be offered the opportunity to resist the coursework in the next year of their degree programme.

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

Failure to sit an examination or submit work by the specified date will result in a mark of 0% being recorded.

The course requires familiarity with the spreadsheet - EXCEL and the add-in @Risk. Students are advised to learn this package and the add-in before attending. Each Engineer will be provided with lecture handouts.

This module is only available to students following the COATED/M2A EngD/MSc by Research schemes.

EGSM10 Entrepreneurship for Research Engineers

Credits: 10 Session: 2024/25 Academic Year

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof I Mabbett

Format: Day 1 - 7 Hrs
Day 2 - 7 Hrs
Day 3 - 6 Hrs
Open Tutorials - 3 Hrs
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Interactive workshops run over 3 consecutive days with guest speakers, discussion and practical application throughout the workshops.

Module Aims: To show the concepts and characteristics behind Enterprise and Entrepreneurs and to demonstrate the skills allowing an individual or group to operate successfully in an Entrepreneurial manner in a personal start-up or corporate business environment.

Module Content: Part 1 - What is Entrepreneurship and do you think you have what it takes to be an Entrepreneur?
Module aims, objectives, structure and assignments
Entrepreneurship and Enterprise definitions, benefits and value, Social entrepreneurship, Corporate entrepreneurship and Engineers as Entrepreneurs - discussion
Conduct and review "Enterprise Catalyst" - exercise
Are you an Entrepreneur? - discussion
Examples of Entrepreneurs - discussion
Can you become an entrepreneur – nature/nurture!!! - discussion

Part 2 – Starting Up & Some Inspiration!
Case study – The Big Ideas Role Models
Feedback and thoughts on case studies
Setting up a business in the UK

Part 3 – Creating Ideas and Getting it Across
Idea generation techniques
Networking
Pitching

Part 4 – People you need to make your Ideas work (Personal & Professional Development)
Structure of a business
Management styles
Leadership styles
Teams
Skills sets

Part 5 – Pitching your Ideas - Team Selection
Pitching of Ideas for group assignment and Networking Session to generate teams for group assignment

Part 6 – Planning your Ideas (Business Planning)
The Lean Canvas
The Value Proposition Canvas
Practice

Part 7 - Funding your Ideas
Outline of finance routes

Part 8 – Protecting your ideas and selling your Ideas
Intellectual Property
PR, Marketing & Sales

Intended Learning Outcomes: A detailed understanding of the concepts of Enterprise and Entrepreneurship and a critical analysis of the qualities typically associated with an Entrepreneur. (M1)

Formulate and modify ideas for business/product creation using various individual and group techniques. (M5)

Develop a greater understanding and maximise application of your own personal and professional skills (including leadership, communication, pitching and networking.) (M16 and M17)

Create and develop a team within an Entrepreneurial environment. (M16)

Have a conceptual understanding of the legalities, mechanisms of raising finance and the business knowledge (including sustainability and business plan development) of starting a business. (M5)

Be inspired to utilise all of the above to be Entrepreneurial in any environment.

Assessment: Other (100%)

Assessment Description: Submission of Business Model 'lean canvas' and 500 word reflection.

Moderation approach to main assessment: Moderation of the entire cohort as Check or Audit

Assessment Feedback: Group discussions during module at the end of each day and at open tutorials.

Failure Redemption: Candidates shall be given one opportunity to redeem a failed training module. All failed training modules must be redeemed within the maximum period of candidature.

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.

This module is only available to students following the COATED/M2A EngD scheme.

EGSM11 Public Engagement and Science Communication
Credits: 10 Session: 2024/25 Academic Year
Pre-requisite Modules:
Co-requisite Modules:
Lecturer(s): Prof RE Johnston and External Provider
Format: Contact Hours will be delivered through a blend of live activities during an off-campus session.
Delivery Method: The module will be delivered in-person and off-campus.
There is no associated assessment for this module. Attendance and engagement is compulsory.
Module Aims: Group workshops, group discussion, and case studies will be used to give students an enhanced understanding of public engagement and science communication, and how they can develop content. It will highlight the importance of communicating science to publics. Using examples of science communication from different outlets and aimed at different audiences. The module will consider science communication from a researcher's point of view, and also journalism/press/media and how to work with science news outlets, consideration of funders and how to develop a public engagement initiative, and also from the perspective of the audience. Students will also learn about outreach and public engagement, linked to the Materials Live programme at Swansea University, and from a science engagement expert. This will be delivered off-campus to facilitate immersion in the topic, and remove the researchers temptation to delve into their every day work during the breaks. Group sessions will focus on developing and delivering talks, demonstrations, audience considerations, reach/engagement.
Module Content: What is science communication – and why is it important? Different audiences and methods of reaching them. Accessible academic communication for varied audiences. A researcher's web visibility and accessibility Current engagement structures and activities available to students – STEMNET, Materials Live, Swansea Science Festival, Research as Art.
Intended Learning Outcomes: On completion of the module the student will demonstrate: <ul style="list-style-type: none"> • A comprehensive understanding of the importance of communicating science and engaging publics to address societal, academic and economic needs (M5) • Increased knowledge and application of the different methods that can be used to communicate their science and engineering (M4 and M17) • Initiative and personal responsibility to create Science communication and outreach outputs aligned with their research that can be published as an individual or in group work (M16) • Greater confidence in developing and delivering content to publics, including schoolchildren – to inform and inspire the next generation of scientists and engineers. (M17)
Assessment: Attendance (100%)
Assessment Description: Attendance at the training session.
Moderation approach to main assessment: Universal Non-Blind Double Marking of the whole cohort
Assessment Feedback: During the training and the activities and discussions, students will receive live feedback.
Failure Redemption: N/A
Additional Notes: Delivery of both teaching will include live delivery, class discussion, group discussion. Provide engineering students with an appreciation of science communication and the media, and the skills to develop, devise, and contribute their own outputs and activities for public engagement and outreach. This module is only available to students following the COATED/M2A EngD scheme.

EGSM34 Leadership and Complexity Management (EngD)

Credits: 10 Session: 2024/25 Academic Year

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): External Provider

Format: 21 hrs workshops

Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

Workshops

Module Aims: One of the key skills identified by employers in all sectors and for life in general is the ability to work in a team and to be able to lead! Additionally, there are a number of other skills and traits required or to at least be aware of, to be most effective in these capacities.

This module is designed to utilise contemporary psychology theories to develop individual and group awareness of personal attributes and group characteristics salient to leadership and effective membership of a team.

This is then applied directly using self and group reflection, discussion and debate and exercises to establish team roles and “hammer together” pre-defined teams. This will allow them to move closer to being an “effective team” and ultimately increase success throughout the program.

Effective communication will be promoted throughout the module, in terms of leadership and team work alongside engagement with internal and external stakeholders, to include such areas as sales, marketing and personal branding.

Successful delivery of engineering business outcomes in a developing or high risk environment requires a detailed understanding of the broader complexities involved. This will include risk analysis and preparation, and an understanding of how your project impacts local stakeholders, in particular cultural issues, local politics and vested interests.

This module will explore these complexities and develop strategies to enable successful delivery by seeking to address the potential risk during the programme’s inception as opposed to reacting to unforeseen circumstances during operations.

The module will equip participants with the skills and methodology to deliver programmes in environments that would normally be the preserve of the UN, DFID, specific NGOs or the Military.

<p>Module Content: Leadership styles and what makes a good leader - practical exercises, personal reflection and discussion throughout</p> <p>Team roles and what makes an effective team - practical exercises, personal, team reflection and discussion throughout</p> <p>Practical leadership and team development - practical exercises</p> <p>The importance of effective communication - case studies, practical exercises, personal and team reflection throughout</p> <p>Strategic risk analysis</p> <p>Identification of source information</p> <p>Contingency planning</p> <p>Working with or in the same environment as the UN, WHO, FCO, DfID and NGOs • Case studies (failure and success)</p> <p>Development and evaluation of an end to end planning regime</p> <p>Develop and apply a Duty of Care integrated risk management strategy.</p>
<p>Intended Learning Outcomes: By the end of this module Students should be able to:</p> <ol style="list-style-type: none"> 1) Critically evaluate personal and team member attributes and strengths in the key areas of leadership, team development, communication, entrepreneurial and innovative thinking and problem solving. (M16) 2) Develop, lead and function as part of a professional and effective team, exercising initiative and personal responsibility. (M16) 3) Analyse and demonstrate effective communication and its critical nature in regard to both leadership and functioning within a team. (M17) 4) Define and evaluate the different roles within an engineering organisation and teams, in regard to personal attributes and technical competence. (M16) 5) Conduct a stakeholder analysis and full risk assessment for the deployment in the project environment, from geopolitical through to technical application. (M5) 6) Evaluate, monitor and maintain full situational awareness in a dynamic environment, making appropriately informed decisions, implementing a Duty of Care Integrated risk management strategy and identifying key human factors increasing risk. (M2)
<p>Assessment: Coursework 1 (100%)</p>
<p>Assessment Description: CW1 - Case Study Analysis (1000 words) and presentation (10-15 mins).</p>
<p>Moderation approach to main assessment: Moderation by sampling of the cohort</p>
<p>Assessment Feedback: Constructive feedback will also be provided during tutorials.</p> <p>Detailed feedback will be provided with the mark of the final report and presentation.</p>
<p>Failure Redemption: Individual report re-submission following feedback (equivalent to 1000 words). Submission will be at the first assessment point available, following marking and feedback.</p>
<p>Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.</p>
<p>This module is not available to Visiting - Exchange students.</p>