Swansea University
Prifysgol Abertawe

FACULTY OF SCIENCE AND ENGINEERING

UNDERGRADUATE STUDENT HANDBOOK

YEAR 2 (FHEQ LEVEL 5)
CIVIL ENGINEERING
DEGREE PROGRAMMES

SUBJECT SPECIFIC
(PART TWO OF TWO)
MODULE AND COURSE STRUCTURE
2022/23

DISCLAIMER

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

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

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

The 22-23 academic year begins on 19 September 2022

Full term dates can be found here

DATES OF 22-23 TERMS

19 September 2022 – 16 December 2022

9 January 2023 – 31 March 2023

24 April 2023 – 09 June 2023

SEMESTER 1

19 September 2022 – 27 January 2023

SEMESTER 2

30 January 2023 – 09 June 2023

SUMMER

12 June 2023 – 22 September 2023

IMPORTANT

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

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

Please ensure that you read the University webpages covering the topic – procedural guidance here and further information here. You should also read the Faculty Part One handbook fully, in particular the pages that concern Academic Misconduct/Academic Integrity. You should also refer to the Faculty of Science and Engineering proof-reading policy and this can be found on the Community HUB on Canvas, under Course Documents.

Welcome to the Faculty of Science and Engineering!

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

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

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

At Swansea University and in the Faculty of Science & Engineering, we believe in working in partnership with students. We work hard to break down barriers and value the contribution of everyone. Our goal is an inclusive community where everyone is respected, and everyone's contributions are valued. Always feel free to talk to academic staff, administrators, and your fellow students - I'm sure you will find many friendly helping hands ready to assist you.

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

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

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

Faculty of Science and Engineering	
Interim Pro-Vice Chancellor/Interim Executive Dean	Professor Johann Sienz
Head of Operations	Mrs Ruth Bunting
Associate Dean – Student Learning and Experience (SLE)	Professor Paul Holland
School of Aerospace, Civil, Electrical, General and Mechanical Engineering **Head of School: Professor Antonio Gil**	
School Education Lead	Professor Cris Arnold
Head of Civil Engineering	Professor Eduardo De Souza Neto
Civil Engineering Programme Director	Dr Clare Wood
Year Coordinators	Dr Yunqing Xuan

STUDENT SUPPORT:

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

Standard Reception opening hours are Monday-Friday 9am-5pm.

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

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

Call: +44 (0) 1792 295514 and also 01792 6062522 (Monday-Friday, 10am–12pm, 2–4pm).

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

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

https://myuni.swansea.ac.uk/college-of-engineering/coe-student-info/

READING LISTS:

Reading lists for each module are available on the course Canvas page, and are also accessible via http://ifindreading.swan.ac.uk/. We've removed reading lists from the 21-22 handbooks to ensure that you have access to the most up-to-date versions. Access to print material in the library may be limited due to CV-19; your reading lists will link to on-line material whenever possible. For Engineering courses, we do not expect you to purchase textbooks, unless it is a specified key text for the course.

THE DIFFERENCE BETWEEN COMPULSORY AND CORE MODULES

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

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

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

Year 2 (FHEQ Level 5) 2022/23
Civil Engineering

BEng Civil Engineering[H200,H205]
BEng Civil Engineering with a Year Abroad[H206]
MEng Civil Engineering[H201]
MEng Civil Engineering with a Year Abroad[H207]

Semester 1 Modules	Semester 2 Modules
EG-219 **Statistical Methods in Engineering** **10 Credits** **Miss CM Barnes/Prof L Li/Prof P Rees/Dr Y Xuan** **CORE**	**EG-201** **Fluid Mechanics II** **10 Credits** **Dr J Li/Prof DE Reeve** **CORE**
EG-221 **Structural Mechanics IIa** **10 Credits** **Prof O Hassan** **CORE**	**EG-225** **Structural Mechanics IIb** **10 Credits** **Dr AS Ademiloye** **CORE**
EG-223 **Basic Soil Mechanics** **10 Credits** **Dr J Clancy** **CORE**	**EG-235** **Dynamics 1 (Med & Civil)** **10 Credits** **Dr H Madinei** **CORE**
EG-228 **Problem Solving in Engineering with Matlab** **10 Credits** **Prof R Sevilla** **CORE**	**GEL200** **Introductory Geology for Engineers** **10 Credits** **Dr J Hiemstra/Dr J Clancy/Dr KJ Ficken** **CORE**
EG-234 **Civil Engineering Management** **10 Credits** **Dr CAC Wood/Miss X Yin** **CORE**	
EG-258 **Civil Engineering Design and Practice 1** **30 Credits** **Dr CAC Wood/Miss X Yin** **CORE**	
EG-277 **Research Project Preparation** **0 Credits** **Dr MR Brown/Mrs KM Thomas**	
Total 120 Credits	

Year 2 (FHEQ Level 5) 2022/23
Civil Engineering
BEng Civil Engineering with a Year in Industry[H202]

Semester 1 Modules	Semester 2 Modules
EG-219 **Statistical Methods in Engineering** **10 Credits** **Miss CM Barnes/Prof L Li/Prof P Rees/Dr Y Xuan** **CORE**	**EG-201** **Fluid Mechanics II** **10 Credits** **Dr J Li/Prof DE Reeve** **CORE**
EG-221 **Structural Mechanics IIa** **10 Credits** **Prof O Hassan** **CORE**	**EG-225** **Structural Mechanics IIb** **10 Credits** **Dr AS Ademiloye** **CORE**
EG-223 **Basic Soil Mechanics** **10 Credits** **Dr J Clancy** **CORE**	**EG-235** **Dynamics 1 (Med & Civil)** **10 Credits** **Dr H Madinei** **CORE**
EG-228 **Problem Solving in Engineering with Matlab** **10 Credits** **Prof R Sevilla** **CORE**	**GEL200** **Introductory Geology for Engineers** **10 Credits** **Dr J Hiemstra/Dr J Clancy/Dr KJ Ficken** **CORE**
EG-234 **Civil Engineering Management** **10 Credits** **Dr CAC Wood/Miss X Yin** **CORE**	
EG-233 **Placement Preparation: Engineering Industrial Year** **0 Credits** **Prof GTM Bunting/Dr CME Charbonneau/Dr P Esteban/Dr SA Rolland/Dr V Samaras/Dr S Sharma**	
EG-258 **Civil Engineering Design and Practice 1** **30 Credits** **Dr CAC Wood/Miss X Yin** **CORE**	
EG-277 **Research Project Preparation** **0 Credits** **Dr MR Brown/Mrs KM Thomas**	
Total 120 Credits	

Year 2 (FHEQ Level 5) 2022/23
Civil Engineering
MEng Civil Engineering with a Year in Industry[H204]

Semester 1 Modules	Semester 2 Modules
EG-219 **Statistical Methods in Engineering** **10 Credits** **Miss CM Barnes/Prof L Li/Prof P Rees/Dr Y Xuan** **CORE**	**EG-201** **Fluid Mechanics II** **10 Credits** **Dr J Li/Prof DE Reeve** **CORE**
EG-221 **Structural Mechanics IIa** **10 Credits** **Prof O Hassan** **CORE**	**EG-225** **Structural Mechanics IIb** **10 Credits** **Dr AS Ademiloye** **CORE**
EG-223 **Basic Soil Mechanics** **10 Credits** **Dr J Clancy** **CORE**	**EG-235** **Dynamics 1 (Med & Civil)** **10 Credits** **Dr H Madinei** **CORE**
EG-228 **Problem Solving in Engineering with Matlab** **10 Credits** **Prof R Sevilla** **CORE**	**GEL200** **Introductory Geology for Engineers** **10 Credits** **Dr J Hiemstra/Dr J Clancy/Dr KJ Ficken** **CORE**
EG-234 **Civil Engineering Management** **10 Credits** **Dr CAC Wood/Miss X Yin** **CORE**	
EG-258 **Civil Engineering Design and Practice 1** **30 Credits** **Dr CAC Wood/Miss X Yin** **CORE**	
EG-277 **Research Project Preparation** **0 Credits** **Dr MR Brown/Mrs KM Thomas** **CORE**	
Total 120 Credits	

EG-201 Fluid Mechanics II

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules: EG-160

Co-requisite Modules:

Lecturer(s): Dr J Li, Prof DE Reeve

Format: Lectures 2 hours per week for 10 weeks
Example classes 1 hour per week for 10 weeks
Laboratory work 2 hours for 1 week
Directed Private Study 3 hours per week
Contact Hours will be delivered through in-person activities and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

This module will contain lectures, worked examples, laboratory classes.
Assessement: 80% from end of teaching block examination; 20% from laboratory report work.

Additional notes:
As the University continues to respond to the developing Covid-19 pandemic module information may be subject to change to ensure students receive the best learning experience possible. We will make every effort to engage with students where changes are necessary and any changes will be communicated to students, as soon as possible. Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus

This module particularly builds on the work you have done in the Level 1 Fluid mechanics. You should revise the topics learnt in this module.

Module Aims: This module aims to create an interest in fluid flow, to show that flow phenomena are amenable to analysis, to show the relevance of fluid mechanics to Civil Engineering and to create confidence and ability in problem-solving in fluid mechanics.

Module Content: 1. Open-channel flow- Introduction to open-channel flow mechanics; Uniform flow; Rapidly-varied flow: Hydraulic jump, Sluice gate, Flow over weir; Gradually-varied flow: Derivation of the GVF equation, Flow profile classification, Numerical solution of the GVF equation.

2. Pipe flow- Pipe flow and energy line, Single pipeline analysis, Pipe network

3. Laminar and turbulent flow; drag force calculations. Vortices, Streamfunction and velocity potential. Linear water waves

Intended Learning Outcomes:
Technical Outcomes
On successful completion of this module, students should be able, at threshold level, to:
- Demonstrate a knowledge and understanding of : the concept of lift and drag; the energy line and pipe network; the classification of river flow and the concept of uniform and critical flow; the concept of backwater curves an hydraulic jump.
- Analyse and assess laboratory measured data and interpret results.
- Collate and present results and draw conclusions.
- Write reports.
- Appreciate errors and accuracy when taking measurements.

Accreditation Outcomes (AHEP)
- Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies (SM1b)
- Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in their engineering discipline and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems (SM2b)
- A comprehensive knowledge and understanding of mathematical and computational models relevant to the engineering discipline, and an appreciation of their limitation (SM5m)
- Understanding of the use of technical literature and other information sources (P4)
- Ability to work with technical uncertainty (P8)
- Understanding of appropriate codes of practice and industry standards (P6)
- Apply their skills in problem solving, communication, information retrieval, working with others 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 (G3b)

Assessment: Examination 1 (80%)
Laboratory work (20%)
Resit Assessment: Examination (Resit instrument) (100%)

Assessment Description:
Laboratory work 20%. This involves proactive laboratory work and report writing. Attendance of the Fluids Laboratory component is compulsory.

Final year exam 80%. This is closed-book assessment examination.

Coursework is optional and is made of a weekly class test on canvas (Total 8 tests).

There is no resit for the laboratory component.

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

Assessment Feedback: Model answers will be provided.
The laboratory report will be marked and feedback given.
Faculty feedback form will be completed and posted on the intranet.

Failure Redemption: A supplementary examination will form 80% of the module mark. There is no supplementary exam for the laboratory part of the module and therefore the laboratory mark obtained in the second semester will hold.

Additional Notes: 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

Laboratory report work must be completed and handed in as specified by the lecturer.

This module has NO SUPPLEMENTARY for the Laboratory part.

In order to take this module you need to have taken Fluids Mechanics I and the Year 1 maths modules.

cessary and any changes will be communicated to students, as soon as possible. Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus

EG-219 Statistical Methods in Engineering

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

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

Format: Lectures: 18 hours
Computer-based example classes: 16 hours
Directed private study 40 hours
Preparation for assessment 35 hours
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

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

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

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

Module Content:
Unit 1: Data Displays

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

Unit 2: Modelling Random Behaviour

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

Unit 3: Estimation and Testing

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

Unit 4: Model Building and Regression Analysis

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

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

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

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

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

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

Exam - Open Book (contributes 50% to module grade). Students will tackle a series statistical questions covering all topics.

Students need to achieve at least 30% in both components in order to pass the module.

If you do not meet the component level requirements for the module (i.e. achieving 30% in both components) you will receive a QF outcome. This means that you will be required to repeat the failed component(s), even if your module mark is above 40%.

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

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

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

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

PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION

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

Students need to achieve at least 30% in both components.

EG-221 Structural Mechanics IIa

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules: EG-113; EG-115; EG-120; EG-166

Co-requisite Modules:

Lecturer(s): Prof O Hassan

Format: Lectures 20 hours
Tutorials / Example classes 10 hours
Directed private study 40 hours
Preparation for assessment 30 hours

Delivery Method: Face to face
3 Group meetings

Module Aims: This module primarily concerns the analysis of statically indeterminate structures. After a review of statics and stress resultants, energy methods of analysis are introduced leading to the calculations of deflection and deformation for truss and frame structures.

Module Content:

• Determinate and Indeterminate Structures - load carrying actions, definitions of external and internal indeterminacy; calculations for pin-jointed trusses and rigid jointed frames; Symmetry and anti-symmetry. [1]
• Analysis of two and three dimensional statically determinate structures - free body diagrams; equations of equilibrium; support and joint symbols; calculation of reactions, bending moment, shear force, axial force and torsion diagrams. Principle of superposition. [2]
• Deflection of continuous beams. [3]
• Virtual work and the calculation of displacements - Definition of work, Principle of virtual work; Unit load theorem; Calculation of displacements in trusses and rigid jointed frames. [6]
• Analysis of simple statically indeterminate structures - use of deflection calculations. [6]
• Analysis of 2D redundant trusses-Applications of the Principle of Virtual Forces to analyse internally indeterminate truss structures. [3]
• Analysis of cable and arches. [6]
• Revision. [3]

Intended Learning Outcomes: Technical Outcomes
On successful completion of this module, students should be able, at threshold level, to:
- Demonstrate a knowledge and understanding of: the principles of equilibrium, compatibility and the influence of material behaviour. Virtual Work expressions and the Unit Load Theorem.
- Identify the forces applied by various supports.
- Distinguish between axial, bending, shear and torsional load carrying actions.
- Distinguish between statically determinate and indeterminate structures.
- Identify appropriate methods of analysis for trusses, beams and frames.
- Apply the equations of static equilibrium to calculate reactions, axial forces, bending moments, shear forces and torsional forces.
- Use the Unit Load Method for the calculation of displacements and rotations in structures. Analyse simple externally indeterminate 2-dimensional structures.
- Use a computer to check analyses of trusses, beams and frames.

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 identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques (EA2)
- Understanding of, and the ability to work in, different roles within an engineering team (P11)
- Apply their skills in problem solving, communication, working with others, information retrieval, and the effective use of general IT facilities (G1)
- Exercise initiative and personal responsibility, which may be as a team member or leader (G4)

Assessment: Examination 1 (50%)
Class Test 1 - Coursework (10%)
Group Work - Project (40%)
Resit Assessment: Examination (Resit instrument) (60%)
Group Work - Project (40%)

Assessment Description: The final theory examination is CLOSED BOOK (50% of the final mark).

A compulsory theory class test which forms 10% of the final mark.

A minimum pass score (40%) in total across the both theory components (Exam 1 and Class test 1) must be obtained to pass this module.

A group project that contributes a total of 40% of the final mark and includes 2 debriefing sessions, each contributes 7.5% of the final mark, and an oral exam on the final submission that contributes 25% of the final mark.

For the summer resit, the mark is purely based 60% on the supplementary exam, with 40% of marks retained from the previously submitted Group Project. Note, the mark for the second sit exam is capped at 40%.

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

Assessment Feedback: Throughout the term, students will receive feedback in the form of marked assignments and discussion of tutorial examples.
Standard examination feedback form available for all students after the examination.

Failure Redemption: For the summer resit, the mark is purely based 60% on the supplementary exam, with 40% of marks retained from the previously submitted Group Project. Note, the mark for the second sit exam is capped at 40%.

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

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

Available to visiting and exchange students. Students will be assessed in January by a 2hr written examination.

Additional notes:
This module particularly builds on the work you have done in the Level 1 Engineering Mechanics module and the Strength of Materials module. You should revise the topics learnt in these modules, particularly in the early part of this current module. This module also assumes that you are familiar with the basic mathematical concepts learnt in the Level 1 mathematics modules.

EG-223 Basic Soil Mechanics

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules: EG-113; EG-115; EG-120; EG-166

Co-requisite Modules:

Lecturer(s): Dr J Clancy

Format: Lectures/Example Classes: 2/3 hours per week
Directed private study 2 hours per week

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 by lectures and example classes.
Communication and course announcements, including office hours details, will be made via Canvas.
Course materials, including the course notes, will be available for download from Canvas.
Lecture recording and screencasts may be employed to aid understanding.
In-class demonstrations of certain soil mechanics aspects.

Module Aims: EG-223 is compulsory for all students, apart from those who completed EG-132 Basic Soil Mechanics in 20/21 (who will instead study EG-257 Highway Design and Surveying).

Module Content: 1. Origin of soils,
2. Soil classification, British Soil Classification System, particle size distribution, specific gravity measurements, moisture content, void ratio, porosity and relationship between various measures,
3. Compaction, optimum moisture content, field compaction methods.
4. Permeability and its determination, constant head and variable head permeability tests, determination of permeability from field tests.
5. Seepage theory, seepage flow through soils, total head, piezometric head and pore pressure,flow nets, flow-net construction, seepage forces, quick sand conditions.
6. Terzaghi's principle of effective stress, effective vertical stress due to self-weight of the soil, change in effective stress due to change in total stress, drained and undrained conditions, influence of rise and fall of water table, influence of capillary rise, influence of seepage flow-induced pore pressure changes, consolidation theory, settlement calculations, oedometer tests.
7. Introduction to shear strength of soils, Mohr-Coulmb failure criterion, drained and undrained strength, strength parameters, determination of strength parameters from shear box test and triaxial test, soil dilatancy, concept of stress paths, peak and residual strength.
8. Ground investigation planning and steps; requirements and techniques

Revision

Intended Learning Outcomes: Technical Outcomes
Upon completion of this module students should be able to:
- Distinguish between different types of soils according to their physical and mechanical characteristics and classify soils according to the British Soil Classification System.
- Determine the optimal moisture content for best soil compaction from compaction testing data.
- Construct flow nets for problems of seepage flow through soils and compute discharge, pore pressures, boiling safety factors and effective stresses.
- Identify how seepage flow can affect the mechanical behaviour of soils and interact with buried structures.
- Determine the coefficient of permeability of soils from laboratory and field testing data.
- Understand the significance of consolidation of soil with respect to effective stress
- Use the Mohr-Coulomb failure criterion, in conjunction with the Principle of Effective Stress to compute the shear strength of soils.
- Determine the Mohr-Coulomb shear strength parameters of soils from shear box and triaxial testing data.
- Distinguish between drained and undrained behaviour of soils.
- Develop an appreciation of ground investigation techniques and evaluate which techniques are most suitable for different scenarios

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)
- Knowledge of characteristics of particular materials, equipment, processes, or products (P2)
- Ability to apply relevant practical and laboratory skills (P3)

Assessment: Examination 1 (80%)
In class test (Invigilated online) (20%)
Resit Assessment: Examination (Resit instrument) (100%)

Assessment Description: Examination - End-of-semester examination, covering all topics seen in the module (accounting for 80% of module marks).
Class Test - Will be given half way through the module delivery and will cover the topics seen up to that point (it will account for 20% of module marks).
Failure to sit the exam or class test will result in a zero mark being recorded for the corresponding component.

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

Assessment Feedback: Examination - Standard Faculty of Science and Engineering exam feedback form.
Class Test - Marked class test scripts may be reviewed with students who may use office hours for further feedback if necessary; Selected test questions may be solved in an example class immediately following the test.

Failure Redemption: Autumn re-sits according to University regulations. A supplementary examination will form 100% of the module mark.

Additional Notes: Delivery of both teaching and assessment will be in-person.
Available to visiting and exchange students. Laboratory experiments illustrating theoretical principles taught in this module are part of the module GEL-200 in Semester 2.

EG-225 Structural Mechanics IIb

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules: EG-221

Lecturer(s): Dr AS Ademiloye

Format: Lectures: 2 hours per week for 10 weeks
Example classes: 1 hour per week for 10 weeks
Laboratory work: 2 hours for 1 week
Directed Private Study: 3 hours per week

Contact Hours will be delivered through live (synchronous) and pre-recorded (asynchronous) activities online 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

Assessment:
Coursework 1: 15% (Structural Lab) - Experimental testing on Portal Frame Structure and Reciprocal Theorems of Betti and Maxwell's law.

Coursework 2: 10% Assignment

Examination: 75% open book written examination.

Module Aims: This module continues from EG-221 and introduces some advanced topics in Structural Analysis - matrix stiffness methods for trusses and frames, moment distribution method for continuous beams and basic theory on influence lines for both statically determinate and indeterminate structures. Furthermore, experimental testing of various structures and familiarization with the use of MATLAB for structural analysis will also be carried out.

Module Content: • Stiffness Method of 2D trusses - Introduction. Stiffness matrix for pin-jointed bar. Force and displacement transformations. Equilibrium and compatibility equations. Application to simple trusses. Systematic assembly of global stiffness matrix. Examples [9 hours]
• Stiffness Method of 2D frames - Introduction. Stiffness matrix for frame elements. Force and displacement transformations. Equilibrium and compatibility equations. Application to continuous beams and simple frames. Systematic assembly of global stiffness matrix. Examples [12 hours]
• Moment Distribution Method - Introduction. Fixed End Moments. Distribution factor. Carry over factors. Systematic resolution. Examples [6 hours]
• Influence Lines - Definition of live loads. Influence lines for statically determinate structures. Maxwell and Betti's Reciprocal Theorems. Mueller-Breslau's Principle. Influence lines for statically indeterminate structures. Examples [6 hours]
• Structural Mechanics- Investigation of structural behaviour using portal frame or parabolic arch experiments. Investigation of Reciprocal theorems using simple beams.
• Experimental testing of structures and familiarisation with the use of MATLAB for structural analysis.

Intended Learning Outcomes:
Technical Outcomes
Upon completion of this module students should be able to:
- Demonstrate a knowledge and understanding of: the principles of equilibrium, compatibility and the influence of material behaviour as applied to the stiffness method of structural analysis. The meaning of a stiffness coefficient. Moment Distribution Method. Influence lines.
- Identify internally redundant trusses.
- Establish suitable coordinates and joint numbering for stiffness analyses.
- Distinguish between free and prescribed displacements and applied and reactive forces in trusses.
- Position releases in beams to obtain appropriate influence lines.
- Position loads on structures in order to obtain worst load case conditions.
- Apply the equations of static equilibrium to calculate reactions, axial forces, bending moments and shear forces.
- Calculate the forces in internally redundant 2D trusses.
- Calculate joint displacements, member forces and joint reactions in simple 2D trusses.
- Calculate influence lines.
- Undertake experimental testing of structures and familiarisation with the use of MATLAB for structural analysis.

Accreditation Outcomes (AHEP)
Mapping to AHEP3 Learning Outcomes for Partial CEng programmes
- 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) - Assessed in Exam and Coursework
- 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) - Assessed in Exam and Coursework
- Understanding of engineering principles and the ability to apply them to analyse key engineering processes (EA1b) - Assessed in Exam and Coursework
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques (EA2) - Assessed in Exam and Coursework
- Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action (EA3b) - Assessed in Exam and Coursework
- Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems (EA4) - Assessed in Exam and Coursework
- Understanding of contexts in which engineering knowledge can be applied (for example operations and management, application and development of technology, etc.) (P1) - Assessed in Exam and Coursework
- Knowledge of characteristics of particular materials, equipment, processes or products (P2b) - Assessed in Exam and Coursework
- Ability to apply relevant practical and laboratory skills (P3) - Assessed in Coursework
- Understanding of the use of technical literature and other information sources (P4) - Assessed in Coursework
- Understanding of appropriate codes of practice and industry standards (P6) - Assessed in Coursework
- Apply their skills in problem solving, communication, working with others, information retrieval, and the effective use of general IT facilities (G1) - Assessed in Exam and Coursework
- Plan self-learning and improve performance, as the foundation for lifelong learning/CPD (G2) - Assessed in Coursework
- Plan and carry out a personal programme of work, adjusting where appropriate (G3b) - Assessed in Coursework

Assessment: Examination 1 (75%)
Laboratory report (15%)
Assignment 1 (10%)
Resit Assessment: Examination (Resit instrument) (100%)

Assessment Description: The final open-book examination duration is 2 hours, during which students are required to answer all 3 questions. The exam contributes 75% to the final mark of the module.
The experimental laboratory report and attendance, and the assignment add up to 25% of the course.

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

Assessment Feedback: Throughout the term, students will receive oral feedback during practical classes and after lecture classes. Written feedback on coursework. Standard examination feedback form available for all students after the examination.

Failure Redemption: A supplementary examination will form 100% of the module mark. There is no supplementary exam for the laboratory component of the module.

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

Penalty for late submission of continual assessment assignments: zero marks awarded
Available to visiting and exchange students.

EG-228 Problem Solving in Engineering with Matlab

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules: EG-201; EG-221

Lecturer(s): Prof R Sevilla

Format: Lectures and computer-based example classes – 2 hours/week
PC Lab – 2 hour/week
Preparation of homework, reports and tests – 2 hours/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 by lectures, using a mixture of power point presentations and whiteboard, and computer-based classes where the students will receive help to solve a proposed list of exercises.

A comprehensive set of notes will be are available for download via Canvas.

Further guidance will be given by providing a list of solved exercises and example Matlab programs.

Communication and course announcements, including office hours details, will be made via Canvas.

Course materials, including the course notes and links to relevant webpages, will be available for download from Canvas.

Module Aims: This module aims at:

• Consolidating the ability to use Matlab and to design computer programs for solving problems in engineering.
• Introducing the fundamentals of numerical methods to solve problems of engineering interest

Module Content: The module is structured in two parts.

Part I aims to review and further develop the ability and confidence of using Matlab as a numerical calculator. It involves:

• Introduction to Matlab.
• Introduction to programming 1: functions and scripts.
• Introduction to programming 2: control flow and loops.

Part II aims to introduce basic numerical methods that are commonly used to solve engineering related problems. It involves:
• Interpolation and approximation
• Numerical integration
• Root finding
• Numerical solution of ordinary differential equations.

Intended Learning Outcomes: Technical Outcomes
Upon completion of this module students should be able to:
• Modify an existing Matlab program to solve a variety of engineering problems.
• Design a Matlab program to solve engineering problems.
• Debug an existing program to find and fix existing syntax errors.
• Apply numerical methods for solving engineering problems that involve numerical integration, root finding, approximation and ordinary differential equations.

Accreditation Outcomes (AHEP)
SM1b 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
SM2b 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
SM3m Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline and then apply them to analyse key engineering processes
SM4m Awareness of developing technologies related to own specialisation
SM5m A comprehensive knowledge and understanding of mathematical and computational models relevant to the engineering discipline, and an appreciation of their limitations
SM6m Understanding of concepts from a range of areas, including some outside engineering, and the ability to evaluate them critically and to apply them effectively in engineering projects.
EA1m Understanding of engineering principles and the ability to apply them to undertake critical analysis of key engineering processes
EA2 Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques
EA3b Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action
EA4 Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems
EA6m Ability to extract and evaluate pertinent data and to apply engineering analysis techniques in the solution of unfamiliar problems
D3b Work with information that may be incomplete or uncertain and quantify the effect of this on the design
P1 Understanding of contexts in which engineering knowledge can be applied (for example operations and management, application and development of technology, etc.)
P3 Ability to apply relevant practical and laboratory skills
P11b Understanding of, and the ability to work in, different roles within an engineering team
G1 Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities
G2 Plan self-learning and improve performance, as the foundation for lifelong learning/CPD
G3b Plan and carry out a personal programme of work, adjusting where appropriate
G4 Exercise initiative and personal responsibility, which may be as a team member or leader

Assessment: Coursework 1 (15%)
Coursework 2 (25%)
Assignment 3 (60%)
Resit Assessment: Coursework reassessment instrument (100%)

Assessment Description: • Coursework 1 (15%) to assess Part I of the module.
This coursework is done in groups.

• Coursework 2 (25%) to assess Part II of the module.
This coursework is done in groups (same groups as in the first coursework).

• Individual Test (60%) to assess both Part I and Part II.
The test will be published in Canvas and students will have a limited time to complete it and submit the Matlab programs.

Moderation approach to main assessment: Not applicable

Assessment Feedback: Interaction, questions and answers are provided by the lecturer/demonstrators in the respective computing and practical laboratories and office hours.

The students will also benefit from the Mathematics and CAE Cafes.

The students will receive detailed feedback on their coursework.

Failure Redemption: A supplementary coursework 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.

Lecture notes and homework for this module can be found on Canvas.

A supplementary individual coursework will form 100% of the module mark.

EG-233 Placement Preparation: Engineering Industrial Year

Credits: 0 Session: 2022/23 September-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Prof GTM Bunting, Dr CME Charbonneau, Dr P Esteban, Dr SA Rolland, Dr V Samaras, Dr S Sharma

Format: 11 hours consisting of a mix of seminars and workshops. 11 one hour drop-in advice sessions. Review of CV and cover letter.
Contact Hours will be delivered through a blend of live activities online and on-campus, and may include, for example, lectures, seminars, practical sessions and Academic Mentoring sessions.

Delivery Method: All Programmes will employ a blended approach to delivery using the Canvas Digital Learning Platform for live and self-directed online activity, with live and self-directed on-campus activities each week. Students may also have the opportunity to engage with online versions of sessions delivered on-campus

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

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

Module Content:

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

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

Intended Learning Outcomes:

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

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

Assessment: Placements (100%)

Assessment Description:

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

Moderation approach to main assessment: Not applicable

Assessment Feedback:

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

Failure Redemption:

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

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

This module is only available for students enrolled on the Engineering Year in Industry scheme.

EG-234 Civil Engineering Management

Credits: 10 Session: 2022/23 September-January

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr CAC Wood, Miss X Yin

Format: Core Lectures: 20 hours
Assignments & Assessments: 12 hours
Private Study: 68 hours
It is hoped that the majority of contact hours will be face to face, involving lectures, seminars, practical sessions and academic mentoring sessions. Delivery may however be a blend of live online activities and on-campus sessions if necessary.

Delivery Method: Lectures will be delivered face to face on a weekly basis. Industry guest lectures will be delivered via Zoom. All assessments will be carried out in-person.

Module Aims: This module is based around the attributes (set out by the Institution of Civil Engineers) which are required to become an Incorporated or Chartered Civil Engineer. It will set out the framework of the construction industry and go some way to prepare students for what they are likely to face when they work in the civil, structural or building construction sector. It will give them an insight of the modern construction industry and the direction of travel of the industry. As well as the application of Civil Engineering and general engineering management, this module will develop knowledge and skills specific to Civil Engineering management, including (but not limited) risk management, sustainability and digital engineering.

Students will be introduced to the types of Civil Engineering projects and the project management processes required to build them. This part of the course will develop knowledge and understanding of considerations for Health and Safety, Sustainability, and Engineering Contracts for projects as well as how these are managed. It will particularly focus on the commercial / contractual management, and the different types of contracts in common use in the industry.

Students will also be encouraged to look at their own management style and the importance of good communication. They will develop their own CV's to gain an understanding of the aspects of professional behavior and development required by professional institutions.

The programme consists of lectures, industry-delivered talks, individual and groupwork assignments on the various aspects that will be encountered in Civil Engineering and the wider construction industry.

Module Content: 1. Introduction
2. Communication & Team Skills
 - Types of Communication
 - Team Management Skills
3. Management & Leadership
 - Leadership Skills
 - Introduction to Project Management
 - Planning and resource management
4. Commercial Ability
 - Cost and budgeting
 - Contract types
5. Health, Safety & Welfare
 - Health, Safety and Welfare
 - Introduction to risk management
 - Diversity and Inclusion
6. Sustainable Development
 - Sustainable development
 - UNSDG and their relation to future projects
7. Professional Commitment
 - Introduction to the ICE
 - Ethics
8. Careers Discussion
 - Unit on careers skills to be supported by the Centre for Academic Success (Mrs P Williams)

Intended Learning Outcomes: Technical Outcomes

After completing the module, students should have understanding of:

• Management, leadership and governance in the construction industry.
• A selection of typical engineering and construction processes used by organisations in the construction industry.
• How various management techniques and applications are applied on construction projects.
• The importance of health and safety within the construction industry, the issues related to health and safety and how it is managed on site within a construction project.
• How sustainability is considered and managed within a construction project.
• The different types of civil engineering contracts and how these are managed.
• The project management process and tools used in the industry.
• Personal development and human resources in construction.
• Professional development and the role if the professional institutions in the construction industry.

Accreditation Outcomes (AHEP)

- Awareness of developing technologies related to own specialisation (SM4m)
- 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)
- Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate (EL4)
- 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 (EL6b)
- Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics (D1)
- Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards (D2)
- Plan and manage the design process, including cost drivers, and evaluate outcomes (D5)
- Knowledge of characteristics of particular materials, equipment, processes or products (P2b)
- Understanding of the key drivers for business success, including innovation, calculated commercial risks and customer satisfaction.(EL7m)
- Understanding of the use of technical literature and other information sources (P4)
- Knowledge of relevant legal and contractual issues (P5)
- Understanding of appropriate codes of practice and industry standards (P6)
- Awareness of quality issues and their application to continuous improvement (P7)
- 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)
- Exercise initiative and personal responsibility, which may be as a team member or leader (G4)

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

Assessment Description: TBL 1 Week 4 (19/10/2022) – Management and Leadership (25%)
TBL 2 Week 6 (02/11/2022) – Commercial Ability (25%)
TBL 3 Week 8 (16/11/2022) – Health and Safety (25%)
TBL 4 Week 10 (30/11/2022) – Sustainable Development (25%)

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

Assessment Feedback: Students will receive feedback on all submitted work. For any Civil Engineering workshops components, students may receive feedback during the discussion sessions after they have completed the assessments. Feedback will be given via canvas on the assignments and assessments.
Failure Redemption: Repeat failed components.
Additional Notes: This module is assessed by a combination of individual and groupwork assignments delivered alongside the teaching (100% coursework). Penalty for late submission of work: ZERO TOLERANCE. The module is available to exchange students.

EG-235 Dynamics 1 (Med & Civil)

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr H Madinei

Format: Lectures & Example Classes 2 hours 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

Classroom based teaching, CANVAS notes.

Module Aims: Elements of vibrating systems; simple harmonic motion; use of complex exponential representation. One-degree-of-freedom systems; natural frequency; effect of damping; harmonic excitation; transient dynamics; frequency domain analysis; impulse response function. Undamped mutli-degree-of-freedom systems; eigenvalues and eigenvectors.

Module Content: • Introduction to vibration and free response: Elements of vibrating systems, basic concepts, natural frequency, and simple harmonic motion.
• Free vibration of One-Degree-of-Freedom Systems: Application of Newton's second law to translating and rotating systems for the determination of differential equations of motion. Finding the natural frequency and considering the effect of damping in vibrating systems.
• Forced vibration of One-Degree-of-Freedom Systems: Considering different types of harmonic excitation.
• Transient response of One-Degree-of-Freedom Systems: Impulse response function and impact response.
• Free vibration of Multi-Degree-of-Freedom Systems: Natural frequency and mode shapes of a Two-Degree-of-Freedom Systems will be investigated.

Intended Learning Outcomes: • A knowledge and understanding of the importance of natural frequencies and resonance. The analysis of single and two degree of freedom systems.
• An ability to estimate resonances of simple systems.
• An ability to apply the methods presented in the course to develop simple models of real structures. Analyse these models to calculate natural frequencies and evaluate the response to harmonic forces.
• Study independently and use library resources.

SM1b 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
SM2b 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
SM3b Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline
EA1b Understanding of engineering principles and the ability to apply them to analyse key engineering processes
EA2 Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques
EA3b Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action
EA4 Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems
P1 Understanding of contexts in which engineering knowledge can be applied (for example operations and management, application and development of technology, etc.)

Assessment: Examination 1 (80%)
Assignment 1 (10%)
Assignment 2 (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 2, and 80% from an in-person examination in May-June.

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

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

Assessment Feedback: 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: An opportunity to redeem failures will be available within the rules of the University. A supplementary 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.

PENALTY: ZERO TOLERANCE FOR LATE SUBMISSION

Available to visiting and exchange students.

Additional notes:
- Office hours will be posted on CANVAS.
- Submission of the assignments will be via CANVAS ONLY. Email submissions will NOT be accepted.
- All notes and other teaching materials will be delivered via CANVAS ONLY.

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-258 Civil Engineering Design and Practice 1

Credits: 30 Session: 2022/23 September-June

Pre-requisite Modules: EG-122; EG-125

Co-requisite Modules:

Lecturer(s): Dr CAC Wood, Miss X Yin

Format: Lectures (demonstrations) 2 hours per week
Example/Design classes 2 hours per week
Group work/Directed private study 10 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

A real-life design project will be undertaken by students in groups. Through the project based learning the design theory and necessary skills for Steel and Reinforced Concrete detailed design will be revealed and put into practice. Weekly lectures and practical design classes will be held to help with the understanding of design methodologies and individual aspects of the project work. Where necessary individual group tutorial sessions can be organised in addition to the lectures and design classes. Students will continue their own familiarisation process with any software utilised e.g. Staad.Pro, Revit, AutoCAD

In addition to group project work submissions (5 in total spread across TB1 and TB2) individual learning and engagement will supported through the use of Canvas test elements.

As part of the assessment, students will be required to give a presentation of their conceptual design to their instructors, peers and engineers from industry where appropriate.

All drawing and calculation group work will be evenly split between all members of the group. Staged submissions and group interviews will be used to moderate between group members if necessary.

Module Aims: A project based learning design module spanning TB1 and TB2. Learning is based upon real-world building design scenarios to develop Steel and Reinforced Concrete detailed design skills, whilst also aiming to provide students with understanding of the whole building design process and real-life design experience. Stages of group work project include: 1. Concept development 2. Preliminary design 3. Health and Safety CDM Risk Assessment and Ethics 4. Detailed design in steel and reinforced concrete and 5. Sustainability

Module Content: TB1:
Structural design principles:
Eurocode philosophy: limit states.
Eurocode design principles: actions/actions on structures/wind loading
Eurocode design principles: load combinations.
Basics on simple analysis methods for continuous beams and moment redistribution methods/analysis of structures
Sustainability concepts.

Steel Design:
Design of steel members in axial tension and compression.
Design of fully laterally restrained steel beams and laterally unrestrained steel beams
Design of steel columns for axial load plus bending.
Design of bolted/welded steel connections, steel column base plate

Reinforced Concrete Design:
Design of reinforced concrete beams and slabs
Simple reinforced concrete column design

TB2:
A comprehensive group design project, which includes both reinforced concrete and steel design based upon a real-world scenario. Students will be required to work through the full design process from conceptual to detailed design, carrying out risk assessment for health and safety, paying due consideration to sustainability of the project where appropriate.

By the end of this project, each group will have produced a conceptual design poster, a full portfolio of complete design calculations, engineering drawings, designer's risk assessment, a discussion of how a design engineer should deal with an ethical dilemma, and an outline of how the whole-life sustainability of building has been considered in the structural design.

Intended Learning Outcomes: Technical Outcomes
By the end of this module, you should:

Develop knowledge and understanding of:
• Development of a building concept from scratch to meet a client brief/tender document, including appraisal in the context of sustainability (BREEAM).
• Design considerations for the detailed design of steelwork, reinforced concrete and the detailed design process of civil engineering projects as a whole.
• The various steps of the building design process and parties involved.
• The 'anatomy' of the structural form of a building.
• Principles of building in CDM.
• Ethical dilemmas which may occur during the design process.

Develop ability to:
• Visualise, through hand sketching and physical modelling of the structural form to identify possible design solutions/problems.
• Disassemble a structure for element design.
• Make planning and design decisions as a group.
• Carry out designers' risk assessment following Health & Safety Executive guidelines.
• Apply knowledge of appropriate steel and reinforced concrete materials selection, design techniques, processes for the appraisal of build options in the context of the sustainability to an individual, real-life project.
• Consider the "whole-life" construction, including life-cycle assessment, environmental, energy, economic, social factors.
• Make use of and apply critical scrutiny to computer software output.
• Communicate planning and design decisions by production of formal drawings using AutoCAD.

Develop skills in:
• Working as a member of a team including division of work, checking of group-members' work and working to deadlines.
• Time management of both individual and group work. Delivering to project deadlines.
• Communication of design ideas and basis of design calculations using hand sketches.

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)
- Understanding of engineering principles and the ability to apply them to analyse key engineering processes EA2 Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques (EA1b)
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques (EA2)
- Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action (EA3b)
- Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems D1 Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics (EA4)
- Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics (D1)
- Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards (D2)
- Work with information that may be incomplete or uncertain and quantify the effect of this on the design (D3)
- Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal (D4)
- 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)
- Understanding of the requirement for engineering activities to promote sustainable development and ability to apply

quantitative techniques where appropriate (EL4)
- Knowledge and understanding of risk issues, including health & safety, environmental and commercial risk, and of risk assessment and risk management techniques (EL6)
- Knowledge of characteristics of particular materials, equipment, processes or products (P2b)
- Understanding of appropriate codes of practice and industry standards (P6)
- Understanding of, and the ability to work in, different roles within an engineering team (P11)
- Apply their skills in problem solving, communication, working with others, information retrieval, and the effective use of general IT facilities (G1)
- Exercise initiative and personal responsibility, which may be as a team member or leader (G4)

Assessment: Online Class Test (5%)
Online Class Test (5%)
Online Class Test (5%)
Group Work - Project (15%)
Group Work - Project (15%)
Group Work - Project (10%)
Group Work - Project (10%)
Group Work - Project (30%)
Group Work - Project (5%)
Resit Assessment: Examination (Resit instrument) (100%)

Assessment Description: Compulsory individual pass/fail assessments via Canvas - 3 in total - will be utilised in TB1

TB1: Introduction to design theory and practice: 30% of 30 credit module, with the following assessment elements:
Online test 1: Actions on Structures - 5% of 30 credit module (PASS/FAIL criterion, multiple attempts permitted)
Online test 2: Steel design - 5% of 30 credit module (PASS/FAIL criterion, multiple attempts permitted)
Online test 3: Reinforced Concrete Design - 5% of 30 credit module (PASS/FAIL criterion, multiple attempts permitted)
TB1 Group design submission - 15% of 30 credit module

TB2: Design Practice Project: 70% of 30 credit module, with the following assessment elements:
Group Work 1 – Conceptual design - 15% of 30 credit module
Group Work 2 – Design development - 10% of 30 credit module
Group Work 3 – CDM Risk assessment and Ethics considerations in design - 10% of 30 credit module
Group Work 4 – Detailed design - 30% of 30 credit module
Group Work 5 – Sustainability - 5% of 30 credit module

Note: The TB2 Design Practice Project (worth 70%) must be passed in order to pass this module.

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

Assessment Feedback: Student groups will receive detailed oral feedback throughout the projects during weekly scheduled design classes. If deemed necessary, some groups may also be invited to a formal group interview at the end of each project, so that a fair distribution of marks may be awarded within the group.

Failure Redemption: Failure redemption of the TB1 three compulsory pass/fail Canvas tests will take place prior to the end of TB1.
If an individual fails to pass the TB2 Design Practice Project or the module overall then the failure may be redeemed in an August supplementary examination.

Additional Notes: Delivery of both teaching and assessment will be blended including live and self-directed activities online and on-campus.
Project work will have phased submissions for marking to ensure satisfactory progress by each member of the group. Groups may be interviewed after each stage submission.
Practical work time will be intermixed with lecture hours and weekly scheduled group tutorials.
Notes from relevant design guides / Eurocodes / details on case studies of good practice will be made available to students by the lecturer involved via Canvas / during lectures.
Where possible learning will be reinforced by guest lectures from practicing civil engineers and site visits. Students are also recommended to attend relevant ICE and IStructE evening lectures.

EG-277 Research Project Preparation

Credits: 0 Session: 2022/23 September-June

Pre-requisite Modules:

Co-requisite Modules:

Lecturer(s): Dr MR Brown, Mrs KM Thomas

Format: Formal Lectures - 2-3 hours

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

Module Aims:

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

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

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

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

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

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

Intended Learning Outcomes: NA

Assessment: Participation Exercise (100%)

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

Moderation approach to main assessment: Not applicable

Assessment Feedback: NA

Failure Redemption: NA

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

GEL200 Introductory Geology for Engineers

Credits: 10 Session: 2022/23 January-June

Pre-requisite Modules: eg-132

Co-requisite Modules: EG-223

Lecturer(s): Dr J Hiemstra, Dr J Clancy, Dr KJ Ficken

Format:

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/Practicals

Module content:
Lectures: Introduction to geology, minerals, igneous rocks, sedimentary rocks, metamorphic rocks, surface processes and superficial deposits, deformation of rocks, site investigations and engineering geology.
Geology practicals: Introduction to practical geology, geological materials - rock identification, Interpretation of geological maps
Geomechanics practicals: Atterberg limits, sieve analysis, constant head permeability test, shear box test and triaxial test with soils.
Lectures (Dr Clancy) – seepage and flownets, consolidation theory, oedometer tests, advanced triaxial box testing.

Module Aims: This module is an introduction to geology aimed particularly at the needs of civil engineers. The module comprises three sections, covering geological materials - minerals and rocks; distribution of rocks through geological maps and their interpretation; and engineering geology. Lectures are supported by practical work. The module assumes no prior knowledge of geology.

Module Content: Information on Canvas

Intended Learning Outcomes: At the end of this module, the student will have a basic knowledge and understanding of geological materials, their properties and distribution, and will be in a position to evaluate potential geological problems in practical civil engineering situations.
The student should also have an understanding of the principles underlying soil classification and shear strength property measurements. The student should also have an ability to conduct basic soil testing experimental procedures.

Assessment: Examination 1 (50%)
Coursework 1 (10%)
Coursework 2 (10%)
Coursework 3 (30%)

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

Assessment Description: Examination (1 hour): Essay (50%)

CW1 and CW2 are Geology practical reports, to be submitted immediately after the practical sessions (10% each)

CW3 is a practical report (Geomechanics classes) (30%)

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

Assessment Feedback: Feedback on coursework, exams feedback given after January examination or if in June the following academic year

Failure Redemption: Resit exam where necessary

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

Available to visiting or exchange students with a prior knowledge of basic soil mechanics.