Swansea University
Prifysgol Abertawe

FACULTY OF SCIENCE AND ENGINEERING

UNDERGRADUATE STUDENT HANDBOOK

YEAR 2 (FHEQ LEVEL 5)

GENERAL ENGINEERING

DEGREE PROGRAMMES

SUBJECT SPECIFIC
PART TWO OF TWO
MODULE AND COURSE STRUCTURE
2023-24

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.

The 23-24 academic year begins on 25 September 2023

Full term dates can be found here

DATES OF 23-24 TERMS

25 September 2023 – 15 December 2023

8 January 2024 – 22 March 2024

15 April 2024 – 07 June 2024

SEMESTER 1

25 September 2023 – 29 January 2024

SEMESTER 2

29 January 2024 – 07 June 2024

SUMMER

10 June 2024 – 20 September 2024

IMPORTANT

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.

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, administrators - 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 Faculty Operations	Mrs Ruth Bunting
Associate Dean – Student Learning and Experience (SLE)	Professor Laura Roberts
School of Aerospace, Civil, Electrical, General and Mechanical Engineering	
Head of School	Professor Antonio Gil
School Education Lead	Professor Cris Arnold
Head of Electronic and Electrical Engineering	Professor Vincent Teng
BEng General Engineering Programme Director	Dr Michael Clee

STUDENT SUPPORT

The Faculty of Science and Engineering has two **Reception** areas - Engineering Central (Bay Campus) and Wallace 223c (Singleton Park Campus).

Standard Reception opening hours are Monday-Friday 8.30am-4pm.

The **Student Support Team** provides dedicated and professional support to all students in the Faculty of Science and Engineering. Should you require assistance, have any questions, be unsure what to do or are experiencing difficulties with your studies or in your personal life, our team can offer direct help and advice, plus signpost you to further sources of support within the University. There are lots of ways to get information and contact the team:

Email: studentsupport-scienceengineering@swansea.ac.uk (Monday–Friday, 9am–5pm)

Call: +44 (0) 1792 295514 (Monday-Friday, 10am–12pm, 2–4pm).

Zoom: By appointment. Students can email, and if appropriate we will share a link to our Zoom calendar for students to select a date/time to meet.

The current student **webpages** also contain useful information and links to other resources:

https://myuni.swansea.ac.uk/fse/

READING LISTS

Reading lists for each module are available on the course Canvas page and are also accessible via http://ifindreading.swan.ac.uk/. We've removed reading lists from the 23-24 handbooks to ensure that you have access to the most up-to-date versions.
We do not expect you to purchase textbooks, unless it is a specified key text for the course.

THE DIFFERENCE BETWEEN COMPULSORY AND CORE MODULES

Compulsory modules must be **pursued** by a student.

Core modules must not only be **pursued**, but also **passed** before a student can proceed to the next level of study or qualify for an award. Failures in core modules must be redeemed.

Further information can be found under "Modular Terminology" on the following link - https://myuni.swansea.ac.uk/academic-life/academic-regulations/taught-guidance/essential-info-taught-students/your-programme-explained/

Year 2 (FHEQ Level 5) 2023/24
Engineering
BEng General Engineering[H500,H901]
BEng General Engineering with a Year Abroad[H501]

Compulsory Modules

Semester 1 Modules	Semester 2 Modules
EG-219 **Statistical Methods in Engineering** **10 Credits** **Miss CM Barnes/Prof L Li/Prof P Rees/Dr Y Xuan** **CORE**	**EG-2001** **Sustainable Integrated Engineering Design II** **20 Credits** **Mr R Rees/Mr D Butcher/Dr C Li** **CORE**
EG-236 **Design for Medical Engineering** **10 Credits** **Dr PJ Dorrington/Dr F Zhao** **CORE**	**EG-243** **Control Systems** **10 Credits** **Dr A Egwebe** **CORE**
EG-241 **Electrical Machines** **10 Credits** **Dr A Egwebe** **CORE**	**EG-260** **Dynamics 1 (Mech & Aero)** **10 Credits** **Prof H Haddad Khodaparast** **CORE**
EG-264A **Solidworks** **5 Credits** **Mr R Rees/Dr L Evans** **CORE**	**EG-262** **Stress Analysis 1** **10 Credits** **Dr L Prakash** **CORE**
EGA222 **Electrical Machines Laboratory** **5 Credits** **Dr A Egwebe** **CORE**	**EG-284** **Manufacturing Technology II** **10 Credits** **Prof TC Claypole** **CORE**
EG-277 **Research Project Preparation** **0 Credits** **Dr AC Tappenden/Dr M Fazeli/Mrs KM Thomas**	
Total 120 Credits	

Optional Modules

Choose exactly 20 credits
Manufacturing stream

EG-244	Software Engineering	Dr JW Jones	TB1	10 (CORE)
EG-269	Design of Machine Elements	Dr CA Griffiths	TB1	10 (CORE)

Or

Choose exactly 20 credits
Management Stream

EG-278	Systems Engineering Management	Dr MJ Clee	TB1	5 (CORE)
MN-2009	Change Management	Dr SM Burvill/Mr AH Price	TB1	15 (CORE)

Year 2 (FHEQ Level 5) 2023/24
Engineering
BEng General Engineering with a Year in Industry[H502]

Compulsory Modules

Semester 1 Modules	Semester 2 Modules
EG-219 **Statistical Methods in Engineering** **10 Credits** **Miss CM Barnes/Prof L Li/Prof P Rees/Dr Y Xuan** **CORE**	**EG-2001** **Sustainable Integrated Engineering Design II** **20 Credits** **Mr R Rees/Mr D Butcher/Dr C Li** **CORE**
EG-236 **Design for Medical Engineering** **10 Credits** **Dr PJ Dorrington/Dr F Zhao** **CORE**	**EG-243** **Control Systems** **10 Credits** **Dr A Egwebe** **CORE**
EG-241 **Electrical Machines** **10 Credits** **Dr A Egwebe** **CORE**	**EG-260** **Dynamics 1 (Mech & Aero)** **10 Credits** **Prof H Haddad Khodaparast** **CORE**
EG-264A **Solidworks** **5 Credits** **Mr R Rees/Dr L Evans** **CORE**	**EG-262** **Stress Analysis 1** **10 Credits** **Dr L Prakash** **CORE**
EGA222 **Electrical Machines Laboratory** **5 Credits** **Dr A Egwebe** **CORE**	**EG-284** **Manufacturing Technology II** **10 Credits** **Prof TC Claypole** **CORE**
EG-233 **Placement Preparation: Engineering Industrial Year** **0 Credits** **Prof GTM Bunting/Dr SA Rolland/Dr V Samaras** **CORE**	
EG-277 **Research Project Preparation** **0 Credits** **Dr AC Tappenden/Dr M Fazeli/Mrs KM Thomas**	
Total 120 Credits	

Optional Modules

Choose exactly 20 credits
Manufacturing stream

EG-244	Software Engineering	Dr JW Jones	TB1	10 (CORE)
EG-269	Design of Machine Elements	Dr CA Griffiths	TB1	10 (CORE)

Or

Choose exactly 20 credits
Management Stream

EG-278	Systems Engineering Management	Dr MJ Clee	TB1	5 (CORE)
MN-2009	Change Management	Dr SM Burvill/Mr AH Price	TB1	15 (CORE)

EG-2001 Sustainable Integrated Engineering Design II

Credits: 20 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Mr R Rees, Mr D Butcher, Dr C Li

Format: In person

Delivery Method: Workshops

Module Aims: Responsible design principles emphasize the importance of considering the impact of engineering solutions on society, the environment, and the economy. In this module, students will learn to apply these principles to their mechatronic system design, taking into account the ethical, social, and environmental impacts of their solutions. The module will also address issues related to sustainability, including the efficient use of resources, energy efficiency, and the disposal of waste.

Module Content: Design Thinking Processes
Systems Engineering
Architecture Mapping
Control Systems
Microcontroller Systems

Intended Learning Outcomes: By the end of this module, students will be able to:

Develop a mechatronic system design to meet a specified set of requirements
Apply engineering principles and techniques to design, build, and test a working mechatronic system
Use project management techniques to plan, organize and execute a group design project
Work effectively as part of a team, communicating ideas and solutions clearly and effectively
Analyze and evaluate the performance of a mechatronic system and make recommendations for improvements

AHEP4 LOs to be added

Assessment:	Group Work - Presentation (25%)
	Report (5%)
	Group Work - Practical (10%)
	Report - Group (20%)
	Report 2 (40%)
Resit Assessment:	Report (100%)

Assessment Description: Assessment Description:

The module will be assessed through a combination of coursework and a final project report and presentation. The coursework will consist of a series of design exercises and project management tasks, which will be completed in groups and will contribute to the final project report. The final project report will document the design process, including system specifications, design calculations, simulations, and experimental results. The final project presentation will allow groups to demonstrate the functionality and performance of their mechatronic system to the class and a panel of examiners.

The final mark for the module will be based on:

Group presentation: 25%
Report: 5%
Group practical: 10%
Group report: 20%
Individual report: 40%

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

Assessment Feedback: Verbal and written feedback

Failure Redemption: Supplementary Assignment in summer

Additional Notes: .

EG-219 Statistical Methods in Engineering

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Miss CM Barnes, Prof L Li, Prof P Rees, Dr Y Xuan

Format:
Lectures: 18 hours
Computer-based example classes: 16 hours
Directed private study 40 hours
Preparation for assessment 35 hours
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

Series of lectures and computer practicals (face-to-face and online options available).

Module Aims: This module offers a balanced, streamlined one-semester introduction to Engineering Statistics that emphasizes the statistical tools most needed by practicing engineers. Using real engineering problems students see how statistics fits within the methods of engineering problem solving and learn how to apply statistical methodologies to their field of study. The module teaches students how to think like an engineer when analysing real data.

Mini projects, tailored to each engineering discipline, are intended to simulate problems that students will encounter professionally during their future careers. Emphasis is placed on the use of statistical software for tackling engineering problems that require the use of statistics.

Module Content:

Unit 1: Data Displays

• Lecture 1: Robust Data Displays. Engineering Method and Statistical Thinking (Variability); The Median; The Inter Quartile Range; Stem-and-Leaf displays; Boxplots.
• Lecture 2: Traditional Data Displays. The Mean; The Standard Deviation; Histograms; Chebyshev's Rule.

Unit 2: Modelling Random Behaviour

• Lecture 3: Probability. Rules of Probability; Independence; Total Probability; Bayes Rule; Reliability.
• Lecture 4: Discrete Random Variables. The Binomial Distribution; The Poisson Distribution; The Hyper geometric Distribution; Modelling Failure.
• Lecture 5: Continuous Random Variables. The Normal Distribution, The Exponential and Weibull Distributions; MLE; Sampling Distributions & The Central Limit Theorem.

Unit 3: Estimation and Testing

• Lecture 6: Non - Parametric Hypothesis Testing. The Null and Alternative Hypothesis; Significance Levels, The Sign Test; The Tukey Test.
• Lecture 7: Parametric Hypothesis Testing. Inference for a Single Mean; Inference for Two Independent Samples; Inference or Variances.

Unit 4: Model Building and Regression Analysis

• Lecture 8-9: Correlation & Simple Regression Analysis. The Correlation Coefficient, Simple Linear Regression, Non Linear Regression through Data transformations.
• Lecture 10-12: Multiple Regression and Diagnostics. Multiple Linear Regression, R2, Statistical Significance of Model Parameters; Residual Analysis.

Practical classes will complement each of the above lectures, where directed study will be provided to highlight how the techniques learnt in each lecture can be applied to typical engineering problems for each discipline.

Intended Learning Outcomes:

Technical Outcomes

Upon completion of this module the student should be able to:
- Appreciate the use and applicability of statistical analysis in engineering.
- Use statistical software to compute and visualise statistical functions.
- Build probabilistic models.
- Apply common statistic methodologies to their field of study.
- Apply statistical thinking and structured problem solving capabilities.
- Think about, understand and deal with variability.

Accreditation Outcomes (AHEP)
- Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems (SM2b/SM2p)
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline (SM3b/SM3p)
- Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action (EA3p)
- Ability to extract and evaluate pertinent data and to apply engineering analysis techniques in the solution of unfamiliar problems (EA6m)

Assessment:	Project (50%) Examination (50%)

Assessment Description: Discipline Specific Mini Project (contributes 50% to module grade). Students will work on a mini project, related to their field of discipline, to perform statistical analysis and interpretation of a real-world data set using Matlab. The students will present their findings by submitting a written report.

Exam - (closed book and face-to-face, contributes 50% to module grade). Students will tackle a series statistical questions covering all topics.

Students need to achieve at least 40% in both components in order to pass the module.

If you do not meet the component level requirements for the module (i.e. achieving 40% in both components) you will receive a QF outcome. This means that you will be required to repeat the failed component(s), even if your module mark is above 40%.

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

Assessment Feedback: Students will receive their grades, together with models answers, within 3 weeks of submission.

Failure Redemption: Students will be required to redeem the component that they fail during the August supplementary period. Failure of both the project and examination will result in resitting both components.

Reading List: Hayter, Anthony J, Probability and statistics for engineers and scientists / Anthony Hayter., Brooks/Cole, Cengage Learning, 2012.ISBN: 1133112145
Ross, Sheldon M, Introduction to Probability and Statistics for Engineers and Scientists, Academic Press, 2020.ISBN: 0128243465
Ross, Sheldon M, Introduction to probability and statistics for engineers and scientists / Sheldon M. Ross., Academic Press, 2004.ISBN: 0125980574

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

PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION

Attendance at computer classes is compulsory.
The module is only for students within the the Faculty of Science and Engineering.
The module is unavailable to visiting/exchange students.
Notes, worked examples, assignments and mini projects can be found on Canvas.

Students need to achieve at least 40% in both components.

EG-233 Placement Preparation: Engineering Industrial Year

Credits: 0 Session: 2023/24 September-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof GTM Bunting, Dr SA Rolland, Dr V Samaras

Format: 11 hours consisting of a mix of seminars and workshops. 11 one hour drop-in advice sessions. Review of CV and cover letter.
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

This module is delivered through directed and self-directed learning, careers resources, interactive workshops, reflective learning practice and drop-in advice sessions. The module is delivered on the Bay Campus.

Module Aims: This generic cross-disciplinary module is for all students who have enrolled (or transferred) onto the Engineering Year in Industry scheme. The module focuses on the underpinning and fundamental requisites required to gain, enter and progress effectively through an industrial placement. Learners will be introduced to a) sourcing placements, CV writing and application techniques; (b) interview techniques - how to pitch yourself and be successful; (c) workplace fundamentals and IP awareness, behaviours and expectations; (d) key employability skills; getting the most from your Industrial Placement; and (e) health and safety in the workplace.

Module Content:
The module will focus on the key requirements to gain and be successful whilst on a placement. Directed and self-directed activity will address the following topics;

1) Engineering Industrial Placements - what they are, how to search and how to apply.
2) CV writing, cover letters and application processes.
3) Assessment centres, interview techniques and mock interviews.
4) Recognising and developing employability skills.
5) Reflecting and maximising the placement experience.
6) One to one meeting with careers and employability staff.
7) Health and safety in the workplace.

Intended Learning Outcomes:
Technical Outcomes
By the end of this module, students will:
- Know how to find and apply for placements, create a CV and complete a placement application.
- Understand the interview process and gain interview experience.
- Discuss and share what is expected within the workplace including behavioural and professional conduct.
- Identify personal employability skills and how these will be used in a workplace setting.

Accreditation Outcomes (AHEP)
EL5b Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues
EL6b Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk,

Assessment: Placements (100%)

Assessment Description:
Students are required to attend the health and safety lecture. Students who do not attend and have no valid reason will not be permitted to continue on an Engineering Industrial Placement Year programme of study.

Moderation approach to main assessment: Not applicable

Assessment Feedback:
N/A: students will however be able to discuss and seek feedback/advice on their search for an industrial placement, during the drop-in sessions.

Failure Redemption:
Successful completion of this module depends upon attendance at, and engagement with, the health and safety lecture. Therefore there will normally be no opportunity to redeem failure. However, special provision will be made for students with extenuating or special circumstances.

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 for students enrolled on the Engineering Year in Industry scheme.

EG-236 Design for Medical Engineering

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr PJ Dorrington, Dr F Zhao

Format: Lectures: x12 (up to 1 hour); Virtual Reality design workshops: 4 hours; PCLabs: 16 hours; directed private study (including additional learning of Virtual Reality (VR) and CAD in your own time, group work, and report writing): 68 hours.

Delivery Method: Any student awarded a supplementary exam in this subject will be provided with an assessment based on Component 2, which will be capped at 40%.

Component 1 (Dr Feihu Zhao)
Lectures and PC Labs will be used to deliver reverse-engineering, CAD and engineering drawing training.

Component 2 (Dr Peter Dorrington)
PC Labs and workshops will be used to deliver Component 2.
Lectures (face-to-face, asynchronous or synchronous) will introduce the design process, the design brief, the importance of the design specification, and how a user-focused design process puts the design requirements into context. Where additional asynchronous lectures are provided (i.e. recorded online) students will be expected to view this content as requested to supplement other learning approaches.

There will be several facilitated workshops to guide students in understanding concept development tools which will then be used for exploring creative engineering solutions individually and as a group. These may take the form of Virtual Reality tools and/or collaborative idea generation sessions as per the discretion of the lecturer, and project progress being made by the class. This will teach the students practical problem-solving techniques to further understand the end-users, and develop and refine their early concepts. These are planned onsite activities.

Additional PC Labs will then follow to support the design project in Component 2, once students have learnt the fundamentals of Solidworks (CAD) and how to utilise resources such as Granta Edupack for material selection.

There will be online office hours to support individual/group student queries, one hour with each lecturer for each week. These will be online and students will be able to share their screens with the lecturer for focused support on their designs and project work.

Onsite PCL abs will have Teaching Assistants (TAs) and lecturers in the room.

NOTE:- students must use part of their self-directed learning time to improve their CAD skills, Virtual Reality (VR) skills and make use of the CAD and VR cafes which are additional to the module and provide drop-in support to improve skills. Students should not leave it to the last minute to learn these fundamental skills which are required to produce a project of sufficient quality.

Module Aims: This module has two main components:

Component 1 (Engineering drawing and CAD):
The first is the development of their engineering drawing skills using a CAD software package to the required British Standard.

Component 2 (Design project):
The second component involves the students working together in groups to address a 'real-world' medical device design brief. Students will be introduced to the medical design development process, which they will follow in order to develop their product concepts. There will be an emphasis on the importance of identifying end user needs (i.e. functional requirements), and how these inform the design process. The importance of having a robust product design specification is emphasised, along with an introduction to innovative design tools and approaches. The selected concept design will be developed virtually in CAD. Each group participant will be responsible for a component or element of the device, which will then be part of the overall product assembly which will be outlined in the group element of the report.

Module Content: Compulsory a) Engineering drawing skills using a CAD software package to the required British Standard. Drawings: a reverse-engineering and dimensioning exercise, medical component/product assembly.

b) group and individual medical engineering design project and report.

Intended Learning Outcomes:

Technical Outcomes

On successful completion of this module, students should be able, at threshold level, to:

• Possess practical engineering skills acquired through, for example, work carried out in laboratories and workshops; in industry through supervised work experience; in individual and group project work; in design work; and in the development and use of computer software in design, analysis and control. Evidence of group working and of participation in a major project is expected. However, individual professional bodies may require particular approaches to this requirement (Evaluated in Coursework 1, Individual Coursework and Group Work Coursework and Class Test 1, PS1)

• Demonstrate a knowledge and understanding of: effective written and oral communications and standard IT tools.

• Produce engineering drawings to the required standard using a CAD system.

• Be aware of business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics (Evaluated in Individual Coursework and Group Work Coursework, D1).

• Apply problem-solving skills, technical knowledge and understanding to create or adapt design solutions that are fit for purpose including operation, maintenance, reliability etc. Work with information that may be incomplete or uncertain and be aware that this may affect the design (Evaluated in Individual Coursework and Group Work Coursework, and Oral Examination, D3, D4).

• Define the problem identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards (Evaluated in Individual Coursework and Group Work Coursework, D2.

Accreditation Outcomes (AHEP)

- Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics (D1)
- Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards (D2)
- Work with information that may be incomplete or uncertain and quantify the effect of this on the design (D3)
- Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal (D4)
- Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) (P1)
- Understanding of, and the ability to work in, different roles within an engineering team (P11)
- Apply their skills in problem solving, communication, working with others, information retrieval, and the effective use of general IT facilities (G1)
- Exercise initiative and personal responsibility, which may be as a team member or leader (G4)

Assessment:	Assignment 1 (20%) Assignment 2 (5%) Assignment 3 (35%) Assignment 4 (40%)
Resit Assessment:	Coursework reassessment instrument (100%)

Assessment Description: Assignment 1, CAD assignment - 20%
Assignment 2, Concept development assignment - 5%
Assignment 3, Coursework (group section) - 35%
Assignment 4, Coursework (individual section) - 40%

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

Assessment Feedback: Students will receive continuous feedback during PC labs, during Q&A lectures, during office hours, and during workshops, along with written feedback on their assessments, within 3 weeks of submission.

Failure Redemption: Supplementary coursework will form 100% of the resit mark; the mark will be capped at a maximum of 40%.

Reading List: Peter J. Ogrodnik, Medical Device Design : Innovation from Concept to Market., Elsevier Science & Technology, 2019.ISBN: 9780128149638
Karl T. Ulrich author., Steven D. Eppinger author., Product design and development / Karl T. Ulrich, University of Pennsylvania, Steven D. Eppinger, Massachusetts Institute of Technology., New York, NY : McGraw-Hill Education, 2016.ISBN: 9780078029066
Thompson, Rob (Designer) author., Manufacturing processes for design professionals, Thames & Hudson, 2007.ISBN: 9780500775011

Additional Notes: PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION

This module will be delivered face-to-face and on-site. Office hours will in the main be online.

This project involves groupwork, which will be carried out using suitable online collaboration tools; these will be recommended to you.

Deadlines will be set during standard teaching, learning and assessment times, and as such it is STRONGLY RECOMMENDED that each individual has reviewed the final group PDF submission before it is made to Canvas. This way all group members see the final version of their work before submission.

There will be zero tolerance for any individual who blames others in their group for not submitting their work correctly if it is part of a group submission.

Available to visiting-exchange students.

EG-241 Electrical Machines

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules: EG-155; EGA107

Co-requisite Modules:

Lecturer(s): Dr A Egwebe

Format: Lectures: 22 hours
Examples: 10 hours
Directed private study and assessment 60 hours

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

This module will employ lectures with assessment by examination.

Module Aims: This module introduces the operation and configuration of the most common electrical machines, with a focus on transformers, asynchronous (induction) motors and dc machines.

Module Content:
Section 1: Introduction
Review of active and reactive power, three-phase systems, electromagnetism.

Section 2: Transformers
Ideal transformer, real single-phase transformers, equivalent circuit of a transformer, three-phase transformers.

Section 3: ac Machines Fundamentals
Induced voltage and torque, rotating magnetic field and power flow diagram.

Section 4: Induction motors
Construction, equivalent circuit, definition power and torque, torque-speed characteristics.

Section 4: dc machines
Commutation in a simple four-loop dc machine, commutation with real machines, voltage-torque equations in real machines, equivalent circuit of dc motor, shunt dc motors. separately excited dc motors.

Intended Learning Outcomes: Technical Outcomes
Upon completion of the module, students should be able to:
• Explain the construction and operation of transformers, induction motors and dc machines.
• Explain, draw and use the equivalent circuits of transformers, induction motors and dc machine.
• Use short-circuit and open-circuit tests to calculate transformer parameters.
• Use equivalent circuits to study operation of transformers, induction motors and dc machines.
• Use power flow diagrams for transformers, induction motors and dc machines to calculate efficiency and power losses
• Apply the concepts of synchronous speed, slip speed, and slip.
• Explain torque-speed/slip characteristic of an induction motor and of a dc machine.

Accreditation Outcomes (AHEP)
- Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies - assessed by exam (SM1p)
- Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems - assessed by online assignment (SM2p)
- Understanding of engineering principles and the ability to apply them to analyse key engineering processes - assessed by online assignment and exam (EA1p)
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques - assessed by exam (EA2p)
- Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action - assessed by online assignment and exam (EA3p)

Assessment:	Examination 1 (80%) Coursework 1 (10%) Coursework 2 (10%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: 80% Examination (closed-book/onsite submission)
10% Coursework 1
10% Coursework 2

This module is assessed by a combination of examination and continual assessment. In order to pass the module students must achieve a minimum of 30% in the examination component, and a minimum of 40% overall for the module. If students do not meet the exam and module requirements they will receive a QF outcome and will be required to take a supplementary assessment in this module, even if their module mark is above 40%.

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

Assessment Feedback:
Coursework feedback will be provided through Canvas and a formal lecture. Additional feedback will be provided during office hours.

Exam feedback will be in a standard format on the College of Engineering intranet. Information provided includes average marks, maximum and minimum marks for the exam as a whole and for individual questions.

Failure Redemption: If a student is awarded a re-sit: failure redemption of this module will be by Examination only (100%).

Level 2 re-sits (Supplementary exams) are capped at 40%

Reading List: Stephen J. Chapman author, Electric machinery fundamentals / Stephen J. Chapman., New York : McGraw-Hill Education, 2012.ISBN: 9780073529547
A. E. Fitzgerald (Arthur Eugene), 1909-, Charles Kingsley 1904-1994.; Stephen D Umans, Electric machinery / A.E. Fitzgerald, Charles Kingsley, Jr., Stephen D. Umans., McGraw-Hill, 2003.ISBN: 9780073660097

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

• Penalty for late submission: ZERO tolerance

EG-243 Control Systems

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr A Egwebe

Format: Lectures: 22 hours
Example classes: 10 hours
Directed private study: 68 hours
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 with assessment by coursework and examination

Module Aims: The module introduces the topic of feedback control systems and presents methods of modelling that lead to transient, steady-state, and stability performances in control systems. An emphasis is placed on links between time responses and complex frequency domains. Principal topics are feedback systems, focusing on the system characteristic equation and its solution. There is an emphasis on the root-locus approach in studying stability conditions and compensation design. The overall aim is to understand and be able to apply basic techniques, using relevant software tools, for the analysis and design of feedback control systems.

Module Content: • Dynamic systems generally;
• Examples of feedback systems and practical performance criteria;
• Time and frequency response analysis;
• Differential equations and the implications of feedback;
• Open and closed loop control system configurations;
• Closed loop characteristics from open-loop transfer functions;
• Stability in the context of negative feedback;
• Complex frequency domain representations;
• Solutions of the characteristic equation, Bode, Nyquist and root-locus techniques;
• Design to meet stability and error performance criteria;
• Proportional, integral and differential (PID) compensation and their role in designs to meet a specification.

Intended Learning Outcomes:

Technical Outcomes

- Upon completion of this module the student should be able to demonstrate a knowledge and understanding of:
- The influence of feedback on dynamic systems;
- The characteristic equation and its importance in feedback systems;
- The link between open-loop and closed-loop transfer functions;
- Stability criteria;
- Steady-state accuracy;
- Time and frequency responses.

Accreditation Outcomes (AHEP)

- Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action (EA3b/EA3p)
- Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems (EA4b)
- Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems (SM2b/SM2p)
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support the study of their own engineering discipline (SM3b/SM3p)
- Work with information that may be incomplete or uncertain and quantify the effect of this on the design (D3b/D3p)

Assessment:	Examination 1 (70%) Coursework 1 (10%) Coursework 2 (10%) Coursework 3 (10%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description:

Coursework:

Three electronic online tests with randomised coefficients/questions will be set during the semester. There will be an opportunity to practice similar exercises before attempting each test. Each test is an individual piece of coursework.

Coursework 1 - Weighting 10%

Coursework 2 - Weighting 10%

Coursework 3* - Weighting 10%

* Coursework 3 will include a one-hour continuous professional development course that students must complete online. It will be assessed by submitting a completion certificate and a reflective blog.

The closed-book examination is worth 70% of the module. The examination consists of 3 questions and students are expected to answer all questions. Question 1 is weighted 30%, and the 2 other questions each weigh 20%. The examination topics will be those presented in the lectures.

This module is assessed by a combination of examination and continual assessment. In order to pass the module students must achieve a minimum of 30% in the examination component, and a minimum of 40% overall for the module. If students do not meet the exam and module requirements they will receive a QF outcome and will be required to take a supplementary assessment in this module, even if their module mark is above 40%.

Moderation approach to main assessment: Partial moderation

Assessment Feedback: Standard University procedure via a generic form. Information is given on popularity of the individual questions, relative performances across the cohort and common mistakes.Other information includes the class grade for each question (1st class, 2:1 class, 2:2 class, 3rd class and fail) achieved by the cohort.

Individual students can make appointments with the lecturer to receive general feedback on the examination where this is requested.

Failure Redemption: If a student is awarded a re-sit: Failure Redemption of this module will be by 100% Examination only.

Reading List: Nise, Norman S. author., Control systems engineering, John Wiley & Sons, Inc., 2019.ISBN: 9781119474210
Norman S. Nise author, Control systems engineering / Norman S. Nise., Hoboken, New Jersey : John Wiley & Sons, 2015.ISBN: 9781118170519
Richard C. Dorf author., Robert H. Bishop 1957- author., Modern control systems / Richard C. Dorf, Robert H. Bishop., Harlow : Pearson Education, 2017.ISBN: 9781292152974
Mulgrew, Bernard,, Grant, Peter M., Thompson, John,, Digital signal processing : concepts and applications / Bernard Mulgrew, Peter Grant and John Thompson., Palgrave,, 2002.ISBN: 0333963563
Stefani, Raymond T., author., Bahram. Shahian author.; C. J. Savant author.; Gene H. Hostetter author., Design of feedback control systems / Raymond T. Stefani, Bahram Shahian, Clement J. Savant and Gene H. Hostetter., New Delhi : Oxford University Press, 2002.ISBN: 9780195682830
Arthur G. O. Mutambara author, Design and analysis of control systems / Arthur G.O. Mutambara., Boca Raton, Fla : CRC Press, 1999.ISBN: 084931898X

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

• AVAILABLE to Visiting and Exchange Students

EG-244 Software Engineering

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr JW Jones

Format: Each week consists of 2 one hour lectures and a 2 hour practical session in a computer laboratory.

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

A blended learning approach to class contact will be used in which the key concepts and readings will be introduced and understanding tested weekly via the Canvas platform.

Lab Assignments will be delivered via Canvas and can be solved using the student's own PC or the campus PC Labs. All required software is free and easily installable (a tutorial video is provided on Canvas).

Assistance with Lab Assignments will be provided via a combincation of in-person lab classes, and drop-in sessions on Zoom.

Module Aims: The module develops software engineering practice through practical applications using Python. This is achieved through a number of programming assignments throughout the semester and a series of class tests each week. Each assignment begins with the students being given one or more programs which they are expected to enhance to satisfy the brief.

Module Content:

The aspects of the Python language that will be covered include:

- Simple interaction with the user through the keyboard and screen;
- Variables and Types;
- Lists;
- Basic Operators;
- String Formatting and Basic String Operations;
- Conditions;
- Loops;
- Developing and using functions;
- Dictionaries;
- Input and Output to Disk and Serialisation;
- Modules and Packages.

Intended Learning Outcomes: Technical Outcomes

After completing this module you should be able to:

- Describe the Python language in the context of the application domain (SM1p, EP2p)
- Develop, analyse and test simple Python programs and algorithms to meet specifications (SM1p, SM2p, EA1p, EP2p)
- Implement simple dynamic data structures (SM1p, SM2p, EA1p, EP2p)

Accreditation Outcomes (AHEP)

- Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies (SM1b/SM1p)
- Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems (SM2b/SM2p)
- Understanding of engineering principles and the ability to apply them to analyse key engineering processes (EA1b/EA1p)
- Knowledge of characteristics of particular materials, equipment, processes, or products (P2/EP2p/EP2m)

Assessment:	Coursework 1 (10%) Coursework 2 (20%) Coursework 3 (5%) Examination (40%) Coursework 4 (25%)

Assessment Description: The coursework component comprises 3 separate programming assignments. The first two are conducted and assessed individually. The 3rd assignment is conducted and assessed in pairs. Coursework 3 assesses the documentation part of the 3rd assignment, and Coursework 4 examines the software itself.

This module is assessed by a combination of exam and continual assessment. In order to pass the module students must achieve a minimum of 30% in the Exam component, and a minimum of 40% overall for the module. If students do not meet the requirements for the exam and module requirements they will receive a QF outcome and will be required to take a supplementary assessment in this module, even if their module mark is above 40%.

Moderation approach to main assessment: Not applicable

Assessment Feedback: All students will receive their coursework marks and feedback within two weeks of the assignment deadline.

Failure Redemption: The coursework components can be redeemed by a supplementary coursework shortly before the August supplementary exam period. The examination component can be redeemed via a supplementary examination during the August supplementary exam period.
Year 2 supplementary exam marks are capped at 40%.

Reading List: John Paul. Mueller, Beginning Programming with Python For Dummies, Wiley, 2014.ISBN: 111889149X
Rance D. Necaise, Data structures and algorithms using Python / Rance D. Necaise., Wiley, 2011.ISBN: 9780470618295

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

The Faculty of Science and Engineering has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment.

EG-260 Dynamics 1 (Mech & Aero)

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules: EG-116; EG-120; EG-155; EG-166

Co-requisite Modules:

Lecturer(s): Prof H Haddad Khodaparast

Format: Lectures 2 hours per week
Example classes 1 hour per week
Directed private study 40 hours
Preparation for assessment 30 hours
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

Classroom based teaching. Lecture notes and recordings will be made available on Canvas.

Module Aims: Elements of vibrating systems; simple harmonic motion; use of complex exponential representation. One-degree-of-freedom systems; natural frequency; effect of damping; harmonic excitation; rotating out-of-balance; vibration transmission. Transient dynamics; frequency domain analysis; impulse response function. Undamped multi-degree-of-freedom systems; Calculation of natural frequencies and mode shapes of two degree of freedom systems.

Module Content: • Introduction: Elements of vibrating systems. Basic concepts. Natural frequency. Simple harmonic motion.
• One-Degree-of-Freedom Systems: Application of Newton's second law to translating and rotating systems for the determination of differential equations of motion. Calculation of natural frequency. Effect of damping.
• Harmonic Excitation of Damped One-Degree-of-Freedom Systems: governing differential equations. Physical significance of complementary function and particular integral. Resonance. Examples including rotating out-of-balance, vibration isolation and transmission.
• Transient response on undamped and damped One-Degree-of-Freedom Systems: impulse response function, frequency response function, impact response, convolution integral.
• Undamped Multi-Degree-of-Freedom Systems: Method of normal modes. Analytical determination of natural frequencies (eigenvalues) and mode shapes (eigenvectors). Harmonically forced vibration.
• Lagrange's Equation: Derivation, physical interpretation, simple examples of its application.

Intended Learning Outcomes: Technical Outcomes
On successful completion of this unit students will be expected, at threshold level, to be able to:
- Gain a knowledge and understanding of the importance of natural frequencies and resonance; the role of damping; the concept of degrees of freedom. (Assessed through examination and assignment 1)
- Estimate resonances of simple systems; derive the equations of motions of systems using Newton's second law and Lagrange's equation (assessed through examination and assignment 2)
- Apply the methods presented in the course to develop simple models of real structures; analyse these models to calculate natural frequencies and evaluate the response to harmonic forces (assessed through examination and assignment 3).
- Analyse the free vibration of undamped two degrees of freedom systems (assessed through examination and assignment 3)

Accreditation Outcomes (AHEP)
Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline (SM3b)
Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques (EA2)
Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies (SM1b)

Assessment:	Assignment 1 (5%) Assignment 2 (5%) Assignment 3 (5%) Examination 1 (85%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: A combination of examination and assignments assesses this module. Final exam in May/June will have 85% weighting.

The final exam consists of two parts:
- Part 1: Multiple Choice Questions (MCQs). Part 1 contributes 50% to the final marks of the module
- Part 2: 1 written question. Part 2 contributes 35% to the final marks of the module.

There will be 3 Canvas assignments; each of the assignments contributes 5% to the module's final marks. Each of these three assignments will include 5 MCQs and students will have 3 days.

The first assignment covers free vibration of single degree of freedom (chapter 1), (Canvas)
The second assignment includes questions on harmonic forced vibration (chapter 2) (Canvas)
The third assignment consists of questions from Chapters 3 and 4. (Canvas)

Resits in August will have a 100% weighting and is similar to the May/June exam. i.e. two parts, part 1: MCQs (50*100/85) and part 2: 1 written question (35*100/85).

Part 1 of the final exam will be conducted in person and will be a closed-book test. Part 2 of the final exam, on the other hand, will be held online and will be open-book. These two parts of the exam will be scheduled at separate times.

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

Assessment Feedback: Via model answers for the assessments and overview of generic issues from written examinations. For the 3 assignments Feedback will be left on Canvas after deadline.

Failure Redemption: An opportunity to redeem failures will be available within the rules of the University. A supplementary exam will form 100% of the module mark.

Reading List: D. J. Inman author., Ramesh Chandra Singh contributor., Engineering vibration / Daniel J. Inman ; international editions contributions by Ramesh Chandra Singh., Harlow : Pearson Education Limited, 2014.ISBN: 9780273768449

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.
PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION
Available to visiting and exchange students.
Office hours will be posted on Canvas and will be also included in introductory lecture notes.
Submission of the assignments will be via Canvas ONLY. Email submissions will NOT be accepted.
All notes and other teaching materials will be delivered via Canvas ONLY.

EG-262 Stress Analysis 1

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules: EG-120

Co-requisite Modules:

Lecturer(s): Dr L Prakash

Format: Lectures: 20 hours Example classes: 10 hours Directed private study and revision: 70 hours

Directed private study and revision: 70 hours
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: This module is based on lectures and example classes and additional supporting on-line content.

Module Aims: This module continues on from EG-120 and includes: section properties; unsymmetrical bending; stresses in thick cylinders; rotating discs; theories of failure; stress concentration effects; fatigue and linear elastic fracture mechanics.

Module Content:

• Stress and strain: Stress equilibrium, strain compatibility, stress-strain relationships.
• Section Properties: Second moment of area; product moment of area; principal axes; unsymmetrical bending.
• Thin cylinder formulae.
• Thick Cylinders: Derivation of Lame equations; built-up cylinders and shrink/interference fits.
• Rotating Discs: Derivation of basic equations; effect of 'fit' and external loads.
• Failure Theories: Failure mechanisms; ductile and brittle failure; Tresca theory, von Mises theory; other relevant theories.
• Stress Concentration Effects: Causes and effects; examples of stress concentration factors and design data; effect of surface finish, residual stresses etc.; design to minimise stress concentration effects.
• Fatigue: Nature of fatigue; low and high cycle fatigue; presentation of fatigue data; fatigue strength; notch sensitivity; variable loading and cumulative damage; design for infinite life and acceptable finite life.
• Linear Elastic Fracture Mechanics: Modes of failure; stress function approach; fracture toughness; LEFM applied to fatigue; environmental effects.

Intended Learning Outcomes:

Technical Outcomes
Upon successful completion of this module, students will be expected, at threshold level, to be able to:
Understand and apply relevant engineering principles to analyse key engineering processes including (EA1b) (evaluated in examination):
• The significance and theory of unsymmetrical bending
• Thin and thick cylinders and rotating disc theory
• Theories of ductile and brittle material failure
• Stress concentration features and their effects on design
• Fatigue and fracture theories

Identify, classify and describe the performance of components through the use of analytical methods (EA2) (evaluated in examination) including an ability to:
• Identify the sources and types of stress and stress concentration in components and structures under various loading regimes and choose suitable methods of analysis based on the loading and boundary conditions.
• Apply the equations of unsymmetrical bending, thin and thick cylinders and rotating discs to practical problems.
• Design simple components and structures to avoid failure by yielding, fatigue and/or fracture, including the effects of stress concentration features.

Accreditation Outcomes (AHEP)
- Understanding of engineering principles and the ability to apply them to analyse key engineering processes (EA1b)
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques (EA2)

Assessment:	Examination 1 (70%) Assignment 1 (30%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: Examination: The examination (written or online or OMR sheet based exam) forms 70% of the module mark.
Assignment 1 (30%) will be either Canvas test or case study.

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

Assessment Feedback: A general pro-forma is completed, covering errors/issues that were identified during the marking process, and produced as formal examination feedback.
The marks for assignment 1 will be provided at the deadline time. Further feedback, including worked solutions will be provided within the week after the deadline.

Failure Redemption: A supplementary written examination will be set which will form 100% of the mark.

Reading List: E. J. Hearn (Edwin John), Mechanics of materials 1 an introduction to the mechanics of elastic and plastic deformation of solids and structural materials / E.J. Hearn., Butterworth-Heinemann, 1997.ISBN: 1281047694
E. J. Hearn (Edwin John), Mechanics of materials 2 : an introduction to the mechanics of elastic and plastic deformation of solids and structural materials / E.J. Hearn., Butterworth-Heinemann, 1997.ISBN: 0750632666
D. W. A. Rees (David W. A.), 1947- author., Mechanics of solids and structures / David W.A. Rees., London : Imperial College Press, 2016.ISBN: 9781783263950
Rees, D. W. A., The mechanics of solids and structures / D.W.A. Rees., McGraw-Hill,, 1990.
Pilkey, Walter D., Pilkey, Deborah F., Peterson, Rudolph Earl,, Peterson's stress concentration factors / Walter D. Pilkey, Deborah F. Pilkey, John Wiley,, c2008..ISBN: 9780470048245

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

The Faculty of Science and Engineering has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment.

Available to visiting and exchange students.

EG-264A Solidworks

Credits: 5 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Mr R Rees, Dr L Evans

Format: Q&A Lectures: 11 hours
PC Lab Activity time:22 hours
(Combined into 3 hour timetabled sessions).
Directed private study: 67 hours
Contact Hours will be delivered on-campus in computer labs with combined lectures and PC lab work time. The sessions will be held through screen sharing software to ensure clarity of the subject material during the lectures and practical computer sessions.

Delivery Method: 1 hour Lecture/Exercise class held in computer lab, after which the 2 hour computer lab session immediately follows to allow students to implement learnt material.

Module Aims: This module deals with the significance of computers in numerical analysis.

Introduction of Finite Element Analysis (FEA) and the techniques to implement FEA by using Solidworks, including design studies and stress simulations.

Module Aims: Competence in SOLIDWORKS to implement FEA method.

Module Content: Module content:
FEA Method: (a) Introduction of FEA method; (b) Fundamental techniques to implement FEA by using SOLIDWORKS software; and (c) Implementation of FEA method for stress analysis of different mechanical structures, e.g., beams and plates subject to different loadings.

Intended Learning Outcomes:
Assessed by:
- Solidworks Individual Assignment 100%

Technical Outcomes
After completing this module students should be able to:
- Demonstrate an ability to implement FEA by using Solidworks

Accreditation Outcomes (AHEP)
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques (EA2)
- Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems (EA4b)
- Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action (EA3b)

Assessment: Coursework 1 (100%)

Assessment Description: Coursework 1 (100%) – Individual Assessment - Technical design-based report using Solidworks, FEA and optimisation.

Assignments are marked after each section

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

Assessment Feedback: Students will receive feedback on their assignment in lectures, office hours and on Canvas

Failure Redemption: Supplementary coursework

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

LATE SUBMISSION PENALTY: ZERO TOLERANCE - For late submissions of continual assessment assignments, ZERO marks will be awarded. To consider late submissions for marking, university procedures for extenuating circumstances must be followed and approved.

NOT-AVAILABLE TO VISITING AND EXCHANGE STUDENTS.

THIS MODULE IS NORMALLY ONLY ASSESSED IN SEMESTER 1.

Office hours will be posted on the Canvas course.

EG-269 Design of Machine Elements

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules: EG-165; EG-165

Co-requisite Modules:

Lecturer(s): Dr CA Griffiths

Format: Lectures 20 hours
Example classes 10 hours (to be delivered online)
Directed private study 70 hours
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

Module Aims: The module introduces the students to the design and analysis of a number of common machine elements including drives and couplings, gears, bearings and power screws. Balancing of rotating machinery is also covered.

Module Content:
- Drives and couplings - clutches, brakes, belts and couplings
- Balancing - rotating and reciprocating systems
- Gear design - gears, the analysis of gearboxes, including epicyclics
- Bearings - types of bearings, bearing design, bearing selection
- Screws and threads - power screws

Intended Learning Outcomes:
Technical Outcomes
- A knowledge and understanding of: the design and selection process for typical machinery components.
- An ability to: identify the important machine components under various loading regimes and choose suitable methods of analysis based on the loading and boundary conditions.
- An ability to: apply the knowledge to practical machine design problems.

Accreditation Outcomes (AHEP)
- Work with information that may be incomplete or uncertain and quantify the effect of this on the design (D3b)
- Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems (EA4b)

Assessment: Examination 1 (100%)
Resit Assessment: Examination (Resit instrument) (100%)

Assessment Description: Closed book examination.

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

Assessment Feedback: Students receive their marked coursework with feedback within three weeks of the submission deadline and in time for exam revision. A general pro-forma is completed, covering errors/issues that were identified during the marking process, and produced as formal examination feedback.

Failure Redemption: A supplementary written examination will be set which will form 100% of the mark.

Reading List: Robert C. Juvinall author., Kurt M. Marshek author., Fundamentals of machine component design / Robert C. Juvinall, Kurt M. Marshek., Hoboken, NJ : John Wiley & Sons, Inc., 2017.ISBN: 9781119342816
Robert C. Juvinall author., Kurt M. Marshek author., Juvinall's fundamentals of machine component design : SI version / Robert C. Juvinall, Kurt M. Marshek., Hoboken, New Jersey : John Wiley & Sons, Inc., 2017.ISBN: 9781119382904
Robert C. Juvinall, Kurt M Marshek, Machine component design / Robert C. Juvinall ; Kurt M. Marshek., Wiley, 2012.ISBN: 9781118092262

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

The Faculty of Science and Engineering has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment.

Notes, worked examples and past papers for this module can be found on Canvas.

EG-277 Research Project Preparation

Credits: 0 Session: 2023/24 September-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr AC Tappenden, Dr M Fazeli, Mrs KM Thomas

Format: Formal Lectures - 2-3 hours

Delivery Method: 2-3 formal lectures throughout the academic year concerning project design and selection.

Module Aims:

This module has been designed to provide you with information needed ahead of undertaking a research project in Year 3 of studies.

The research project in Year 3 is worth 30 credits, and will involve the application of scientific and engineering principles to the solution of a practical problem associated with engineering systems and processes.

In the research project you will gain experience in working independently on a substantial, individually assigned task, using accepted planning procedures. It will require and develop self-organisation and the critical evaluation of options and results, as well as developing technical knowledge in the chosen topic.

The preparation for the research project commences in Year 2 where you are required to engage in project selection. In this preparation module we will confirm the options available to you to either define your own project or to select from a list of project titles and descriptors put forward by academic staff. Communications concerned project selection will be done via the Canvas course page. Additional supplementary resources will also be provided.

Module Content: In conjunction the formal lectures and supplementary resources will cover:

- Key staff members - contact details
- Key dates for Year 2 regarding project selection - defining your own project or selecting from staff titles
- How to design a project concept and what to consider before approaching a possible supervisor
- Where to start in finding a possible supervisor
- What to do if you're hoping to undertake a placement year
- Selecting from staff titles
- Further information around the allocation process
- First steps in EG-353 when you commence Year 3

Intended Learning Outcomes: NA

Assessment: Participation Exercise (100%)

Assessment Description: This module is not assessed but we would strongly suggest participation to ensure that you understand how the project selection system will work.

Moderation approach to main assessment: Not applicable

Assessment Feedback: NA

Failure Redemption: NA

Additional Notes: Only available to students following an Engineering Degree Programme.

EG-278 Systems Engineering Management

Credits: 5 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr MJ Clee

Format: Lecture
Workshop

Delivery Method: Lectures and active learning workshops

Module Aims: Systems Engineering is a holistic approach to manage complex engineering processes. Systems Theory recognises that any system is an amalgamation of different products and processes (social, technical, economic, environmental), with shifting drivers and barriers which are interlinked with differing dependent relationships.

Systems Engineering requires looking at the life cycle of a process, from concept to end of life. This module will introduce some systems theory, and explore conceptual models and management techniques for applying systems thinking to engineering projects

Module Content: 1. Systems Science overview & principles
2. Development of Systems Engineering
3. Model-building and framing context, drivers and barriers to engineering processes (workshop)
4. Identification and analysis of system failures in engineering case studies (workshop)
5. Hard and soft models, primary and secondary systems (workshop)

Intended Learning Outcomes: The student will be able to:
-Explain systems science and systems engineering processes
-Select appropriate systems engineering tools and/or techniques for a given process
-Create conceptual models for a range of engineering processes and contexts that capture a systems approach

Assessment: Coursework 1 (100%)
Resit Assessment: Coursework reassessment instrument (100%)

Assessment Description: Given a case study of project proposals from real and/or artificial case studies, students are required to apply a systems approach to conceptualizing and mapping the process, identifying constraints and considerations.

Students are required to submit:
-a systems map
-a 2000 word, referenced account of the merits (or not) of adopting a systems approach to their case study topic

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

Assessment Feedback: Students will receive feedback during active learning workshops (case study driven). Students will have the opportunity to submit a draft of the assignment for formative feedback.

Failure Redemption: Failure is redeemed during the Autumn supplementary period

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

EG-284 Manufacturing Technology II

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof TC Claypole

Format: Lectures 24 hours
Tutorials / Example classes 12 hours
Directed private study 36 hours
Preparation for assessment 28 hours

Delivery Method: Assessment:
Examination – 60%
Assignments – 40%
- State of the art notes for each the 3 topics - (Topic 1 10%, Topic 2 10%, Topic 3 5%)
Based on a Literature review of journal papers correctly referenced Bibliography
Summary of the lectures/examples for each of the 3 topics (5% per topic)

Module Aims: The course builds on information presented in Manufacturing Technology I (EG-182) by describing advanced processes for special machining and surface modification and by examining available joining techniques for assembly of components. The advantages and limitations of specific processes are outlined and procedure for optimum design and manufacture provided.
Module Aims: to provide awareness and understanding of advanced manufacturing methods used for engineering materials and components.

Module Content:
Module content:

Topic 1 – Non-traditional machining
• Fabrication – machining of flat stock
o Laser
o Plasma
o Waterjet
• Micro machining
o Applications
o Advanced Manufacture by Printing
Flexography
o Screen printing
o Ink jet
o Aerosol jet deposition
o Vacuum Metallising
o Laser micromachining
Topic 2 – Additive manufacture
• Measurement of surface profile
o Stylus system
o Infinite focus microscopy
o White light interferometry
• Coating
o Anodising
o Plasma Carburising and Nitriding
o Electroplating
• 3D Printing
o Fused Deposition
o Stereolithography/Resin 3D printing
o Ink jet resin injection
o Laser sintering
Topic 3 – Joining
• Welding
o Fusion welding
o Solid state welding
• Brazing
• Soldering
• Adhesive Bonding
o Joint design
o Adhesive types
• Mechanical Assembly
o Threaded fasteners
o Rivets
o Assembly methods based on interference fits
o Other mechanical fastening methods
o Moulding inserts and integral fasteners
o Design for assembly

Intended Learning Outcomes:
Technical Outcomes
Upon completion of the module the student should be able to:
- Understand the principles, advantages and limitations of the main non-traditional machining processes.
- Discuss coating technology, joining techniques and their advantages and limitations.
- Select appropriate machining, coating and joining techniques.
- Relate the effects of large scale processes on the microscopic structure of materials.
- Compare information from several sources to select optimum processing.

Accreditation Outcomes (AHEP)
- Knowledge and understanding of the commercial, economic and social context of engineering processes (EL2)
- Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate (EL4)
- Knowledge of characteristics of particular materials, equipment, processes or products (P2)

Assessment:	Assignment 1 (10%) Examination (60%) Assignment 2 (10%) Assignment 3 (5%) Coursework 1 (5%) Coursework 2 (5%) Coursework 3 (5%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: Assessment:
Examination – 60%
Assignments – 40%
- Based on a Summary of the lectures/examples for each of the 3 topics
Topic 1 5% (Coursework 1)
Topic 2 5% (Coursework 2)
Topic 3 5% (Coursework 3)
-Literature review of journal papers correctly referenced with a Bibliography
Topic 1 10% (Assignment 1)
Topic 2 10% (Assignment 2)
Topic 3 5% (Assignment 3)

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

Assessment Feedback: Through Faculty of Science and Engineering feedback procedure

Failure Redemption: Supplementary Examination 100% in August

Reading List: Cary, Howard B., Helzer, Scott C., Modern welding technology / Howard B. Cary, Scott C. Helzer., Pearson/Prentice Hall,, c2005..ISBN: 978013130296
Easterling, K. E., Introduction to the physical metallurgy of welding., Butterworths,, 1983.ISBN: 0408013524
Halmshaw, R., Non-destructive testing / R. Halmshaw., Edward Arnold,, 1991.ISBN: 0340545216

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

PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION

EGA222 Electrical Machines Laboratory

Credits: 5 Session: 2023/24 September-January

Pre-requisite Modules: EG-151; EG-152; EG-168; EGA107

Co-requisite Modules: EG-241; EG-243

Lecturer(s): Dr A Egwebe

Format: On-campus Laboratory work 15 hours; On-demand lab work 15 hours; On-demand online support 5 hours;
Directed private study 15 hours

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

On-campus laboratory work: Each student will have a minimum of 12-hours, timetabled, lab access to complete an assortment of electrical machine experiments.

The lab work has been carefully designed for students to complete on-campus and on-demand.

In term time, the progress of each student will be captured via a Biweekly Blog on the VLE platform.

Assessment Components: Biweekly reflective blog (30%) + Laboratory Diary (20%) + Technical Report (50%)

Module Aims: Module Aims:

The laboratory modules EGA222 and EGA223 provide a practical experience of some of the material presented in taught modules, including EG-241 Electrical Machines, EG-243 Control Systems, EG-240 Electronic Circuits, EG-247 Signals and Systems. Experiments on Amplitude Modulation, Frequency Modulation and Digital Modulation are also included (in EGA223) to support the two Communications modules later in the degree programme.

Module Content:

Selected Electrical Machines Experiments:

- DC motor in PM, shunt, series and compound mode.
- Design, operation, and characteristics of Single-and-Three Phase Transformers.
- Modelling, characterisation and control of a Brushless DC motor.
- Investigation and characterisation of a three-phase induction machine.
- Characterisation and control of a Stepper motor.
- The operation and positioning of a Linear motor.
- Closed-loop speed control of an electrical drive.

Intended Learning Outcomes: Technical Outcomes
After completing this module you should be able to:
• Perform electrical machine simulation and experiments according to an open-ended script (EA1-4 assessed by a lab diary).
• Select and apply instrumentation required for electrical measurements (EP1-3 assessed by a lab diary and progress report).
• To design, build and analyse electrical circuits to a specification (SM2 assessed by blogs, lab dairy and technical report).
• Prepare informative technical reports using Information Technology (D6 assessed by progress report).

Accreditation Outcomes (AHEP)
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques (EA2p)
- Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems (EA4p)
- Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards (D2)
- Work with information that may be incomplete or uncertain and quantify the effect of this on the design (D3b)
- Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) (EP1p)
- Knowledge of characteristics of particular materials, equipment, processes, or products (EP2p)
- Ability to apply relevant practical and laboratory skills (EP3p)

Assessment:	Coursework 1 (50%) Coursework 2 (20%) Coursework 3 (30%)
Resit Assessment:	Coursework reassessment instrument (100%)

Assessment Description:
Set of experiments to support taught modules, assessed as follows:

• Coursework 1: Formal technical report, worth 50% of the module
• Coursework 2: Laboratory diary inspection, worth 20% of the module
• Coursework 3: Biweekly blog, worth 30% of the module

Specific rules for passing this module:

This module is assessed by three assignments. In order to pass the module students must achieve a minimum of 30% in Coursework 1, and a minimum of 40% overall for the module. If students do not meet the Coursework 1 and module requirements they will receive a QF outcome and will be required to take a supplementary assessment in this module, even if their module mark is above 40%.

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

Assessment Feedback:
Feedback will be provided informally by means of class emails, when laboratory reports are submitted and marked, and in a standard format on the The Faculty of Science and Engineering intranet. Information provided includes average marks, maximum and minimum marks for the assessment components as a whole and for individual coursework.

Failure Redemption: If the examining board awards a student a re-sit, at least one piece of coursework will be set, for example one or more laboratory reports. The failure redemption is only available to students who had at least 80% attendance at laboratory classes or online equivalents during the teaching semester.

Reading List: Stephen J. Chapman author, Electric machinery fundamentals / Stephen J. Chapman., New York : McGraw-Hill Education, 2012.ISBN: 9780073529547
A. E. Fitzgerald (Arthur Eugene), 1909-, Charles Kingsley 1904-1994.; Stephen D Umans, Electric machinery / A.E. Fitzgerald, Charles Kingsley, Jr., Stephen D. Umans., McGraw-Hill, 2003.ISBN: 9780073660097

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

• AVAILABLE TO Visiting and Exchange Students

• LABORATORY CLASSES ARE COMPULSORY. Students must have at least 80% attendance at laboratory classes or online equivalents in order to be allowed to be assessed for the module.

• The Faculty of Science and Engineering has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment.

MN-2009 Change Management

Credits: 15 Session: 2023/24 September-January

Pre-requisite Modules: None

Co-requisite Modules: None

Lecturer(s): Dr SM Burvill, Mr AH Price

Format: 10 x 2 hour lecture

Seminars to run in weeks 3,6,10 (Teaching weeks 2,5,9) only.

For the other weeks students will have a 1 hour drop in session.

Delivery Method: Delivery of this module will be through a series of lectures followed by seminars in small groups. All teaching is based on campus. Guest speakers may be invited to contribute as appropriate.

Module Aims: The module outlines the difficult process of implementing and leading change in organisations.

Module Content: Lectures:
1 - The nature and need for change
2 – Diagnosing change: systems and diagnostic models
3 – The human element of change
4 – Theories of change management
4 – Planning and Implementation
6 – Change through persuasion
7 – Radical change
8 – Leadership
9 – Overcoming resistance
10 – Sustaining change and the failure of change programmes

Seminars to run in weeks 3,6,10 (Teaching weeks 2,5,9) only. For the other weeks students will have a 1 hour drop in session to meet with the module coordinator and discuss lecture and seminar content if required.

Intended Learning Outcomes: On completion of the module, students will:
- identify the need for change
- Explain theories of change management in depth.
- Critically apply approaches to change management to different contexts.
- evaluate change programmes in practice
- illustrate the application of theory to practice of humanistic elements of change management.

Assessment: Poster (80%)
Coursework 1 (20%)

Resit Assessment: Coursework reassessment instrument (100%)

Assessment Description: Poster and 1000-word supporting explanatory brief on a topic of the students choice from the module – these will be submitted together in the same document on Turnitin (80%)

Discussion board contribution (20%)
Students to respond to at least 5 discussion board topics and respond to peers at least 5 times. For each contribution and response they score 2% thus making up 20% over the course of the 10 weeks. Contributions to be between 100-200 words. To be marked at the end of the teaching block.

Students who need to re-sit this assessment will do so via a 2500 word essay covering a topic of their choice from the module.

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

Assessment Feedback: Coursework: Written feedback via Canvas plus drop-in session for students who would like individual feedback on their performance.

Failure Redemption: To redeem failure in this module students will be expected to resit second coursework component, a 2500-word essay covering a topic of their choice from the module.

Reading List: Hayes, John, 1943- author., The theory and practice of change management, Red Globe Press, 2022.ISBN: 9781352012552
Hayes, John, 1943- author., The theory and practice of change management, Palgrave, 2018.ISBN: 9781352001327
Hayes, John, Case Study 29.1 Managing change in the urology department of a hospital in England, Red Globe Press, 2022.ISBN: 9781352012538

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

This module is available to incoming exchange/visiting students, if there are any linked pre-requisites students will need to provide a copy of their transcript to assess suitability. Please email somplacements@swansea.ac.uk for more information.