Swansea University
Prifysgol Abertawe

FACULTY OF SCIENCE AND ENGINEERING

POSTGRADUATE RESEARCH DEGREE STUDENT HANDBOOK

FHEQ LEVEL 8

EngD in MATERIALS, MODELLING AND MANFACTURING

SUBJECT SPECIFIC
PART TWO OF TWO
MODULE AND COURSE STRUCTURE
2025-26

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ACADEMIC YEAR 2025-2026

Full semester and term dates are available here.

ACADEMIC INTEGRITY

Swansea University and the Faculty of Science of Engineering takes any form of **academic misconduct** very seriously. 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.

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CONTACTS

The EngD in Materials, Modelling and Manufacturing programme is encompassed within the School of Engineering and Applied Sciences.

School of Engineering and Applied Sciences	
Head of School	Professor Serena Margadonna
School Education Lead	Dr Matthew Barrow
Head of Materials Science and Engineering	Professor Trystan Watson
EngD Programme Director	Professor James Sullivan

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

Key Programme Staff

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COATED M2A OFFICE

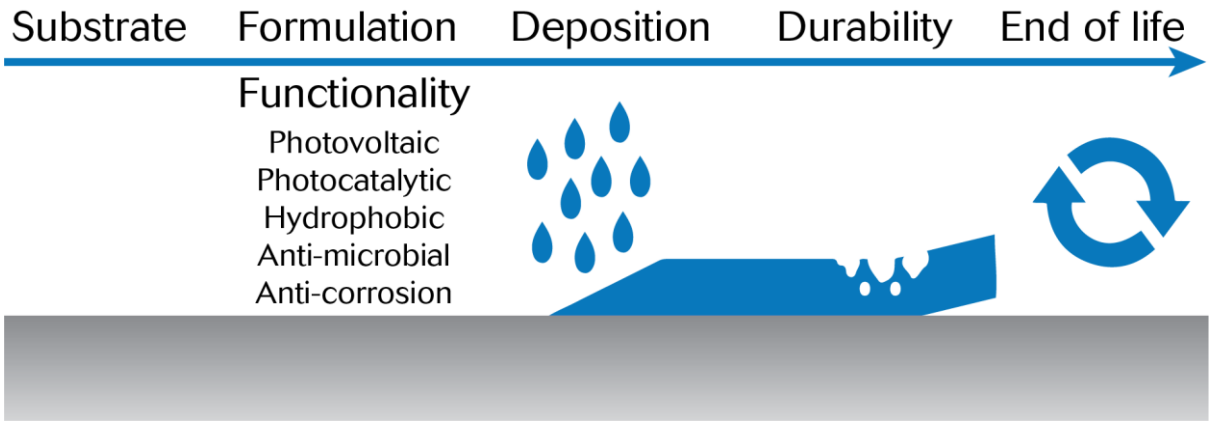
For COATED M2A specific enquiries please email m2a@swansea.ac.uk. The COATED M2A Project Team are based in Room A201a, Engineering East, with exception of the Programme Directors. The team can help with printing posters for conferences, theme review and project related issues as well as being the contact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

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 primary objective of the CDT is to provide Research Engineers with advanced technical and research expertise in functional industrial coatings, while simultaneously developing their professional competencies to prepare them for leadership roles in both industry and academia.

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 cover everything from substrate and coating formulations though 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 of both formal and 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 are aligned with current industrial needs, EPSRC priorities, and guidance from the Steering Committee. Although the EngD is a research degree the training component is formally assessed and credited. Research Engineers must complete 170 credits of training, passing each component with a mark of over 50%. Assessment is a mixture of formal exams, 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 2025/26.

Functional Coatings Technical Modules	Professional Skills Modules
EGTM38 *[A] Elements of Materials Selection*[A]	EGGM00 [A] Ethics in Engineering
EGSM03 [A] Literature Review of Industrial Problem (30 credits)	EGSM02 [A] 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 [A] 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 - non-credit bearing and optional for Materials Engineering graduates.

** Responsible Research and Innovation - non-credit bearing, but compulsory for all.

[A] Modules not running during the 2025/26 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 & 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 & 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. Modules 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 will 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

The **informal training** component will include activities such as producing quarterly reports, delivering quarterly theme review presentations, and preparing an annual report. These tasks are designed to help you develop and refine your written and presentation skills. Additional informal learning opportunities may involve equipment training and completing relevant online modules through the University's Canvas platform. All Research Engineers are expected to participate in at least one outreach event each year. While these opportunities are compulsory, they do not carry academic credit.

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 conduct your research under the supervision of both Industrial and Academic Supervisors. At the end of the four-year programme, you will produce a thesis that will be examined according to University regulations, typically by one external examiner, and defended in a viva examination. As part of the viva, you will present your research to an open audience, including the internal and external examiners.

Throughout the research project, you are expected to deliver three presentations each year and present a poster or platform talk at the COATED M2A Annual Conference. You will also be encouraged to present at an international conference, participate in the University's '3 Minute Thesis' and 'Research as Art' competitions, and submit three to four papers to peer-reviewed upper quartile journals.

APPENDIX 1 – FHEQ Level 7 Module Descriptors

Modules being taught during the 2025/26 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.

EGSM08 Economic Appraisal of Engineering Projects

Credits: 10 Session: 2025/26 Academic Year

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr DJ Warren

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.

EGSM11 Public Engagement and Science Communication

Credits: 10 Session: 2025/26 Academic Year

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof RE Johnston

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 everyday 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:

• 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: Not applicable

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: 2025/26 Academic Year

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof JH Sullivan

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. 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 psychological and behavioural 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 teamwork 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.

Module Content: Leadership styles and what makes a good leader - practical exercises, personal reflection and discussion throughout

Team roles and what makes an effective team - practical exercises, personal, team reflection and discussion throughout

Practical leadership and team development - practical exercises

The importance of effective communication - case studies, practical exercises, personal and team reflection throughout

Strategic risk analysis

Identification of source information

Contingency planning

Development and evaluation of an end to end planning regime

Develop and apply a Duty of Care integrated risk management strategy.

Intended Learning Outcomes: By the end of this module Students should be able to:

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)

Assessment: Coursework 1 (40%)
Presentation (60%)

Assessment Description: CW1 - Case Study Analysis (1000 words) and presentation (10-15 mins).
Pass mark is 50%.

Moderation approach to main assessment: Moderation by sampling of the cohort

Assessment Feedback: Detailed and constructive feedback will be provided with the mark of the final report case study and presentation.

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.

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.