Swansea University
Prifysgol Abertawe

FACULTY OF SCIENCE AND ENGINEERING

UNDERGRADUATE STUDENT HANDBOOK

YEAR 1 (FHEQ LEVEL 4)

MECHANICAL ENGINEERING

DEGREE PROGRAMMES

SUBJECT SPECIFIC
PART TWO OF TWO
MODULE AND COURSE STRUCTURE
2022-23

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 22-23 academic year begins on 26 September 2022

Full term dates can be found here

DATES OF 22-23 TERMS

26 September 2022 – 16 December 2022

9 January 2023 – 31 March 2023

24 April 2023 – 09 June 2023

SEMESTER 1

26 September 2022 – 27 January 2023

SEMESTER 2

30 January 2023 – 09 June 2023

SUMMER

12 June 2023 – 22 September 2023

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. You should also refer to the Faculty of Science and Engineering proof-reading policy and this can be found on the Community HUB on Canvas, under Course Documents.

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.

This has been a challenging period for everyone. The COVID-19 pandemic has prompted a huge change in society as well as how we deliver our programmes at Swansea University and the way in which you study, research, learn and collaborate. We have been working hard to make sure you will have or continue to having an excellent experience with us.

We have further developed some exciting new approaches that I know you will enjoy, both on campus and online, and we cannot wait to share these with you.

At Swansea University and in the Faculty of Science & 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 staff, administrators, and your fellow students - I'm sure you will find many friendly helping hands ready to assist you.

We all know this period of change will continue and we will need to adapt and innovate to continue to be supportive and successful. At Swansea we are committed to making sure our students are fully involved in and informed about our response to challenges.

In the meantime, learn, create, collaborate, and most of all – enjoy yourself!

Professor Johann (Hans) Sienz
Interim Pro-Vice Chancellor/Interim Executive Dean
Faculty of Science and Engineering

Faculty of Science and Engineering	
Interim Pro-Vice Chancellor/Interim Executive Dean	Professor Johann Sienz
Head of Operations	Mrs Ruth Bunting
Associate Dean – Student Learning and Experience (SLE)	Professor Paul Holland
School of Aerospace, Civil, Electrical, General and Mechanical Engineering **Head of School: Professor Antonio Gil**	
School Education Lead	Professor Cris Arnold
Head of Mechanical Engineering	Dr Andrew Rees
Mechanical Engineering Programme Director	Dr Eifion Jewell e.jewell@swansea.ac.uk
Year 1 Coordinator	Dr Alberto Coccarelli Alberto.Coccarelli@Swansea.ac.uk

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 9am-5pm.

The **Student Support Team** provides dedicated and professional support to all studentsin 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 and 01792 6062522 (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 otherresources:

https://myuni.swansea.ac.uk/fse/coe-student-info/

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 22-23 handbooks to ensure that you have access to the most up-to-date versions. Access to print material in the library may be limited due to CV-19; your reading lists will link to on-line material whenever possible. 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 1 (FHEQ Level 4) 2022/23
Mechanical Engineering

BEng Mechanical Engineering[H300,H307]
BEng Mechanical Engineering with a Year Abroad[H308]
MEng Mechanical Engineering[H304]
MEng Mechanical Engineering with a Year Abroad[H309]

Coordinator: Dr A Coccarelli

Semester 1 Modules	Semester 2 Modules
EG-110 **Engineering Skills & Applications** **10 Credits** **Prof D Deganello/Prof JC Arnold/Prof RJ Lancaster/Dr B Morgan/...** **CORE**	**EG-116** **Engineering Mathematics 2 (Mech & EEE & Engineering)** **10 Credits** **Dr S Salim** **CORE**
EG-114 **Engineering Mathematics 1 (Mech & EEE & Engineering)** **10 Credits** **Dr AJ Bruce** **CORE**	**EG-131** **Strength of Materials (Mech & Med & Engineering)** **10 Credits** **Dr S Azizishirvanshahi** **CORE**
EG-133 **Engineering for People Hackathon** **10 Credits** **Prof JC Arnold/Dr WG Bennett/Dr JW Jones/Dr S Potts/...** **CORE**	**EG-156** **Engineering Design Principles 1** **10 Credits** **Dr WH Newton/Dr AA Fahmy Abdo/Dr B Morgan** **CORE**
EG-134 **Engineering Mechanics (Mech & Med & Engineering)** **10 Credits** **Dr Y Xia** **CORE**	**EG-160** **Fluid Mechanics 1** **10 Credits** **Dr F Del Giudice/Dr A Celik/Dr JS Thompson** **CORE**
EG-137 **Data analysis and simulation** **10 Credits** **Dr EH Jewell/Dr S Potts/Dr AC Tappenden** **CORE**	**EG-161** **Thermodynamics 1** **10 Credits** **Dr A Coccarelli/Dr M Togneri** **CORE**
EG-180 **Introduction to Materials Engineering** **10 Credits** **Dr MP Coleman** **CORE**	**EG-182** **Manufacturing Technology I** **10 Credits** **Prof HM Davies** **CORE**
Total 120 Credits	

Year 1 (FHEQ Level 4) 2022/23
Mechanical Engineering

BEng Mechanical Engineering with a Year in Industry[H305]
MEng Mechanical Engineering with a Year in Industry[H306]

Coordinator: Dr A Coccarelli

Semester 1 Modules	Semester 2 Modules
EG-110 **Engineering Skills & Applications** **10 Credits** **Prof D Deganello/Prof JC Arnold/Prof RJ Lancaster/Dr B Morgan/...** **CORE**	**EG-116** **Engineering Mathematics 2 (Mech & EEE & Engineering)** **10 Credits** **Dr S Salim** **CORE**
EG-114 **Engineering Mathematics 1 (Mech & EEE & Engineering)** **10 Credits** **Dr AJ Bruce** **CORE**	**EG-131** **Strength of Materials (Mech & Med & Engineering)** **10 Credits** **Dr S Azizishirvanshahi** **CORE**
EG-133 **Engineering for People Hackathon** **10 Credits** **Prof JC Arnold/Dr WG Bennett/Dr JW Jones/Dr S Potts/...** **CORE**	**EG-135** **Placement Preparation: Science and Engineering Year in Industry** **0 Credits** **Prof GTM Bunting/Dr SA Rolland/Dr V Samaras**
EG-134 **Engineering Mechanics (Mech & Med & Engineering)** **10 Credits** **Dr Y Xia** **CORE**	**EG-156** **Engineering Design Principles 1** **10 Credits** **Dr WH Newton/Dr AA Fahmy Abdo/Dr B Morgan** **CORE**
EG-137 **Data analysis and simulation** **10 Credits** **Dr EH Jewell/Dr S Potts/Dr AC Tappenden** **CORE**	**EG-160** **Fluid Mechanics 1** **10 Credits** **Dr F Del Giudice/Dr A Celik/Dr JS Thompson** **CORE**
EG-180 **Introduction to Materials Engineering** **10 Credits** **Dr MP Coleman** **CORE**	**EG-161** **Thermodynamics 1** **10 Credits** **Dr A Coccarelli/Dr M Togneri** **CORE**
	EG-182 **Manufacturing Technology I** **10 Credits** **Prof HM Davies** **CORE**
Total 120 Credits	

EG-110 Engineering Skills & Applications

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof D Deganello, Prof JC Arnold, Prof RJ Lancaster, Dr B Morgan, Dr S Potts, Dr AC Tappenden

Format: Lectures 10 hours
Example classes / Laboratory work 20 hours
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

Continual Assessment.
PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION

Module Aims: Competence in engineering drawing using an industry standard CAD system and essential laboratory skills for Mechanical Engineers.

Module Content:
a) CAD: Introduction to 3D modelling (Solidworks) and Engineering drawings
b) Engineering drawing standards (BS 8888)
c) Laboratory: Understanding Material selection process via EDU software
d) Experimental Laboratory: Fluid experiment on Venturi tube with report
e) Experimental Laboratory: Measurement and interpretation of mechanical properties of materials.

Intended Learning Outcomes: KU2: Have an appreciation of the wider multidisciplinary engineering context and its underlying principles.
IA1: Apply appropriate quantitative science and engineering tools to the analysis of problems.
PS1: 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.

A knowledge and understanding of effective written and oral communications and standard IT tools.

After completing this module you should be able to:
1) Produce engineering drawings to the required standard using a CAD system.
2) Apply basic laboratory techniques including safety issues; data manipulation; development of report writing skills

Assessment: Coursework 1 (15%)
Coursework 2 (35%)
Coursework 3 (25%)
Coursework 4 (10%)
Coursework 5 (15%)

Resit Assessment: Coursework reassessment instrument (100%)

Assessment Description: Coursework 1: CAD design & Foundations of Drawing Standards (BS8888)
Coursework 2: CAD design and drawing of an assembly
Coursework 3: Material selection Laboratory report
Coursework 4: Mechanical testing report
Coursework 5: Fluid experiment report

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Students will receive pro-forma marking sheets and feedback through CANVAS

Failure Redemption: Supplementary coursework based on the CAD elements. No practical experiment during supplementary session

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

EG-114 Engineering Mathematics 1 (Mech & EEE & Engineering)

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr AJ Bruce

Format: Lectures 30 hours
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

This module will consist of lectures, which concentrate on the mathematical theory, and electronic examples, which concentrate on applying the theory to solve problems.

Module Aims: This module (in combination with Engineering Analysis 2B) provides the essential grounding in mathematical analysis techniques for engineering students. This module ensures that all students have a suitable level of analytical skills for subsequent engineering modules.

Module Content: Module content:

• Number systems: numbers, algebra and geometry.
• Functions: inverse and composite functions, polynomial functions, rational functions, circular functions, exponential, logarithmic and hyperbolic functions, continuous and discontinuous functions.
• Introduction to complex numbers: The number j, real and imaginary components, Cartesian form, complex conjugate and polar form.
• Differentiation: basic ideas and definition, elementary functions, rules of differentiation, parametric and implicit differentiation, higher derivatives, optimum values.
• Integration: basic ideas and definition, definite and indefinite integrals, techniques of integration, integrals of partial fractions, integration by parts, integration by substitution.
• Linear Algebra: simultaneous equations, Gauss elimination, matrices, rules of matrix algebra, rank and linear dependence, calculation of determinates and eigenvalue problems.

Intended Learning Outcomes:
Technical Outcomes
On successful completion of this unit students will be expected, at threshold level, to be able to:
- Demonstrate knowledge of the fundamentals of mathematics, which underpin their engineering degree. (Evaluated in the MyMathLab continuous assessments and the examination.
- Demonstrate a comprehension of the fundamentals of mathematics, which underpin their engineering degree, using the following specific techniques: manipulate algebraic expressions, differentiation (including optimisation of functionals), integration, matrices and Gauss elimination (Evaluated in the examination).

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)
- 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)

Assessment: Coursework 1 (25%)
Coursework 2 (25%)
Coursework 3 (25%)
Coursework 4 (25%)

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

Assessment Description:
Coursework:
4 electronic online tests with randomised coefficients 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 25%

Coursework 2 - Weighting 25%

Coursework 3 - Weighting 25%

Coursework 4 - Weighting 25%

Note: Students are required to pass each MyMathLab test with 40% or more. If you do not meet the component level requirements for the module you will receive a QF outcome.

If a student does not pass all required components they will be given one further attempt at failed components during the January assessment period. If the January attempt is not passed students will be offered a supplementary examination in August (subject to regulations).

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: Feedback will be provided electronically for each of the assessed tests.

Failure Redemption: A supplementary examination will form 100% of the module mark.

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.

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

EG-116 Engineering Mathematics 2 (Mech & EEE & Engineering)

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr S Salim

Format: Lectures 20 hours
Tutoring classes 10 hours
Directed private study 70 hours

Delivery Method: This module will consist of lectures, which concentrate on the mathematical theory, and example classes, which concentrate on applying the theory to solve examples.

Module Aims: Module Aims: this module (in combination with Engineering Analysis 1B) provides further grounding in mathematical analysis techniques for Engineering students. The module extends the understanding into more complex analytical methods, focusing on complex numbers, multi-variable functions, series and sequences and differential equations.

Module Content:

• Vectors: Physical meaning, components in Cartesian, cylindrical and spherical coordinates magnitude, scalar product, cross product, equations of lines and planes.
• Further complex numbers: manipulation of complex numbers, Cartesian, polar and exponential forms, Euler's formula, relationship between trigonometric and hyperbolic functions, De Moivre's theorem.
• Ordinary differential equations: classification of differential equations, solutions to first order ODE's including separable, linear and more specialised types. Solution to second order ODE's with constant coefficients.
• Functions of more than one variable: visualisation, partial differentiation, integration of lines, surfaces and volumes.
• Sequences and Series: review of arithmetic and geometric sequences and series, limit of a sequence, infinite series and tests of convergence, binomial series, and power series of common functions.

Intended Learning Outcomes:

Technical Outcomes
On successful completion of this unit students will be expected, at threshold level, to be able to:
- Demonstrate knowledge of the mathematics, which underpin their engineering degree.
- Demonstrate a comprehension of the mathematics, which underpin their engineering degree, through the use of the following specific techniques: work with complex numbers, manipulate vectors (in Cartesian, cylindrical and spherical coordinates), perform partial differentiation, integrate lines, surfaces and volumes, solve first and second order differential equations and expand real functions into series.

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)
- 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)

Assessment: Coursework 1 (34%)
Coursework 2 (33%)
Coursework 3 (33%)

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

Assessment Description: Coursework (Continuous Assessment):
4 electronic online tests with randomised coefficients will be set during the semester. There will be an opportunity to practice similar exercises before attempting each test. These tests will be each worth 25% of the module mark. Each test is an individual piece of coursework.

Specific rules for passing this module:
This module is assessed by coursework (continuous assessment) in the form of 4 online tests. You must pass each test with at least 40% in order to pass the module. If you do not meet the component level requirements for the module you will receive a QF outcome.

NB – for the 22-23 session due to UCU strike action one of the online electronic tests (CW4) did not run and as a result the assessments for CW1/CW2/CW3 were reweighted to equal value.

If a student does not pass all required components they will be given one further attempt at failed components during the May/June assessment period. If the second attempt in May/June is not passed students will be offered a supplementary examination in August (subject to regulations).

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: A feedback form for the examination will be available electronically.

Feedback will be provided electronically for each of the assessed tests.

Failure Redemption: A supplementary examination will form 100% of the module mark.

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.

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

EG-131 Strength of Materials (Mech & Med & Engineering)

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr S Azizishirvanshahi

Format: Lectures 2 hours per week
Example classes 1 hour per week
Directed private study 3 hours per week

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

The module is delivered through lectures and example classes. The Canvas site contains course notes, screencasts, example sheets, practice tests, past exam papers and model answers. Lecture recording may be applied. Assessment is conducted though Canvas tests and final examination.

Module Aims: The aim of the module is to gain understanding into how engineering structures and components transmit loads and other external actions by means of internal stresses and how these stresses lead to strains and displacements. The course aims to explain the simple models of beam behaviour, concepts such as Mohr circle of stress and the relationships between stress and strain. Relevant case studies will be used to illustrate the importance of these subject areas.

Module Content:

1 - Introduction to basic concepts: rupture, deformation, stress, strain, brittle and ductile behaviour, elasticity, creep, fatigue, static determinacy. [2]
2 - Basic Beam theory: axial, shear force and bending moments, Euler beam theory, centroid (mass centre) and moment of inertia of sections, deflection of beams, indeterminate beams. [8]
3 - Stress and Strain analysis: principal directions, maximum shear stress, Mohr's circle, stress-strain relationships in linear elasticity. Stresses in pressurised vessels. [6]
4 - Advanced beam theory: combined loading, , Euler torsion theory, shear stresses, shear warping of sections, shear distribution in rectangular and thin sections. [4]
5 - Revision [2]

Intended Learning Outcomes:
Technical Outcomes
Upon completion of this module students should be able to:
- Determine the compatibility conditions for elementary structures.
- Construct partial and full free body diagrams required to obtain reactions, axial forces, bending moments and shear forces in simple rods and beams.
- Apply the equations of static equilibrium to calculate reactions, axial forces, bending moments, shear forces.
- Develop shear force and bending moment diagrams for beams of varying support conditions.
- Determine beam displacements from bending moments that are compatible with the support conditions.
- Propose designs of beam structures to operate within specified loading and material limitations.
- Apply the principle of superposition for structures with complex loading.
- Evaluate section properties of beams and similar structures, such as the second moment of area and centroid location.
- Obtain stress distribution on simple sections from bending moments and shear or axial forces.
- Apply the Mohr Circle principle to obtain principal stresses and maximum shear stress in 2-dimensions. Obtain strains from stresses and vice versa for 2-D elastic materials.
- Demonstrate the understanding of origin of formulae that appear in pressure vessel design codes.
- Make basic design and performance calculations on pressure vessels.
- Evaluate the effect of torsional moments on simple beams and the resultant stresses and deformations.

Accreditation Outcomes (AHEP)
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering (SM3b)
- Knowledge of characteristics of particular materials, equipment, processes or products (P2)
- Understanding of the use of technical literature and other information sources (P4)

Assessment: Assignment 1 (7%)
Assignment 2 (7%)
Laboratory report (6%)
Examination 1 (80%)

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

Assessment Description: Final examination in May/June will consist of a mix of multiple choice and written solution questions. All questions are compulsory. The examination is closed-book.

Two assignments consists of a Canvas test.

One will be a laboratory experiment.

Specific rules for passing this module:
This module is assessed by a combination of examination and coursework. In order for the coursework marks to count, you have to pass the exam component (with at least 40%). If you have less than 40% in the exam, then the module mark will be just the exam mark. Any resits are done by a supplementary exam. If you pass the exam but have failed the coursework, you may still fail the module, depending on the marks achieved, so it is important to do the coursework.

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: Students receive feedback from each of the three Canvas tests by being given their scores in each question together with the correct answer. Once the Canvas test has been scored and the exercises done by the lecturer in an example class, students can re-try the tests as many times as desired. Each time the numeric values of the questions change and they can compare their answers against the correct ones until they are satisfied with their understanding of the topic. Feedback from the final examination is via the University feedback form.

Failure Redemption: Through 100% supplementary examination in August.

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.

Failure to complete the Canvas tests in time will lead to zero marks being awarded in the relevant exercise.

This module is assessed by a combination of examination and coursework. In order for the coursework marks to count, you have to pass the exam component (with at least 40%). If you have less than 40% in the exam, then the module mark will be just the exam mark. Any resits are done by a supplementary exam. If you pass the exam but have failed the coursework, you may still fail the module, depending on the marks achieved, so it is important to do the coursework.

This version of Strength of Materials is for the Mechanical and Medical cohorts.

EG-133 Engineering for People Hackathon

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof JC Arnold, Dr WG Bennett, Dr JW Jones, Dr S Potts, Dr S Salim, Dr N Wint, Dr W Zhang

Format: One lecture per week: 10 hours
3-hour group session each week for each discipline: 30 hours
Contact Hours will be delivered through a blend of live on-campus activities online work, and some aspects will take part in Academic Mentoring sessions.

Delivery Method: The delivery method is primarily on-Campus, although the 1 hour lecture each week will be recorded and be made available for on-line review. Students are required to participate in the group work sessions and this will require on-campus participation.

Module Aims: Engineering is more than understanding technical design, it is often the social, environmental and economic context underpinning engineering solutions that determine success or failure,

This has never been more relevant since the world is currently planning a radical transition to a low carbon economy while facing increased risks due to climate crisis which will bring with it unprecedented change to the world. Engineers will be at the forefront of this, and need to be equipped to tackle open-ended, unstructured and complex problems in collaboration with others.

The module will allow students to explore these issues within their chosen discipline with the following structure:

Each week there will be a 1-hour lecture, introducing engineering thinking and contemporary issues in global engineering design. Most activity will then take place in group-work sessions (3 hours per week), where groups of around 6 students will work in a facilitated way towards a Engineering design solution. Students will be presented with a range of Global Challenges (e.g. access to water/ off-grid energy), and over the course of the term will work to research, design and critique possible engineering solutions.

The groups with the best performance in this module may have opportunities to represent Swansea University in the national Engineers without Borders UK competition.

Module Content: 1. Engineering Mindset/ Self Awareness
2. Ethics and Professional Responsibilities and Sustainability
3. Failure and Learning through Mistakes/ Design mindset
4. Design Method
5. Teamwork
6. Positionality and Personal Design Perspectives
7. Reflection

Intended Learning Outcomes: The main learning outcomes of this module are:

D2 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

EL1 Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct

EL4 Understanding of the requirement for engineering activities to promote sustainable development

Supported learning outcomes are:

D1 Be aware of business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics

P11 Awareness of team roles and the ability to work as a member of an engineering team

Assessment:	Coursework 1 (10%) Coursework 2 (10%) Coursework 3 (70%) Coursework 4 (10%)
Resit Assessment:	Coursework reassessment instrument (100%)

Assessment Description: Coursework 1: (10%)
Team work building tasks - puzzles

Coursework 2: (10%)
Professional development assignments

Coursework 3: Presentation (70%)
The final poster with show all stages of project conception and development:
-need identification
-evaluation criteria
-long list of options
-short list of options

The mark will be given to the group and peer assessment will be used

Coursework 4: A group reflection task (10%)

Moderation approach to main assessment: Partial second marking

Assessment Feedback: Formal feedback from online test

10% of marks are available for completion of specified professional development course units. There are 5 units for students to complete.
To complete a unit a student must gain 8/10 in the unit test, and they get 5 attempts to sit each unit test. A student can gain 2% for each unit they pass.
When they complete a test canvas will let the students know how many marks out of 10 they have gained. If they have not gained 8/10 they will need to take the test again.

Regular informal feedback given throughout the term, with structured group feedback sessions at intervals, reflecting on progress, including some peer feedback.
Formal feedback on presentation and reflection task will be provided on Canvas.

Failure Redemption: Supplementary Assessment to be submitted in August.

Reassessment: Design Reflection & Report (100%)

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

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EG-134 Engineering Mechanics (Mech & Med & Engineering)

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr Y Xia

Format: Lectures: 2 hours per week,
Example classes : 1 hour per week,
Directed private study: 3 hours per week,

Contact Hours will be delivered through on-campus lectures and example classes.

Delivery Method: The module will employ a blended approach using the Canvas Digital Learning Platform, with on-campus lectures and example classes. The Canvas site contains learning materials such as lecture notes, lecture recordings, example sheets and solutions, online tests, past exam papers and answers.

Lectures: 2 hours per week,
Example classes : 1 hour per week,
Directed private study: 3 hours per week

Module Aims: This module aims to provide the students with the basic knowledge of the fundamental concepts of statics, including force, moment/couple, resultant force and resultant moment of a general force-couple system, equilibrium conditions/equations of a force system, common types of constraints/supports, and free body diagram, and by applying these concepts, the students will be able to solve statically determined truss structures using the methods of joints and sections.

Module Content:

Introduction: Basic concepts; Newton's laws of motion; Units; Idealisations of a real body and forces. [1]
2D Force Systems: Force definition; The principle of transmissibility; Concurrent & non-concurrent forces; Resultant forces; Resolution of forces; Projection; Moments and couples; Varignon's theorem; Simplification of co-planar force-couple systems; [6]
Equilibrium: Equations of equilibrium for a rigid body and assemblage of rigid bodies; Types of supports and connections; Free body diagrams; Externally static determinacy; Practical Examples. [5]
Friction: Characteristics of dry friction; Coulomb friction model; The angle of Friction; Wedge; Practical Examples. [5]
Application - Truss analysis: Definitions; Two-force member; Internally static determinacy; The method of joints; The method of sections; Advanced issues. [6]
3D force systems: Forces with vector representation; Moments; Equilibrium of concurrent and general 3D force systems. [5]
Revision [1] and Assessment [1]

Intended Learning Outcomes:

Technical Outcomes

Upon completion of this module the student should be able to:

- Calculate the resultant force of several forces using vector analysis; compute the moment of a force generated about a point; and determine both the resultant force and the resultant moment of a general force-couple system;
- Correctly identify types of constraints/supports and corresponding reaction forces;
- Correctly draw free body diagrams;
- Establish and solve the equilibrium equations of a rigid body or a group of rigid bodies subject to various loadings and supports.
- Solve simple problems involving dry friction;
- Determine if a give truss structure is statically determinant or not;
- Apply the method of joints and the method of sections to analyse simple/statically determinant truss structures to obtain the axial forces of all the truss members;
- Determine the resultant force of several 3D forces, and calculate the moment vector of a force produced about a point.

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 engineering principles and the ability to apply them to analyse key engineering processes (EA1b)
- 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: Exam - open book (80%)
Class Test 1 - Coursework (10%)
Class Test 2 - Coursework (10%)

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

Assessment Description: This module is assessed by a combination of examination (80%) and courseworks (20%). Courseworks are in the format of two online tests (10% each) administered via Canvas at the middle and towards the end of semester 1, and 80% from open book examination.

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: Generic feedback on the online tests will be provided, following the tests. The feedback for the final examination will be through the Faculty module feedback procedure.

Failure Redemption: If a student is awarded a re-sit, failure redemption of this module will be by examination worth 100% of the module mark.

Additional Notes: NA

EG-135 Placement Preparation: Science and Engineering Year in Industry

Credits: 0 Session: 2022/23 January-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 and drop-in advice sessions. 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 Faculty of Science and 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; and (d) key employability skills; getting the most from your Industrial Placement.

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) 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

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

1) Demonstrate the essential skills needed to apply for and secure placement opportunities.
2) Perform effectively in an interview process and apply the tools and attributes that make a good interview.
3) Discuss and share what is expected within the workplace including behavioural and professional conduct.
4) Identify personal employability skills and how these will be used in a workplace setting.
5) Express a reflective view of the placement demonstrating the ability to maximise the placement experience in future career decisions

Assessment: Participation Exercise (100%)

Assessment Description: Not assessed

Moderation approach to main assessment: Not applicable

Assessment Feedback: Not assessed

Failure Redemption: Not assessed

Additional Notes: Module to support students on the Year in Industry programmes.

EG-137 Data analysis and simulation

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr EH Jewell, Dr S Potts, Dr AC Tappenden

Format: Lectures and PC lab class

Delivery Method: The module will be delivered through in person lectures and PC laboratory classes. These will vary through the module, with appropriate choices made for each element of the course. Although specified as in person classes, although there may need to adjust the delivery model should Covid restrictions apply. Module material including lectures, notes, example case studies and additional resources will available on Canvas.

Module Aims: The module will examine how data gathering and computational methods can be used to solve real world engineering problems. It brings together the need to capture real world information in a date centric engineering world with the need to predict performance using fundamental understanding of the engineering science. The module will develop the key IT analysis (Excel and Matlab) and technical writing skills which are applicable to many of the modules within the programme.

Module Content: The syllabus aims to develop the student's appreciation of the role that data analysis and programming plays in solving real world problems.

1. Why data analysis and simulation the key to future engineering data
2. Data from sensors in the real world
3. Types and forms of data
4. Capturing data from a real-world experiments and Excel data analysis
5. MATLAB as an engineering tool
6. Basics of programming, introduction to MATLAB, input and output of data, operations, functions, plotting, simple programming, conditional statements and debugging.
7. MATLAB programming for engineering problem solving

Intended Learning Outcomes: Accreditation Outcomes (AHEP)

- Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems (EA4B)
- Apply their skills in problem solving, communication, working with others, information retrieval, and the effective use of general IT facilities (G1)

Assessment:
Coursework 1 (5%)
Assignment 1 (40%)
Coursework 2 (10%)
In class test (Invigilated on campus) (15%)
Class Test 2 - Held under exam conditions (20%)
Coursework 3 (10%)

Assessment Description: Assessments

1. 1 x 5% quiz on academic malpractice. Open for the entirety of the module.
2. 1 x 40% Assignment on Arduino experimentation and write up
3. 1 x 10% quiz on taught elements of data capture and handling.
4. 1 x 10% Matlab Onramp beginner assessment
5. 1 x 15% Matlab classroom assessment under exam conditions in PC labs. Students prepare code from scratch, submit results and m-code within 1.5 hours. Run within a 2 hour lab class).
6. 1 x 20% Matlab classroom assessment under exam conditions in PC labs. Students prepare code from scratch, submit results and m-code within 1.5 hours. Run within a 2 hour lab class).

Requirements to pass the module:
Class test 1, Class test 2 and Coursework 3 must be passed with a combined mark of 40% in order to pass the module.

Moderation approach to main assessment: Partial second marking

Assessment Feedback: There will be no feedback on the online test beyond the mark. Students will receive generic feedback on their coursework submissions in a lecture/ lab. This will highlight good practice and where common mistakes have been made. In addition, office hours will allow students receive feedback on individual pieces of work.

Failure Redemption: Failure redemption

Additional Notes: Available to visiting and exchange students.

EG-156 Engineering Design Principles 1

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr WH Newton, Dr AA Fahmy Abdo, Dr B Morgan

Format: Lectures: 8 hours
Example classes / Laboratory work 16 hours
Directed private study 76 hours
[including Engineering Applications 1 (EA1) 50 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, which may be face-face or recorded online for students to access at their own will during the duration of the module. To put the design projects into context the majority of work will take place in CAD computer design lab sessions and independent working, individually and as a group. Assessment: continual Assessment 100%. A number of short design projects culminating in 100% total.

Module Aims: This course follows a series of case studies as given in the course text. This covers a wide range of subjects including conceptual design, innovation, standardisation, reliability, safety, failure, ergonomics, materials and management. Additionally, the students will take part in the compulsory design activity and respective Engineering Application 1 activities.

Module Content:

1. Introduction to Design: This course follows a series of case studies as given in the course text. This covers a wide range of subjects including conceptual design, innovation, standardisation, reliability, safety, failure, ergonomics, materials and management. 20 hours nominal study.
2. Design Methodology: basic engineering design: bearings, fasteners, limits and fits, tolerances, surface finish. 30 hours nominal study.
3. Engineering Applications 1 The EA1 component includes a competitive design and make project and workshop familiarisation via a manufacture to design project. This is a compulsory part of the module and is a residential course held during term after the summer exam period. This is a compulsory and assessed part of the module. 50 hours nominal study.

Intended Learning Outcomes:

Technical Outcomes
Upon completion of this module students should have:
- A knowledge and understanding of the multidisciplinary nature of design and understand the implications of many design decisions. Understand the main stages of embodiment, concept and detail design and be able to contribute to each of these.
- An understanding of the link between design and manufacture of a product prototype model.
- An ability to apply analysis tools in the design and manufacture of a product. This will include engineering sciences as well as manufacturing and commercial considerations.

Accreditation Outcomes (AHEP)
- Understanding of appropriate codes of practice and industry standards (P6)
- Ability to work with technical uncertainty (P8)
- Communicate their work to technical and non-technical audiences (D6)
- 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)
- Plan and manage the design process, including cost drivers, and evaluate outcomes (D5)

Assessment: Coursework 1 (40%)
Coursework 2 (60%)
Coursework 3 (0%)

Resit Assessment: Coursework reassessment instrument (100%)

Assessment Description: Coursework 1 (40%) - Conceptual design review.
Coursework 2 (60%) - Prototype demonstration, including but not limited to CAD, BOM and physical prototype.
Coursework 3 (Pass/Fail) - Design and Build project, relating to EA1 activity

N.B. The assessment period for this coursework runs from January through to June and is completed in small sessions throughout term.

Moderation approach to main assessment: Second marking as sampling or moderation

Assessment Feedback: Lectures will provide feedback on presentations during lecture and laboratory sessions. Tutorial sessions may also be used for general feedback and guidance.

Failure Redemption: You would redeem failure by doing a design exercise and submitting a formal report during the normal resit period in summer.

In some cases you may be required to re-submit case study work not previously completed satisfactorily

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

NOT AVAILABLE TO VISITING AND EXCHANGE STUDENTS

EG-160 Fluid Mechanics 1

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules: EG-113; EG-114; EG-118

Lecturer(s): Dr F Del Giudice, Dr A Celik, Dr JS Thompson

Format: Lectures: 22 Hours (2 hours per week)
Office Hour: 55 hours (5 hours per week)
Directed Private Study: 100 hours

Delivery Method: Students will be expected to study some materials at home in preparation for the lecture. The preparation material will be part of a coursework component and will need to be completed using a technology adaptive learning platform fully integrated with Canvas. During the weekly 2 hours of lecture, some common difficulties experienced by the cohort when studying the preparation material will be addressed. Afterwards, students will be invited to solve a new set of problems together with the lecturers and may receive feedback at any time.

Module Aims: To help the students understand the role that theory can play in the process of understanding the nature of basic hydrostatics and fluid dynamics.

Module Content: Introduction to the module. Fluid Properties [2]
Stevin's and Pascal Law [2]
Forces on Planar Surfaces [2]
Forces on Curved Surfaces [2]
Buoyancy [2]
Class Test [2]
Macroscopic mass balance and energy Balance: The Bernoulli equation [2]
Pipe Flow and distributed viscous losses [2]
Minor Losses [2]
Pipelines, Pumps and turbines [2]
Macroscopic Momentum Balance [2]

Intended Learning Outcomes:
Technical Outcomes
By the end of the module, the student should be able to:
- Comprehend the conservation laws of mass, energy and momentum.
- Apply conservation laws to solve engineering problems.
- Determine how to calculate hydrostatic forces on both planar and curved surfaces.

Accreditation Outcomes (AHEP)
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline (SM3b)
- Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems (EA4b)

Assessment: Coursework 1 (25%)
Examination (50%)
Class Test 1 - Coursework (25%)

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

Assessment Description: Coursework (25%): this coursework component will be completed using a technology adaptive platform fully integrated to Canvas. Students will be expected to complete a theory section and some additional problems in preparation to each week lecture.

Class Test (25%): this is a 2-hours closed book class-test to be completed in a university computer room in invigilated conditions. The test will focus on Fluid Statics.

Examination 1 (50%): This is a 2.5-hours closed book exam. Students will be expected to solve two new fluid mechanics problems about fluid dynamics.

Coursework will be awarded regardless of the examination mark. You will pass the module if the sum of all the contributions is greater than 40%. This means that the coursework is important to pass the exam. You can pass the exam and still fail the module if you do not complete the coursework, meaning that the coursework is very important.

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: Students will receive instant feedback on their coursework components. Students will receive feedback on the Class test within 3 weeks of submitting the work.

Failure Redemption: Resit: Examination 100%
This is a 2.5-hours closed book exam. Students will be expected to solve two new fluid mechanics problems featuring the topics presented in the module.

Please bear in mind that the coursework mark will not be applicable for the resit.

Additional Notes: Available to visiting and exchange students.

The Faculty of Science and Engineering has a zero-tolerance policy for late submissions.

The module will be taught in parallel to different departments by different lecturers. The module syllabus, the assignment, the delivery and the exam components will be the same across the cohort.

Students are invited to attend the lectures, as these will feature interactive solutions of new problems. During this period, students will have the opportunity to interact with the lecturer directly and to solve problems together with their peers. Students that cannot attend the lecture, are invited to visit the office hour and to interact more with the lecturers during the scheduled times.

EG-161 Thermodynamics 1

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr A Coccarelli, Dr M Togneri

Format: Lectures: 22 hours
Example Classes: 22 hours
Directed private study 44 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

Lectures, Example classes and on-line quizzes

Module Aims: The aim of the module is to give an introduction to the laws of thermodynamics and the relevant properties, thus providing an appreciation of energy conversion processes for thermodynamic systems. Topics covered are heat and work, properties of pure substances, liquids, gases and vapours, the first and second laws of thermodynamics. The module will focus on practical problem solving of steady flow systems using conservation of energy equation applied to ideal refrigeration systems and the ideal gas turbine engine extended to ideal jet engine analysis.

Module Content:

The typical syllabus covers [indicative hours]:

- Introduction to the course [0.5]: course requirements in terms of syllabus, attendance, assessment, examples classes, energy and the environment.
- Basic concepts [3.5]: thermodynamics and energy, dimensions and units, closed and open systems, properties of a system, state and equilibrium, processes and cycles, forms of energy.
- Energy, Energy Transfer and General Energy Analysis [4]: energy conservation, energy transfer by heat and work, mechanical forms of work, first law of thermodynamics, efficiencies.
- Energy Analysis of Closed Systems [2]: moving boundary work, internal energy, enthalpy, energy balance for closed systems, the ideal-gas equation of state [2] and specific heats of ideal gases
- Properties of Pure Substances [4]: pure substance, phases of a pure substance, phase-change processes, property diagrams, property tables
- Energy and Mass Analysis of Control Volumes [4]: conservation of mass, flow work and the energy of a flow fluid, energy analysis for steady-flow devices.
- Cycles direct and indirect, Entropy and isentropic efficiency. [4]
- Steady flow analysis of ideal gas turbine cycles [4]: Brayton cycle extended to jet engine cycles [4].
- Steady flow analysis of ideal refrigeration cycles [4]: second law of thermodynamics, thermal reservoirs, heat engines, refrigerators and heat pumps,coefficient of performance, reversible and irreversible processes. [4]
- Revision [4]

Intended Learning Outcomes:
Technical Outcomes
Having successfully completed the module, you will be able to demonstrate;
- Knowledge of basic principles (properties, laws systems) governing thermodynamics (Evaluated in Canvas quiz and final exam)
- Comprehension of the energy conversion processes involving heat and work and energy storage. (Evaluated in Canvas quiz and final exam)
- Application of thermodynamic principles to solve simple problems involving substances, processes and energy transfer. (Evaluated in Canvas quiz and final exam)
- Analyse ideal steady flow refrigeration and gas turbine cycles by applying the laws of thermodynamics. (Evaluated in Canvas quiz and final exam)
- Use property tables to determine properties of substances. (Evaluated in Canvas quiz and final exam)

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)
- Understanding of engineering principles and the ability to apply them to analyse key engineering processes (EA1b)

Assessment: Assignment 1 (5%)
Assignment 2 (5%)
Assignment 3 (5%)
Assignment 4 (5%)
Assignment 5 (5%)
Examination (75%)
Resit Assessment: Examination (Resit instrument) (100%)

Assessment Description: Each assignment consists of a on-line quiz covering specific topics.

The end of semester exam has approximately 16 questions covering all topics covered within the module, data sheet of formulas and property tables are provided

The resit examination is one exam following the same format as the end of semester exam. The resit examination will form 100% of the module mark.

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: Students receive feedback from each of the five on-line tests by being given their scores in each question together with the correct answer and method.

Examination feedback will be available through the forms submitted to the Engineering Community page on Canvas.

Failure Redemption: A supplementary examination following the same style as the end of semester exam will form 100% of the module mark.

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. Course material, videos, examples, quizzes, past papers and additional material.

EG-180 Introduction to Materials Engineering

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr MP Coleman

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

Delivery Method: Assessment: The module will be assessed via an online course work assessment during the first semester, worth 20% followed by a standard 2 hour multiple choice examination at the end of the teaching block, worth 80%

Module Aims: The module aims to introduce year 1 Engineering students to the understanding of key concepts relating to materials selection and applications. Following completion of this module the student should be able to demonstrate an appreciation of materials selection in relation to the structure/mechanical and physical properties/applications of metallic, ceramic, polymeric and composite materials.

Module Content: Principles of Materials Selection: Classes and typical properties of materials, the role of materials selection in mechanical design [1].
Elastic and Plastic Behaviour of Solids: Stress and strain in solids, elastic behaviour. Plastic behaviour, tensile testing, stress-stain curves [3].
Toughness and Hardness Testing: Impact testing, hardness testing [1].
Atomic Structure: Atomic structure, atomic numbers and weights, electronic structure of atoms, types of atomic bonding including ionic, covalent, metallic, intermediate, Van de Waals, and hydrogen bonding [1].
Crystal Structure of Solids: Types of solid state structure (e.g. crystalline and amorphous), atomic packing in crystals, atomic arrangements (eg FCC, HCP, BCC), crystallography: Plane (Miller) indices, direction indices, crystal structure of ceramics [4].
Solidification: Volume change, nucleation and growth of crystals, grain boundaries, glasses: temperature dependence, silica glass structures, forms of silica glass, soda glass [2].
Cement and Concrete: Portland cement and its manufacture, hydration and its development, strength of concrete [1].
Vacancies and Diffusion: Diffusion and Fick's Law, crystal lattice defects, atomic vibration, probability of diffusion, mechanisms of diffusion [2].
Microstructure of Solids: Examples of microstructures, microstructural features, phases, diagrams (maps), unary diagrams and Gibbs Phase rule, solid solubility, solubility in a binary system, composition in a two-phase region, microstructural development, Lever rule [3].
Polymers and Composites: Polymerisation, skeletal structures, structure of polymers, homopolymers, copolymers, classification of polymers, classification of composites, manufacture routes, fibre-reinforced composites, fibre matrix interface [2].
Steels: Iron-Iron carbide system, eutectoid steel, effect of carbon content, effect of cooling rate, non-equilibrium steels, heat treatment of steels, diffusion, classification of steels: plain carbon steels (e.g. low-carbon, mild, medium-carbon, high-carbon steels) and alloy steels (e.g. high strength low-alloy steels (HSLA), tool/die steels, corrosion/heat-resistant steels) [4].

Intended Learning Outcomes:
Technical Outcomes
Upon completion of the module the student should be able to demonstrate a knowledge and understanding of:
- The fundamental concepts across a broad spectrum of material families and mechanical/material properties.
- The basic principles of materials selection in mechanical design, including characterisation of mechanical properties, atomic structure of materials, crystal structures, vacancies and diffusion, microstructure evolution (solidification), phase diagrams, the treatment of plain carbon steels, creep, corrosion and oxidation.

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)
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline (SM3b)
- Understanding of engineering principles and the ability to apply them to analyse key engineering processes (EA1b)

Assessment:	Coursework 1 (20%) Exam - Multiple choice questions (80%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: Online course work assessment - 20%
Formal MCQ in Jan exam period - 80%

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: Feedback on CW1 will be provided during lecture time.

Failure Redemption: A 2 hour multiple choice examination in the supplementary exam period in August will form 100% of the module mark.

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

PENALTY: THE FACULTY OF SCIENCE AND ENGINEERING HAS A ZERO TOLERANCE FOR LATE SUBMISSION OF ALL COURSEWORK AND CONTINUOUS ASSESSMENT
Available to visiting and exchange students.
Full course notes provided. Additional Reading list provided.

EG-182 Manufacturing Technology I

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof HM Davies

Format: Lectures: 30 hours
Directed private study: 40 hours
Preparation for assessment: 30 hours

Delivery Method: Quizzes will be incorporated into the lectures.

Module Aims: Manufacturing makes a major contribution to the world economy and, engineering processes help solve some of the most serious challenges facing society today. The role of engineers in the manufacturing sector is crucial to generate sustainable high economic value products and jobs. To meet this ever-changing role, new graduates require an understanding of established and advanced processes. The module provides students with a holistic view of current, emerging and integrated manufacturing processes, providing a wide range of techniques required for producing product specifications based on process/technology selection. The taught material builds together with knowledge gained from materials and design modules. The topics are delivered by means of traditional lectures in each of the areas shown in the syllabus below.

Module Content: • Overview of Manufacturing and Materials
• Polymers and PMCs
• Ceramics and Cermets
• Glass Working
• Metal Casting
• Powder Metallurgy
• Metal Forming
• Sheet Metalworking
• Metal Machining
• Cutting Tools
• Grinding and other Abrasive Processes
• Heat Treatment of Metals
• Manufacturing Economics
• 21st Century Manufacturing

Intended Learning Outcomes:
Technical Outcomes
Upon completion of this module the student should be able to:
- Describe important manufacturing techniques.
- Understand the control of these techniques including metrology.
- Discuss how the forming techniques affect the material's structure.
- Understand that both materials selection and manufacturing processes are important in producing products with optimum performance at minimum cost.
- Undertake selection of production process for successful product manufacture.
- Perform quality metrology measurements.

Accreditation Outcomes (AHEP)
- Knowledge of characteristics of particular materials, equipment, processes or products (P2)
- Understanding of the use of technical literature and other information sources (P4)
- Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) (P1)

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

Assessment Description: Assessment: 2 hour examination at the end of the Semester (100%). Resits in August will have 100% weighting.

Moderation approach to main assessment: Universal second marking as check or audit

Assessment Feedback: Via generic feedback form from written examinations.

Failure Redemption: Closed book exam in the supplementary exam period in August will form 100% of the module mark.

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.
Assessment: examination.
Resource pack from lecturer. Available to visiting and exchange students.