Swansea University
Prifysgol Abertawe

FACULTY OF SCIENCE AND ENGINEERING

UNDERGRADUATE STUDENT HANDBOOK

YEAR 1 (FHEQ LEVEL 4)

AEROSPACE 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 Aerospace Engineering	Professor Ben Evans
Aerospace Engineering Programme Director	Dr Alexander Shaw A.D.Shaw@swansea.ac.uk
Year 1 Coordinator	Mr Jason McFadzean j.k.mcfadzean@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 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 1 (FHEQ Level 4) 2023/24
Aerospace Engineering
BEng Aerospace Engineering[H400,H405]
BEng Aerospace Engineering with a Year Abroad[H401]
MEng Aerospace Engineering[H403]
MEng Aerospace Engineering with a Year Abroad[H406]

Semester 1 Modules	Semester 2 Modules
EG-113 Engineering Mathematics 1 (Aero & Civil) 10 Credits Dr X Zou CORE	EG-115 Engineering Mathematics 2 (Aero & Civil) 10 Credits Dr N Jamia CORE
EG-163 Design and Laboratory Classes 1 10 Credits Prof D Deganello/Prof JC Arnold/Mr D Butcher/Dr N Jamia/... CORE	EG-120 Strength of Materials (Aero & Civil) 10 Credits Dr S Azizishirvanshahi CORE
EG-166 Engineering Mechanics (Aero & Civil) 10 Credits Dr S Jiffri 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-194 Introduction to Aerospace Engineering 10 Credits Dr Z Ren CORE	EG-165 Engineering Design 1 10 Credits Mr W Jarrett/Dr NV Taylor CORE
EGA119 Engineering Skills for Aerospace Engineers 10 Credits Dr SP Jeffs/Ms NM Chartier/Mrs PM Williams CORE	EGA118 Problem solving for Aerospace Engineers 10 Credits Dr TN Croft CORE
Total 120 Credits	

Year 1 (FHEQ Level 4) 2023/24
Aerospace Engineering
BEng Aerospace Engineering with a Year in Industry[H402]
MEng Aerospace Engineering with a Year in Industry[H404]

Semester 1 Modules	Semester 2 Modules
EG-113 **Engineering Mathematics 1 (Aero & Civil)** **10 Credits** **Dr X Zou** **CORE**	**EG-115** **Engineering Mathematics 2 (Aero & Civil)** **10 Credits** **Dr N Jamia** **CORE**
EG-163 **Design and Laboratory Classes 1** **10 Credits** **Prof D Deganello/Prof JC Arnold/Mr D Butcher/Dr N Jamia/...** **CORE**	**EG-120** **Strength of Materials (Aero & Civil)** **10 Credits** **Dr S Azizishirvanshahi** **CORE**
EG-166 **Engineering Mechanics (Aero & Civil)** **10 Credits** **Dr S Jiffri** **CORE**	**EG-135** **Placement Preparation: Science and Engineering Year in Industry** **0 Credits** **Prof GTM Bunting/Dr SA Rolland/Dr V Samaras**
EG-180 **Introduction to Materials Engineering** **10 Credits** **Dr MP Coleman** **CORE**	**EG-160** **Fluid Mechanics 1** **10 Credits** **Dr F Del Giudice/Dr A Celik/Dr JS Thompson** **CORE**
EG-194 **Introduction to Aerospace Engineering** **10 Credits** **Dr Z Ren** **CORE**	**EG-161** **Thermodynamics 1** **10 Credits** **Dr A Coccarelli/Dr M Togneri** **CORE**
EGA119 **Engineering Skills for Aerospace Engineers** **10 Credits** **Dr SP Jeffs/Ms NM Chartier/Mrs PM Williams** **CORE**	**EG-165** **Engineering Design 1** **10 Credits** **Mr W Jarrett/Dr NV Taylor** **CORE**
	EGA118 **Problem solving for Aerospace Engineers** **10 Credits** **Dr TN Croft** **CORE**
Total 120 Credits	

EG-113 Engineering Mathematics 1 (Aero & Civil)

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr X Zou

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: This module will consist of lectures, which concentrate on understanding the concepts of mathematical theory and the application in solving engineering problems. Besides, self-directed e-learning and e-assessment system MyMathLab developed by Pearson, which concentrate on practising the calculation techniques, will be available through the Canvas Digital Learning Platform.

Module Aims: This module, in combination with Engineering Mathematics 2 (Aero & Civil), provides the essential grounding in mathematical analysis techniques for students in departments of Aerospace Engineering and Civil Engineering. This module ensures that all students have a suitable level of mathematical skills for subsequent engineering modules.

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. Graphing/plotting of functions.

• 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: linear equation system, Gauss elimination, matrices, rules of matrix algebra, rank and linear dependence, calculation of determinates and eigenvalue problems.

Intended Learning Outcomes: On successful completion of this module students will be expected, at threshold level, to be able to:

Technical Outcomes
- Demonstrate knowledge of the fundamentals of mathematics, which underpin their engineering degree.
- Demonstrate a comprehension of the fundamentals of mathematics, which underpin their engineering degree, through the use of the following specific techniques: manipulate algebraic expressions, differentiation (including optmisation of functionals), integration, matrices and Gauss elimination.

Accreditation Outcomes (AHEP3)
- 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 (10%)
Coursework 2 (10%)
Coursework 3 (10%)
Coursework 4 (10%)
Examination (60%)

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

Assessment Description: Coursework:
4 electronic online tests with randomised coefficients will be set during the semester, in total worth 40% of the final mark. There will be an opportunity to practice similar exercises before attempting each test. Each test is an individual piece of coursework.

Examination:
A closed book 2 hour examination will take place in January (worth 60% of the final mark).

Specific rules for passing this module:
This module is assessed by a combination of examination and continual assessment. In order to pass the module students must achieve a minimum of 40% 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%.
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 complete the coursework.
Resits are in the format of a supplementary exam.

Moderation approach to main assessment: Moderation of the entire cohort 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-115 Engineering Mathematics 2 (Aero & Civil)

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules: EG-113

Co-requisite Modules:

Lecturer(s): Dr N Jamia

Format: Lectures 20 hours
Tutoring classes 10 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: This module will consist of lectures and examples classes, which concentrate on understanding the concepts of mathematical theory and the application in solving engineering problems. Besides, self-directed e-learning and e-assessment system MyMathLab developed by Pearson, which concentrate on practising the calculation techniques, will be available through the Canvas Digital Learning Platform.

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

Module Content:
• Vectors: physical meaning, Cartesian, cylindrical and spherical coordinates scalar and cross products. Equations of lines and planes. Scalar and vector fields.
• Complex numbers: manipulation with complex numbers, Cartesian, polar and exponential forms. Functions of complex variable, Euler's formula, relationship between trigonometric and hyperbolic functions. Solving ODEs with the help of complex numbers.
• 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, homogeneous and inhomogeneous. Laplace transform methods.
• Functions of more than one variable: visualisation, partial differentiation, vector calculus differential operators (in Cartesian coordinates). Contour, surface and volume integrals.
• Sequences and series, infinite series, tests of convergence. Taylor series of common functions.

Intended Learning Outcomes:
On successful completion of this module students will be expected, at threshold level, to be able to:

Technical Outcomes
- Demonstrate knowledge of the fundamentals of 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 (AHEP3)
- 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 (10%) Coursework 2 (10%) Coursework 3 (10%) Coursework 4 (10%) Examination (60%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: Coursework:
4 electronic online tests with randomised questions will be set during the semester, in total worth 40% of the final mark. There will be an opportunity to practice similar exercises before attempting each test. Each test is an individual piece of coursework.

Examination:
A closed book 2 hour examination will take place in May/June (worth 60% of the final mark).

Specific rules for passing this module:
This module is assessed by a combination of examination and continual assessment. In order to pass the module students must achieve a minimum of 40% 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%.
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 complete the coursework.

Resits are in the format of a supplementary exam.

Moderation approach to main assessment: Moderation of the entire cohort 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-120 Strength of Materials (Aero & Civil)

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr S Azizishirvanshahi

Format: Lectures 1 hour per week
Example classes 2 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 - 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.
3 - Stress and Strain analysis: principal directions, maximum shear stress, Mohr's circle, stress-strain relationships in linear elasticity. Stresses in pressurised vessels.
4 - Advanced beam theory: combined loading, torsion theory, shear stresses, shear warping of sections.
5 - Revision

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)
- 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)
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering (SM3b)
- Understanding of engineering principles and the ability to apply them to analyse key engineering processes (EA1b)
- Knowledge of characteristics of particular materials, equipment, processes or products (P2)

Assessment:	Assignment 1 (7%) Assignment 2 (7%) Assignment 3 (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.

Each assignment consists of a Canvas test.

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: Moderation of the entire cohort 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.

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

Credits: 0 Session: 2023/24 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-160 Fluid Mechanics 1

Credits: 10 Session: 2023/24 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: 30 Hours (3 hours per week) Office Hour: 33 hours (3 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 contact hours of lectures, first some concepts to strengthen the theoretical understanding of the topic will be introduced, followed by several exam-like examples. Common difficulties experienced by the cohort when studying the preparation material will also be addressed.

Module Aims: Fluid mechanics is ubiquitous in our daily life, as well as within a wide breath of engineering disciplines. For instance, fluid mechanics plays a crucial role in understanding and optimising the flow of air around aircraft, in the design and optimization of vehicles, in the design and analysis of chemical reactors, mixing vessels, heat exchangers, and other process equipment, and it also underpins several key processes taking place in our body (e.g. blood flow).

This modules provides an introduction to Fluid Mechanics, with special focusing on hydrostatics, hydrodynamics and pipe flow. Hydrostatics is essential to identify points of high pressure in a system and to also identify forces acting on submerged surfaces either planar or curved. Hydrodynamics, instead, focuses on the motion of fluids and the requirement to identify pressure drops, losses, flow rate values, and forces generated by moving fluids. Pipe flow is a special case of hydrodynamics, where the fluid is forced to flow in a closed geometry that can have different types of cross-section.

Module Content: Introduction to the module. Classification of fluid flows. System and control volume. Importance of dimensions and units. Density and specific gravity. Viscosity. [3]
Pressure at a point. Variation of pressure with Depth. Stevin’s and Pascal Law. Hydraulic Jack. Multi-flow manometers. [3]
Forces on Planar Surfaces. Forces on submerged planar objects. Forces acting on gates and moment equation. [3]
Forces on Curved Surfaces. Cylindrical gates. Circular gates attached to springs. [3]
Class Test on hydrostatics.[2]
Conservation of Mass and Energy. Mass and volume flow rate. Mass balance for steady-flow processes. Incompressible flows. The Bernoulli equation. General Energy equation. [3]
Laminar and Turbulent flow in pipes. The Moody Chart. Iterative procedure for the resolution of fluid mechanics problems. Flow in channel having a different cross-section. [3]
Minor Losses in Pipe Flows. [3]
Piping Network and and Pump selection [3]
Momentum analysis of flow systems. Newton's law. Choosing a contro volume. Forces acting on a control volume. The linear Momentum equation. [5]

Intended Learning Outcomes: Technical Outcomes
By the end of the module, the student should be able to:
- Critically apply fluid mechanics laws and equations to solve engineering problems.

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 (1.8%) Examination (60%) Class Test 1 - Coursework (25%) Coursework 2 (1.8%) Coursework 3 (1.8%) Coursework 4 (1.8%) Coursework 5 (1.8%) Coursework 6 (1.8%) Coursework 7 (1.8%) Coursework 8 (1.8%)

Assessment Description: Coursework (15%): this coursework component is a sum of 8 weekly individual components. It will be completed using a technology-adaptive platform fully integrated into Canvas. Students will be expected to complete a theory section in preparation for each week's lecture.

Class Test (25%): this is a 1-hour closed book class-test to be completed in a university computer room in invigilated conditions. The test will focus on Fluid Statics. The class test will take place in Week 5 of the teaching block. For those with granted Extenuating Circumstances, the class test will be sat in week 11 of the teaching block. If a second extenuating circumstances in approved, the class test will be disregarded from the mark, and the module mark will instead be calculated as 0.15 x CW1 + 0.85 x Examination.

Examination 1 (60%): This is a 2-hour closed book exam. Students will be expected to solve two new fluid mechanics problems about fluid dynamics. For those of you with granted deferrals, the exam paper will be the same as the one for the cohort re-sitting the module, meaning that students will have to solve two problems featuring all the topics in the module, including hydrostatics.

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: Moderation of the entire cohort as Check or Audit

Assessment Feedback: Students will receive instant feedback on their coursework components and on their class test.

Failure Redemption: Resit: Examination 100%
This is a 2-hours closed book exam. Students will be expected to solve two new fluid mechanics problems featuring all the topics presented in the module, meaning hydrostatics and hydrodynamics.

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 cohorts.

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: 2023/24 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: Moderation of the entire cohort 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-163 Design and Laboratory Classes 1

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof D Deganello, Prof JC Arnold, Mr D Butcher, Dr N Jamia, Prof RJ Lancaster, Dr B Morgan, Mr R Rees

Format: Lectures: 9 hours; Example classes / Laboratory work: 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

Continual Assessment: Coursework and laboratory classes. PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION

Available to visiting and exchange students.

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

Module Content:
a) CAD: Introduction to 3D modelling (Solidworks) and drawings
b) Engineering drawing standards
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:
Produce engineering drawings to the required standard using a CAD system.
Apply basic laboratory techniques including safety issues; data manipulation; development of report writing skills and teamworking.

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 a Aerospace themed assembly Coursework 3: Material selection Laboratory report Coursework 4: Mechanical testing report Coursework 5: Fluid experiment report
Moderation approach to main assessment: Moderation by sampling of the cohort
Assessment Feedback: 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-165 Engineering Design 1

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules: EG-163

Lecturer(s): Mr W Jarrett, Dr NV Taylor

Format: Lectures: 8 hours
Example classes / Laboratory work: 16 hours
Directed private study 76 hours [including the Engineering Application's 50 hours] Contact Hours will be delivered on-campus and may include, for example, lectures (recorded also), 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: Design projects culminating in 100% total.

Module Aims: This course will look at a design case study as given in the course text. This covers a wide range of topics 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 lecture 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: Students will demonstrate basic engineering understanding and design using CAD: bearings, fasteners, limits and fits, tolerances, surface finish. 30 hours nominal study.
3. Engineering Applications. A competitive design and make project and workshop familiarisation, via a manufacture to design project. This is a compulsory part of the module.
Product testing is held during term after the summer exam period. Aerospace students are Swansea based for this exercise. 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 (30%)
Coursework 3 (40%)
Coursework 2 (10%)
Coursework 4 (20%)

Resit Assessment: Coursework reassessment instrument (100%)

Assessment Description: Coursework 1: Casting Machine Coursework 2: Glider Design Presentation Coursework 3: Glider Design Report Coursework 4: Glider Build and Test Basic design assignment (bearing selection, datums, fits & finish) 30% Design project 40% Presentation 10% Built and test 20% All marks are group marks. Zero contribution, however, will lead to zero marks.
Moderation approach to main assessment: Moderation by sampling of the cohort
Assessment Feedback: Lecturer and teaching assistants will provide feedback during laboratory sessions and on marking assignments. Tutorial sessions may also be used for general feedback and guidance.
Failure Redemption: Module failure redeemed by a design exercise and submitting a formal report during the normal resit period in summer, which will become 100% of the final mark.
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-166 Engineering Mechanics (Aero & Civil)

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr S Jiffri

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 (synchronous) online sessions and pre-recorded (asynchronous) online material.

Delivery Method: This module will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity.

Module is Lecture and Examples class based.
A blend of live (synchronous) and pre-recorded (asynchronous) online delivery is envisaged.
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:	Examination 1 (80%)
	Class Test 1 - Coursework (10%)
	Class Test 2 - Coursework (10%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: 20% from two online tests (10% each) administered via Canvas at the middle and towards the end of semester 1, and 80% from an in-person January examination.

This module is assessed by a combination of examination and continual assessment. In order to pass the module students must achieve a minimum of 40% 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%.
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 complete the coursework.
Resits are in the format of a supplementary exam.

Moderation approach to main assessment: Moderation of the entire cohort 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 College 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: 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.

EG-180 Introduction to Materials Engineering

Credits: 10 Session: 2023/24 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: Moderation of the entire cohort 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-194 Introduction to Aerospace Engineering

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr Z Ren

Format: Live sessions: 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: A typical week will consist of a three hour live sessions. These sessions will cover the topics that the students will be required to understand in order to succeed in this module. In addition the students should expect to spend an average of a little over 3 hours per week during the teaching term supporting their learning through additional reading, working through examples and completing assignments. Over the semester it is expected that 70 hours of self directed learning will be required for this module.

Module Aims: This module will introduce students to the fundamental technology of aerospace engineering. It serves as an integrating module, demonstrating the application of the fundamental scientific principles taught in other modules, in an aerospace context. The module provides a foundation for further specialist aerospace modules at levels 5, 6 and 7.

Module Content: - Introduction [1]
- History of aviation. [1] (Not examined)
- RAeS visit [1] (Not examined)
- The standard atmosphere [1]
- Airfoils, wings and other aircraft components [3]
- Basic principles of flight and aerodynamic characteristics of aircraft. [3]
- Introduction to engine types and characteristics [2]
- Introduction to aircraft performance in flight [3]
- glide and climb [2]
- range and endurance, [2]
- loops and turns. [4]
- Introduction to the regulatory system for aircraft and testing [4]
- Materials for aerospace applications [2]
- Review [1]

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

• Collect from a variety of sources information related to an aerospace topic and write a paper that discusses the important aspects of the topic (Evaluated in the assessment 1, G1)
• Identify the equations that can be applied to the solution of problems involving cruise, climb or glide flight and perform calculations to determine flight characteristics such as speed, range, endurance. (Evaluated in assignment 2 and the examination, SM1, EA1)
• Demonstrate knowledge and comprehension of the fundamental engineering principles of flight. (Evaluated in the examination, SM1, EA1)

Note: The G1, SM1 et cetera codes relate to accreditation learning outcomes

Assessment:	Examination 1 (75%)
	Assignment 1 (12.5%)
	Assignment 2 (12.5%)
Resit Assessment:	Examination (Resit instrument) (87.5%)
	Coursework reassessment instrument (12.5%)

Assessment Description: The first assignment will require the students to write a two page report, using a prescribed format that is consistent with formal writing, on a topic related to an aircraft design concept. This assignment will require the student to make use of the library and the intranet to obtain the information they will include in the report. This is an individual piece of coursework. The second assignment will test the student's understanding of the mathematics and concepts underlying the topics covered in the course. This is an individual piece of coursework. It will consist of four Canvas tests, each consisting of three questions plus the submission of worked solutions to some of the Canvas test questions plus a more open question. The examination will be an in person, closed book examination with a duration of 2 hours.
Moderation approach to main assessment: Moderation of the entire cohort as Check or Audit
Assessment Feedback: Feedback on the first assignment will be available on Canvas. Feedback on the second assignment will be through the return of the marked submission. Step by step solutions to the questions will be posted on Canvas. Examination feedback will be available through the forms submitted to the Engineering Community page on Canvas.
Failure Redemption: Failure in the module can be redeemed through a combination of the equivalent of the first assignment and the examination. Students who have failed the module but achieved a pass mark in the first assignment at the first sit will carry that mark forward to the resit and will not be allowed to repeat the assignment. Students who have failed the module but achieved a pass mark in the combined mark of the second assignment and the examination will carry that mark forward to the resit and will not be allowed to repeat the examination.
Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus. Visiting/Exchange students are eligible to enroll on this module. Canvas will be used as a repository of all module related documents. The Faculty of Science and Engineering has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment

EGA118 Problem solving for Aerospace Engineers

Credits: 10 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr TN Croft

Format: Lectures 7 hours
Presentations 1 hour (Or more by choice)
Laboratory work 12 hours

Delivery Method: The module employs a flipped learning approach with respect to delivery of the content.

The non-MATLAB content of the module is contained in seven chapters. Students will be required to read a chapter related to the current topic. Summative quizzes are used to allow students to measure their understanding of the topics. Additionally, teams of (normally) seven students prepare presentations each week on a given task related to the current chapter. Every student is expected to present to their peers once.

The learning of the MATLAB component of the module is supported by resources provided on Canvas in the form of recorded examples, worksheets and code examples. Computer laboratory sessions will run each week throughout the semester. It is through practice in these labs that students should determine their understanding of programming. The lectures will provide a link between the learning material and MATLAB. They are not intended as the primary learning mechanism for either but aim to put some of the learning material in a MATLAB context.

Module Aims: The module provides an introduction to some of the problem solving techniques that can be used to address the type of problems that are encountered by aerospace engineers. The module will introduce students to the concepts of structured programming and software engineering. It will then use MATLAB to allow the students to practice using the techniques.

Module Content:
• An introduction to the module and the teaching techniques to be used
• The concepts of problem solving and structured programming
 o An introduction to problem solving
 o Data and variables
 o Logic and loops
 o Structured Programming
 o Pseudo Code
 o Program Design
• Basic space theory
 o Launch equations
 o Orbital equations
• MATLAB
 o Basic MATLAB commands
 o Matrix manipulation within MATLAB
 o Plotting in MATLAB
 o If, for and while constructs in MATLAB
 o Writing a function in MATLAB
 o Solving transient problems using MATLAB

Intended Learning Outcomes: Technical Outcomes
On successful completion of this module, students should be able, at threshold level, to:
• Work as part of a group to create presentations and individually present to their peers what they have learnt related to problem solving (Assessed through assignment 1)
• Demonstrate knowledge and comprehension of what they have learnt related to problem solving (Assessed through assignment 2 and the examination)
• Show knowledge and comprehension of the flying experience (Assessed through assignment 3)
• Use MATLAB, pseudo code, flow charts and other techniques taught in this module as part of problem solving.
(Assessed through assignment 4)

Advanced level learning outcomes that will be assessed to allow students to demonstrate enhanced abilities in the topic.
• Demonstrate the ability to apply what they have learnt related to problem solving (Assessed through the problem solving exercise)

Assessment:
Assignment 1 (10%)
Assignment 2 (10%)
Assignment 3 (10%)
Assignment 4 (20%)
Examination 1 (50%)

Assessment Description: "Presentation (Assignment 1): Students will deliver a talk based on the reading material. The presentations will be distributed over the taught portion of the module. Presentations will be on different topics. The creation of the presentation is expected to be a group activity. Delivery of the presentation will be an individual activity. Marks will be awarded to the group for the technical content, and to the presenter for presentation style. Each
member of a group will present once during the module.

The remainder of the assessments will be individual activities:

Canvas Test (Assessment 2): A set of Canvas tests will be used to evaluate the understanding of the concepts. The tests will not be timed beyond having a deadline for submission.

Flight Simulator Exercise (Assessment 3): The students will perform a set of tasks using the flight simulator. This exercise will normally be performed in semester 1.

MATLAB Exercise (Assessment 4): The exercise will have two purposes. The first is to test the ability of the students to do some basic tasks in MATLAB. The second purpose is to test the ability to write a MATLAB program to solve engineering based problems.

Examination: The examination will consist of a 2.0 hour examination. The exam will comprise of a set of compulsory questions that will test the student's knowledge and comprehension of the subjects covered in the module as well as their use of problem solving techniques. Questions in the exam will cover all topics introduced in the module's reading material with the exception of the basic space theory. The problem solving part of the examination will not require the writing of MATLAB code but may require the student to undertake the understand, design, implement and review stages of problem solving.

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

Assessment Feedback: Feedback for the examination will be in a standard format on the College of Engineering Community page on Canvas. Information provided includes average marks, maximum and minimum marks for the exam as a whole and for individual questions.

Feedback for the Canvas tests will be through the test themselves.

Feedback for the MATLAB exercises will be through worked solutions that are uploaded to Canvas as well as individual comments.

Failure Redemption: If a student is awarded a re-sit: Failure Redemption of this module will be by repeating an equivalent assignment to any component in which a pass mark was not achieved. Marks achieved in components passed during the first attempt in the current academic year will automatically be transferred to the equivalent component in the resit. No opportunity to resit the passed components will be allowed.
Additional Notes: • Students will be required to achieve an average score of 70 out of 100 over the assessments, assignments plus examination, to pass this module. As the university exam system requires a pass mark of 40, scaling will be used to convert the actual marks achieved to that required by the exam system. 0 will be mapped to 0, 70 will be mapped to 40 and 100 will be mapped to 100. Linear scaling will be used between these data points, for example for an actual mark (AM) of less than or equal to 70 the exam system mark will be AM*40/70 and for an actual mark of over 70 the exam system mark will be will map to 2*AM-100 • There is no requirement to achieve a specific mark in any assessment, including the examination. Only the total mark matters in deciding pass or fail. Marks in assessments will affect what is resat should the student fail the module, see the rules in the relevant section • Available to Visiting and Exchange students. • Penalty for late submission of work: ZERO TOLERANCE.

EGA119 Engineering Skills for Aerospace Engineers

Credits: 10 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr SP Jeffs, Ms NM Chartier, Mrs PM Williams

Format: Lectures and seminars 14 hours
Practical work 16 hours
Assessment and 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

Combination of synchronous and asynchronous lectures, PC labs and group work
Assessment: 100% Continual Assessment
Penalty for late submission of continual assessment: Zero mark

CW1 is a compulsory component that cannot be exempted as it meets key learning outcomes for the programme.

Module Aims: The module will introduce students to a range of professional skills that are part of engineering practice such as group work, ethics, sustainability, virtual reality (VR), health & safety and employability. Technical communication and report writing will also be introduced in the module in the context of the Bloodhound LSR. To allow students to practice these skills a statistical based analysis exercise using Excel will be undertaken. Excel, uncertainty and statistical skills will also be taught as part of the module to support the analysis exercise.

Module Content:

• Management principles: team dynamics, project planning, leadership skills.

• Career planning and professional development: CVs, covering letters, interview techniques, personal development planning.

• Roles and responsibilities of professionals in science and engineering: health and safety, risk assessment, sustainability, environmental issues.

• Introduction to uncertainty, statistics and Excel: basics of uncertainty, introduction to statistical methods, introduction to Excel, input and output of data, operations, functions, plotting.

• Introduction to virtual reality (VR)

• Ethics in Engineering case studies.

Intended Learning Outcomes: Technical Outcomes On successful completion of this unit, students should be able, at threshold level, to: • Describe the wider multidisciplinary engineering context and its underlying principles as well as describe the ethical implications of engineering design and practice (All CWs – G1, P1, EL1, EL6, D6). • Recognise and discuss the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement (CW2, CW5, CW7 – EL2, P8). • Select appropriate quantitative science and engineering tools to the analysis of problems (CW2, CW7 – G1). • Show evidence of practical engineering skills acquired through, for example, work carried out in laboratories & workshops; in individual and group project work; in design work; and in the development and use of software in design, analysis and control. (CW4, CW6, CW7 – G1, G2, G3, P11). • Identify management techniques that may be used to achieve engineering objectives within that context (CW7 – EL3, P11, G4). • Outline the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues (CW3, CW7 – EL5). Accreditation Outcomes (AHEP) - Communicate their work to technical and non-technical audiences (D6) - Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct (EL1) - Knowledge and understanding of the commercial, economic and social context of engineering processes (EL2) - Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives (EL3) - Awareness of relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues (EL5) - Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, and of risk assessment and risk management techniques (EL6) - Understanding of contexts in which engineering knowledge can be applied (eg operations and management, application and development of technology, etc) (P1) - Ability to work with technical uncertainty (P8) - 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) - Plan self-learning and improve performance, as the foundation for lifelong learning/CPD (G2) - Plan and carry out a personal programme of work, adjusting where appropriate (G3) - Exercise initiative and personal responsibility, which may be as a team member or leader (G4)
Assessment: Coursework 1 (10%) Coursework 2 (10%) Coursework 3 (10%) Coursework 4 (20%) Coursework 5 (5%) Coursework 6 (5%) Coursework 7 (40%) **Resit Assessment:** Coursework reassessment instrument (100%)
Assessment Description: Coursework 1: English Audit, Learning & Academic Integrity (10%) {all are self study} Coursework 2: Uncertainty CANVAS Test (10%) Coursework 3: Excel CANVAS Test (10%) Coursework 4: Ethics Presentation Video (20%) Coursework 5: Career Development Course (5%) Coursework 6: Virtual Reality - Aerospace Spatial Awareness (5%) Coursework 7: Group Report & Performance Analysis (40%) - Group Performance Analysis (10%), Bloodhound LSR Technical Report (30%)
Moderation approach to main assessment: Moderation by sampling of the cohort
Assessment Feedback: All assignments will be submitted electronically via CANVAS and will receive electronic feedback. Seminar sessions will also be used for general feedback and guidance related to the module.

Failure Redemption: Supplementary coursework, which will form 100% of the module mark, will be available for students.
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; SUBMISSION ON EACH ASSIGNMENT MANDATORY. CW1 is a compulsory component that cannot be exempted as it meets key learning outcomes for the programme. Available to visiting and exchange students.