Swansea University
Prifysgol Abertawe

FACULTY OF SCIENCE AND ENGINEERING

UNDERGRADUATE TAUGHT STUDENT HANDBOOK

YEAR 0 (FHEQ LEVEL 3)

FOUNDATION ENGINEERING

DEGREE PROGRAMMES

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

DISCLAIMER

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

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

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

The 23-24 academic year begins on 25 September 2023

Full term dates can be found here

DATES OF 23-24 TERMS

25 September 2023 – 15 December 2023

8 January 2024 – 22 March 2024

15 April 2024 – 07 June 2024

SEMESTER 1

25 September 2023 – 29 January 2024

SEMESTER 2

29 January 2024 – 07 June 2024

SUMMER

10 June 2024 – 20 September 2024

IMPORTANT

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

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

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

Welcome to the Faculty of Science and Engineering!

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

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

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

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

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

Faculty of Science and Engineering	
Pro-Vice-Chancellor and Executive Dean	Professor David Smith
Director of Faculty Operations	Mrs Ruth Bunting
Associate Dean – Student Learning and Experience (SLE)	Professor Laura Roberts
School of Aerospace, Civil, Electrical, General and Mechanical Engineering	
Head of School	Professor Antonio Gil
School Education Lead	Professor Cris Arnold
Head of Electronic and Electrical Engineering	Professor Vincent Teng
Foundation Engineering Programme Director	Dr Augustine Egwebe

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/

FACULTY OF SCIENCE AND ENGINEERING

Progression Requirements from Year 0 Foundation Year to Year 1 Undergraduate Programmes (2023-24)

The following progression requirements ensure that the Foundation Year meets the requirements of the Professional Institutions which accredit our degrees.

The normal University Progression rules require you to pass all modules with at least 40% in each module. You can have up to 20 credits with marks between 30% and 40% and still progress. These are known as "tolerated failures". However, certain modules are classed as 'Core' and **a minimum mark of 40%** must be attained in each of these modules. The table below shows which modules are 'Core' for progression to which Year 1 programmes.

DEGREE SCHEMES		EG-003	EG-001	EG-002	EG-091
Aerospace Engineering		CORE	CORE	CORE	
H405	FEGAS				
Chemical Engineering		CORE	CORE	CORE	
H835	FEGBS				
Chemistry					CORE
F10F	FCHEMS				
Civil Engineering		CORE	CORE	CORE	
H205	FCIVS				
Electronic & Electrical Engineering			CORE	CORE	
H605	FEEES				
Engineering		CORE	CORE	CORE	
H101	FEGGS				
Materials Engineering			CORE		
J505	FMTSS				
Mechanical Engineering		CORE	CORE	CORE	
H307	FMECS				

Biomedical Engineering		**CORE**	**CORE**	**CORE**	
HBC9	**FEGLS**				

Year 0 (FHEQ Level 3) 2023/24
Foundation Year

BEng Aerospace Engineering[H405]
BEng Biomedical Engineering[HBC9]
BEng Chemical Engineering[H835]
BEng Civil Engineering[H205]
BEng Engineering with Deferred Choice of Specialism with a Foundation Year[H101]
BEng Mechanical Engineering[H307]

Semester 1 Modules	Semester 2 Modules
EG-001 **Foundation Mathematics for Engineers I** **15 Credits** **Dr SP Jeffs/Dr DR Daniels** **CORE**	**EG-002** **Foundation Mathematics for Engineers II** **15 Credits** **Dr AJ Williams/Dr AM Higgins** **CORE**
EG-091 **Chemistry of Materials** **15 Credits** **Prof G Williams/Prof HM Davies**	**EG-003** **Applied Engineering** **30 Credits** **Dr C Wang/Dr AM Higgins/Dr B Sandnes** **CORE**
EG-092 **Fundamentals of Engineering Science** **15 Credits** **Dr WC Tsoi/Dr A Egwebe**	
EG-000 **Fundamentals of Engineering Design** **30 Credits** **Dr MR Brown/Dr WG Bennett/Dr J Li/Dr B Morgan**	
Total 120 Credits	

Year 0 (FHEQ Level 3) 2023/24
Foundation Year
BEng Electronic and Electrical Engineering[H605]

Semester 1 Modules	Semester 2 Modules
EG-001 **Foundation Mathematics for Engineers I** **15 Credits** **Dr SP Jeffs/Dr DR Daniels** **CORE**	**EG-002** **Foundation Mathematics for Engineers II** **15 Credits** **Dr AJ Williams/Dr AM Higgins** **CORE**
EG-091 **Chemistry of Materials** **15 Credits** **Prof G Williams/Prof HM Davies**	**EG-003** **Applied Engineering** **30 Credits** **Dr C Wang/Dr AM Higgins/Dr B Sandnes**
EG-092 **Fundamentals of Engineering Science** **15 Credits** **Dr WC Tsoi/Dr A Egwebe**	
EG-000 **Fundamentals of Engineering Design** **30 Credits** **Dr MR Brown/Dr WG Bennett/Dr J Li/Dr B Morgan**	
Total 120 Credits	

Year 0 (FHEQ Level 3) 2023/24
Foundation Year
BEng Materials Science and Engineering[J505]

Semester 1 Modules	Semester 2 Modules
EG-001 **Foundation Mathematics for Engineers I** **15 Credits** **Dr SP Jeffs/Dr DR Daniels** **CORE**	**EG-002** **Foundation Mathematics for Engineers II** **15 Credits** **Dr AJ Williams/Dr AM Higgins**
EG-091 **Chemistry of Materials** **15 Credits** **Prof G Williams/Prof HM Davies**	**EG-003** **Applied Engineering** **30 Credits** **Dr C Wang/Dr AM Higgins/Dr B Sandnes**
EG-092 **Fundamentals of Engineering Science** **15 Credits** **Dr WC Tsoi/Dr A Egwebe**	
EG-000 **Fundamentals of Engineering Design** **30 Credits** **Dr MR Brown/Dr WG Bennett/Dr J Li/Dr B Morgan**	
Total 120 Credits	

EG-000 Fundamentals of Engineering Design

Credits: 30 Session: 2023/24 Academic Year

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr MR Brown, Dr WG Bennett, Dr J Li, Dr B Morgan

Format: Contact hours;
Taught lectures (50 hours)
Computer labs (20 hours)
Design group work tutorials (50 hours)

Delivery Method: This module will employ a blended approach to delivery using on-site lectures and group activities each week with the Canvas Digital Learning Platform for self-directed online activity.

Module Aims: This module provides the essential skills required for future design modules and project tasks by providing a firm grounding for teamwork and emphasizing the need for professional standards and strong communication skills within engineering.

Module Content: The role of a professional engineer within society and skills necessary to become an effective engineer
Personal and professional development: self-awareness; reflection; setting targets; receiving and acting upon feedback
Project Work: structure of the project, planning and organisation, managing competing demands and prioritizing tasks; brainstorming, review of progress.
Teamwork: active listening: delegation; providing effective feedback
Research skills - Making effective use of resources to search for and gather relevant information to develop knowledge and understanding and present accurate research information
Critical Thinking: assess, interrogate and create arguments
Oral, written and graphical communication
Statistical analysis and the use of computer software
Problem Solving and the design process
Design tasks to identify problems to be solved, to create conceptual ideas to solve a problem, to understand and be able to work to a design brief, to consider external factors on engineering design.

Intended Learning Outcomes: After completing this module the student should be able to demonstrate:
An increased understanding of the engineering profession and the variety of roles available to engineering graduates
Knowledge and understanding in the fundamental skills that engineers require during academic study and professional careers.

Students should develop an ability to:
Present and communicate ideas, including, plans and designs effectively to variety of audiences, provide written descriptions and explanation
Create engineering drawings / sketches to represent to represent 3D structures, with appropriate detail.
Plan and carry out project work as a member of a group and individually
Use basic computational methods to solve engineering problems
Demonstrate feedback literacy and provide meaningful, clear and constructive peer feedback
Recognise anomalies within data, manipulate data to task and purpose

AHEP 4

Select and use technical literature and other sources of information to address well-defined problems.
Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet business, customer or user needs as appropriate. This will involve consideration of applicable health and safety, diversity, inclusion, cultural, societal and
environmental matters, codes of practice and industry standards.
Function effectively as an individual, and as a member or leader of a team
Communicate effectively with technical and non-technical audiences
Plan and record self-learning and development as the foundation for lifelong learning/CPD.

Assessment:	Coursework 1 (5%) Coursework 2 (10%) Coursework 3 (15%) Coursework 4 (25%) Coursework 5 (15%) Coursework 6 (15%) Coursework 7 (15%)
Resit Assessment:	Coursework reassessment instrument (100%)

Assessment Description: Coursework 1 Reflection and development plan Individual 5%
Coursework 2 Lab report (linked to EG-092) Individual 10%
Coursework 3 Data Analysis and Statistics assignment Individual 15%

Each group design task includes: Group reflection; Project Plan, Team log, aims, contract plus additional elements depending on coursework number

Coursework 4 Design 1 (Redesign of current product) Group 25%
Design Report: Context, PDS, initial design ideas
Design pitch

Coursework 5 Design 2 (Prototyping) Group 15%
Design Report: initial design ideas, evidence of iterative design, evaluation

Coursework 6 Design 3 (Provided Need and PDS) Individual 15%
Engineering drawing and description

Coursework 7 Design 4 (Need given) Group 15%
Design Report PDS, PDS justification, Concepts, Final design

Peer feedback/marking will be used for group assessment

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

Assessment Feedback: Formative and peer feedback will be given in group/workshop sessions
Feedback during Q&As in lecture and example classes.
Lecturer available for ad-hoc feedback during office hours.
Written feedback on all coursework submitted

Failure Redemption: Students will be given an alternative assessment during the resit period.

Additional Notes: The FSE has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment.

EG-001 Foundation Mathematics for Engineers I

Credits: 15 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr SP Jeffs, Dr DR Daniels

Format: Synchronous lectures and example classes: 44 hour

Delivery Method: This module will employ a blended approach to delivery using on-site lectures and example classes each week with the Canvas Digital Learning Platform for self-directed online activity.

Module Aims: This module will introduce some of the key mathematical techniques used in engineering including algebra, functions, trigonometry and vectors

Module Content: Fractions, percentages and ratios;
Basic algebra: indices, algebraic expressions, equation manipulation, use of brackets;
Functions and their graphs, lines, quadratics and polynomials, exponentials and logarithms; Inverse, periodic, rational;
Trigonometry: angles, trigonometrical functions, polar coordinates;
Linear, quadratic, simultaneous equations;
Introduction of vectors;

Intended Learning Outcomes: Understand fundamental mathematical principles and their relevance to engineering disciplines
Select appropriate techniques to solve well defined mathematical problems
Solve well defined problems using basic mathematical techniques

AHEP 4
Apply knowledge of mathematics, statistics, natural science and engineering principles to well-defined problems

Assessment:	Coursework 1 (30%) Coursework 2 (10%) Examination (60%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: Coursework 1: 4 x MyLab Math online MCQ Electronic online tests with randomised coefficients will be set during the semester. These tests make up 30% of the course, where each test is an individual piece of coursework worth 7.5%

Coursework 2: Mid-term test under exam conditions (10%)

January examination: 2-hours (60%)

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 students pass the exam but have failed the coursework, they 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: Coursework feedback will be provided within 3 weeks of the deadline according to University policy. Where assessment is a computer based assignment, the feedback will be completed online and if required during lectures. Feedback will also be provided verbally through example classes. Students can also attend office hours for this module for individual feedback. Exam: an examination feedback summary is available online to students.

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

Additional Notes: Available to visiting and exchange students. This module will be supported with Canvas. Penalty for late submission of continuous assessment: zero tolerance. This module is assessed by a combination of examination (60%) and coursework (40%).

EG-002 Foundation Mathematics for Engineers II

Credits: 15 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr AJ Williams, Dr AM Higgins

Format: Synchronous lectures and example classes: 44 hours;

Delivery Method: This module will employ a blended approach to delivery using on-site lectures and example classes each week with the Canvas Digital Learning Platform for self-directed online activity.

Module Aims: This module will introduce some of the key mathematical techniques used in engineering including integration and differentiation

Module Content: Syllabus should be as shown below:

Differentiation: geometrical basis, definition and examples. Tangents and normal to curves.
Differentiation of elementary functions. Differentiation rules including chain rule, product rule and quotient rule.
Using differentiation to find maxima and minima of curves and engineering based applications.
Introduction to implicit differentiation.

Integration: geometrical basis and basics of integral calculus.
Techniques of integration.
Numerical integration

Intended Learning Outcomes: Understand fundamental principles of differential and integral calculus and their relevance to engineering disciplines
Select appropriate differential and integral calculus techniques to solve well defined problems
Solve well defined problems using differential and integral calculus

AHEP 4

Apply knowledge of mathematics, statistics, natural science and engineering principles to well-defined problems

Assessment:	Coursework 1 (8%) Coursework 2 (8%) Coursework 3 (8%) Coursework 4 (8%) Coursework 5 (8%) Examination (60%)
Resit Assessment:	Examination (Resit instrument) (100%)

Assessment Description: Examination: A 2 hour closed book exam will take place in May/June (worth 60 % of the final mark).
Coursework 1, 2, 3, 4, 5: Electronic online tests with randomised coefficients will be set during the semester. Each test is an individual piece of coursework and worth 8% each.

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 students pass the exam but have failed the coursework, they 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: Coursework feedback will be provided within 3-week after deadline according to University policy. When computer based assignment the feedback will be done online and if required during lectures. Exam: an examination feedback summary is available online to students

Failure Redemption: A supplementary examination will form 100% of the module mark.
Reading List: Croft, Anthony, author., Davison, Robert, author., Foundation maths, Pearson Education Limited, 2019.ISBN: 1292289686 Olive, Jenny, 1939- author., Maths : a student's survival guide, Cambridge University Press, 2003 - 2003.ISBN: 0521017076
Additional Notes: The FSE has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment.

EG-003 Applied Engineering

Credits: 30 Session: 2023/24 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr C Wang, Dr AM Higgins, Dr B Sandnes

Format: Taught theory - Lectures (33 hours).
Examples cLasses (33 hours)
Practicals (4 hours)

Delivery Method: This module will employ a blended approach to delivery using on-site lectures, example classes and practicals each week with the Canvas Digital Learning Platform for self-directed online activity.

Module Aims: This course provides an introduction to the principles of statics, dynamics and thermo-fluid mechanics relevant to engineering. A practical component will be used to complement taught theory.

Module Content: Introduction: Basic concepts, units and dimensions. Vectors, addition, subtraction and resolution.
Force Systems: Turning effect, couples and moments, equilibrium and friction.
Velocity and Acceleration: Linear motion with constant acceleration. Displacement/time and velocity/time graphs, gravity.
Newton's Laws: Effect of a constant force acting in a body, motion of connected particles.
Projectiles: General equations for path and motion of a projectile.
Work, Power and Energy: Work done, resistance to motion, motion up and down slopes, kinetic and potential energy, Hooke's law, elastic energy, conservation of energy.
Momentum: direct impact, conservation of momentum, laws of restitution, elastic and non-elastic impact.
Rotational Dynamics: Rotational motion, equations of motion for constant angular acceleration, torque, moment of inertia, energy and power.
Centres of Gravity: Particles in a plane, uniform laminas, composite bodies.
Motion in a Circle: Circular motion with constant speed, centripetal, force, conical pendulum, banked tracks, practical applications.
Matter and material behaviour, phases and phase change
Basic Principles of Fluid Statics - Concepts of pressure, hydrostatic pressure, buoyancy and Archimedes Principle.
Pressure Measurement Devices - Piezometer, inclined piezometers, manometers, differential manometers.
Fluid forces and centre of pressure.
The relationships between Temperature, Heat, Pressure and Volume in fluids.

Intended Learning Outcomes: Describe fundamental principles of mechanics and fluid mechanics and their relevance to engineering practice
Select appropriate analytical techniques to solve well defined problems within mechanics and fluid mechanics
Solve well defined problems within mechanics and fluid mechanics using appropriate analytical techniques

AHEP 4
Apply knowledge of mathematics, statistics, natural science and engineering principles to well-defined problems.
Analyse well defined problems reaching substantiated conclusions
Use appropriate computational and analytical techniques to solve well-defined problems.

Assessment: Coursework 1 (10%)
Coursework 2 (10%)
Coursework 3 (20%)
Examination (60%)

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

Assessment Description: 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 students pass the exam but have failed the coursework, they 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.

Class test 20%
Practical 10%
Canvas quiz 10%
Examination 60%

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

Assessment Feedback: Correct answers to quizzes will be provided.
Feedback during Q&As in lecture and example classes.
Lecturer available for ad-hoc feedback during office hours.
A general exam feedback pro-forma will be distributed after the exam marks are released

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

Additional Notes: The FSE has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment

EG-091 Chemistry of Materials

Credits: 15 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof G Williams, Prof HM Davies

Format: Taught theory - Lectures (26 hours).
Examples classes (4 hours).
Practicals to complement taught theory (8 hours).
A seminar style/groupwork approach will be used to introduce materials selection case studies and explore the use of chemical reactions within engineering processes (6 hours).

Delivery Method: This module will employ a blended approach to delivery using on-site lectures, example classes and practicals each week with the Canvas Digital Learning Platform for self-directed online activity.

Module Aims: This course provides an introduction to the chemical properties of materials used throughout engineering. A practical component will be used to complement taught theory and will allow students to develop the skills to carry out a number of basic laboratory manipulations in an accurate and safe manner. Fundamental knowledge regarding atomic structure and chemical bonding will be used to understand material properties and their use within engineering applications, and to understand the ways in which chemical reactions are utilized within a range of engineering processes.

Module Content:

• Atoms: the proton, neutron and electron. Atomic number. Mass number. Elements and isotopes.
• Atomic trends: Relative atomic mass. Energy levels. Electronic configurations. The Periodic Table.
• Chemical Reactions: Writing Formulae. Chemical equations and their balancing. Scaling up from atoms and molecules to moles.
• Bonding and forces: Principles of ionic and metallic bonding. Covalent bonds. Intermolecular forces.
• Types of reaction: Redox, acid-base, precipitation and complexation. Organic Compounds: Functional groups and reactions. Hybridisation and aromaticity. Isomerism
• Energetics: Bond energy. Enthalpy changes. Heat capacities.
• Equilibria: Le Chatelier principle.
• Electrochemical cells: Electricity from chemical reactions. Electrode potentials.
• Rates of reaction: Rate equations. Orders of reaction. Effect of temperature on reaction rates. Activation energies. Effect of catalysts
• Materials selection
• Sustainable materials issues, for example: manufacturing steel and alumimium with reduced environmental impact; biodegradable polymers; low environmental impact cement; alternative fuels / energy sources for aviation

Intended Learning Outcomes: • Understand fundamental principles of chemistry and its relevance to engineering practice
• Construct and analyse balanced chemical equations
• Describe the fundamental structure of an atom and the way in which atomic and molecular structure influences the properties and uses of common engineering materials
• Select the most appropriate material (or group of materials) for given applications.
• Discuss the ways in which chemical reactions are utilized within a range of engineering processes (e.g. electrochemical cell).

AHEP 4
F1. Apply knowledge of mathematics, statistics, natural science and engineering principles to broadly-defined problems.
F4. Select and use technical literature and other sources of information to address broadly defined problems.
F12. Use practical laboratory and workshop skills to investigate broadly defined problems

Assessment: Examination 1 (50%)
Laboratory work (15%)
Assignment 1 (10%)
Case Study (25%)

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

Assessment Description: Exam January 50%
Laboratory work 15%
Assignment 1 (Canvas quiz) 10%
Materials Case Study 25%

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: Students will receive verbal feedback during laboratory sessions and written feedback on laboratory reports. They will be provided with the correct answers to the quiz. They will receive both formative feedback (including peer feedback) on the case study, as well as written summative feedback.

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

Additional Notes: Compulsory for all Foundation Year Engineering students and assumes no previous Chemistry background.

PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION.

EG-092 Fundamentals of Engineering Science

Credits: 15 Session: 2023/24 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr WC Tsoi, Dr A Egwebe

Format: Taught theory - Lectures (33 hours).
Examples classes (11 hours).
Practicals to complement taught theory (6 hours).

Delivery Method: This module will employ a blended approach to delivery using on-site lectures, example classes and practicals each week with the Canvas Digital Learning Platform for self-directed online activity.

Module Aims: This course provides an introduction to the physical sciences (including thermal, electrical and optical properties of matter) and their application in engineering. A practical component will be used to complement taught theory.

Module Content: • Quantities, units, dimensions,
• Measurement accuracy, uncertainties, introduction to errors
• States of matter, phase changes
• Temperature and Heat; specific heats, latent heats
• Heat transfer; conduction, radiation, convection
• Electrical charges, current, voltages
• Introduction to sources of EMF, basic units
• Ohm's law, resistivity
• Resistors in series and parallel, solving resistor networks
• Intro to capacitance and capacitors, static electricity
• EM spectrum
• Reflection and mirrors
• Refraction and lenses, refractive index, Snell's law
• AC, RMS values, Phase angle
• Introduction to Magnetism.
• Magnetic Induction, electromagnets and solenoids, forces on current carrying conductors.
• Magnetic Circuits.
• Basic transformers.
• Basic motors

Intended Learning Outcomes: • Describe fundamaental physical, thermal, optical and electrical principles and their relavance to engineering
• Select appropriate analytical techniques to solve problems within engineering and the physical sciences
• Solve problems within engineering and the physical sciences using appropriate analytical techniques

AHEP 4
F1. Apply knowledge of mathematics, statistics, natural science and engineering principles to broadly-defined problems.
F12. Use practical laboratory and workshop skills to investigate broadly defined problems.

Assessment: Practical (15%)
Assignment 1 (20%)
Practical (15%)
Examination 1 (50%)

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

Assessment Description: Exam January 50%
Practical 1 15%
Practical 2 15%
Assignment 1 (Canvas quiz) 20%

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 students pass the exam but have failed the coursework, they 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: Correct answers to quizzes will be provided.
Feedback during Q&As in lecture and example classes.
Lecturer available for ad-hoc feedback during office hours.
A general exam feedback pro-forma will be distributed after the exam marks are released

Failure Redemption: In the case of failure students will be given the opportunity to resit during the supplementary period, worth 100% of the module.

Reading List: Knight, Randall Dewey, author., Physics for scientists and engineers : a strategic approach with modern physics, Pearson, 2022.ISBN: 9781292438221
Knight, Randall Dewey author., Physics for scientists and engineers : a strategic approach with modern physics, Pearson Education Limited, 2017.ISBN: 1292157429
Muncaster, Roger., A-Level physics / Roger Muncaster., Stanley Thornes,, 1993.ISBN: 9780748715848

Additional Notes: The Faculty of Science and Engineering has a ZERO TOLERANCE penalty policy for late submission of all coursework and continuous assessment.
Available to visiting and exchange students.
This module will be supported with Canvas.