COMPUTER LABORATORY - 2024/5

Module code: ENG0018

Module Overview

The emphasis of this module is on the development of digital capabilities, academic skills and problem-solving skills. The module will facilitate the development of competency in working with software commonly used to support calculations, analysis and presentation. Microsoft Excel will be used for spreadsheet-based calculations and experimental data analysis. MATLAB will be used as a platform for developing elementary programming skills and applying various processes to novel problem-solving scenarios. The breadth and depth of digital capabilities will be further enhanced by working with HTML, CSS and JavaScript within the GitHub environment to develop a webpage, presenting the student's research project narrative. The project provides students with an opportunity to carry out guided research and prepare an online article on one of many discipline-specific topic choices. Students will develop a wide range of writing, referencing and other important academic skills and learn how to use embedded and/or interactive online content to support the presentation of their online article.

Module provider

Sustainability, Civil & Env Engineering

Module Leader

RAHMAN Alifah (Mech Eng Sci)

Number of Credits: 15

ECTS Credits: 7.5

Framework: FHEQ Level 3

Module cap (Maximum number of students): N/A

Overall student workload

Workshop Hours: 9

Independent Learning Hours: 50

Lecture Hours: 5

Seminar Hours: 10

Laboratory Hours: 20

Practical/Performance Hours: 1

Guided Learning: 50

Captured Content: 5

Module Availability

Semester 1

Prerequisites / Co-requisites

N/A

Module content

Indicative content includes:

- Excel: data analysis, calculations, functions and plot customisation.
- MATLAB: basic operations and programming fundamentals applied in novel contexts.
- Research Project: guided research and preparation of an online article presenting the student's research narrative.
- HTML/CSS and JavaScript: develop a webpage for hosting content related to the conference project, through the GitHub environment.
- Academic skills development: research, referencing, writing and presentation.
- Digital knowledge: The internet, IOT, AI

Assessment pattern

Assessment type	Unit of assessment	Weighting
Coursework	COMPUTING 1 - EXCEL DATA ANALYSIS AND APPLICATIONS	20
Coursework	COMPUTING 2 - MATLAB APPLICATIONS	30
Coursework	RESEARCH PROJECT (PEER REVIEW & FEEDBACK)	5
Coursework	RESEARCH PROJECT (WEB-PAGE DEVELOPMENT & ONLINE RESEARCH ARTICLE)	40
Online Scheduled Summative Class Test	COMPUTING 3 - INTERNET TECHNOLOGY (30 mins)	5

Alternative Assessment

N/A

Assessment Strategy

The assessment strategy is designed to provide students with the opportunity to demonstrate their progress on the full range of learning outcomes applying their skills and knowledge in a variety of authentic contexts.

The summative assessment for this module consists of:

COMPUTING 1 – Excel data analysis & application; [LO 1] Students will use learning from lectures and computing labs to perform calculations, analyse data and prepare a customised chart using Microsoft Excel

COMPUTING 2 – MATLAB application; [LO 2] Students will apply MATLAB operations and programming concepts to solve a set of problems by creating simple mathematical models and preparing graphical representations.

RESEARCH PROJECT 1 – Peer review & feedback [LO 3, 4, 5] Students will self-evaluate, obtain peer review and create an action plan for their online research article demonstrating their progress with researching and designing/developing their web content using HTML/CSS and JavaScript in the GitHub environment.

RESEARCH PROJECT 2 – Online Research Article [LO 3, 4, 5] Students will share their article on a topic of their choice demonstrating their use of HTML/CSS and JavaScript for website design and development, using appropriate embedded or interactive content to engage the reader with their research narrative. Students will also demonstrate their development of academic skills in researching information, accessing and assessing the validity of different sources of information, referencing, and academic writing.

COMPUTING 3 - INTERNET TECHNOLOGY [LO 5] Students will demonstrate their knowledge and understanding of basic concepts related to the internet, IOT, and AI.

Formative assessment

Weekly lab worksheets to assess Excel, MATLAB, HTML, CSS and JavaScript progress. Embedded questions in Excel e-book. Verbal feedback given in weekly workshop sessions for the conference project.

Feedback

Written feedback as well as detailed individual and cohort contextual quantitative feedback on the Excel and MATLAB assessments. Feedback can be applied to future work on presenting and modelling data in module ENG0014 and in undergraduate programmes.

Assessed peer review and feedback exercise included in the research project. This exercise exemplifies the process of seeking and using feedback on written assignments in a timely manner ahead of submitting final work for assessment, as such it has wide relevance to future studies, projects and work.

Written feedback as well as detailed individual quantitative feedback on the online article (including web page formatting/use of HTML, CSS and JavaScript.) This feedback will be linked to future assignments such as the lab report for ENG0014 (semester two) and more broadly to academic writing (e.g. how to write an abstract) that is relevant to undergraduate programmes and beyond.

Written (automated) feedback on Internet technology test.

Module aims

- Provide basic introduction to the use of Excel and MATLAB to support laboratory work and engineering calculations
- Introduce students to web based presentation design and delivery that make effective use of popular digital technologies
- Develop student research skills through the use of information and communication technologies and reference management systems

- Develop critical thinking and problem solving skills in mathematical and computational processes
- Introduce students to web page design and development using HTML, CSS and JavaScript through the GitHub environment

Learning outcomes

		Attributes Developed
001	Perform calculations, analyse data and prepare a customised chart using Microsoft Excel.	KCPT
002	Apply MATLAB operations and programming concepts to solve novel problems, create simple mathematical models and prepare graphical representations.	KCPT
003	Develop academic skills necessary for preparing a web-based article presenting a narrative of the student's research, supported by embedded and/or interactive content.	KCPT
004	Use digital tools for effective research, information access and referencing to support the preparation of the paper and presentation for the conference project.	KCPT
005	Utilise HTML/CSS and JavaScript to develop and host a web page in the GitHub environment.	KCPT

Attributes Developed

C - Cognitive/analytical

K - Subject knowledge

T - Transferable skills

P - Professional/Practical skills

Methods of Teaching / Learning

The learning and teaching strategy is designed to use practical computer laboratory sessions to develop a basic understanding of Excel and MATLAB. The research project involves researching and preparing an online article to present the student's findings. The topic area relates to the students' area of interest and intended undergraduate progression route.

The learning and teaching methods include:

- Computing lectures - for students to gain basic knowledge and background information
- Computer laboratories – tuition to consolidate students’ understanding of basic knowledge and to develop practical skills
- Research project workshop sessions to support students through the stages of researching and preparing an online article to present their research findings.
- Online content presentation styles – peer to peer observation and feedback
- Guided support sessions for students to access online materials and resources to deepen their understanding and enhance their practical skills
- Independent learning for students to self-evaluate their work and develop their critical thinking and problem-solving skills in mathematical and computational processes

Indicated Lecture Hours (which may also include seminars, tutorials, workshops and other contact time) are approximate and may include in-class tests where one or more of these are an assessment on the module. In-class tests are scheduled/organised separately to taught content and will be published on to student personal timetables, where they apply to taken modules, as soon as they are finalised by central administration. This will usually be after the initial publication of the teaching timetable for the relevant semester.

Reading list

https://readinglists.surrey.ac.uk
Upon accessing the reading list, please search for the module using the module code: ENG0018

Other information

Surrey's Foundation Year programmes are committed to developing students with strengths in Employability, Digital Capabilities, Global and Cultural Capabilities, Sustainability, and Resourcefulness and Resilience. This module is designed to particularly develop knowledge and skills in the following:

Resourcefulness and resilience: Students are exposed to challenging and authentic data processing, programming and research scenarios in this module, which invariably lead to setbacks and frustration. They are encouraged to reflect, fault-find, and to question their strategy if the outcome of a problem-solving process is not as expected. Students learn how to seek verification of their output through independent research or peer collaboration and how to respond constructively to formal and informal feedback. Additionally, time management with regards to coursework deadlines in this module, developing successful approaches to problem-solving for mathematical and computational tasks, and developing research skills through finding and reviewing suitable sources of information for the web based delivery of the research project are all developed in this module and contribute to strengthening student resourcefulness and resilience.

Digital capabilities: Students develop skills and confidence in using a variety of software tools, and they are encouraged as well as supported in organising and setting up their own social network groups. Digital knowledge and understanding are key components of this module. Excel, MATLAB, website design and development via a GitHub webpage, as well as discussion of the internet, IOT, and AI will be undertaken by the students as a foundation for developing their digital capabilities further during their undergraduate programmes. The students become conversant with working within the university VLE (SurreyLearn) through dedicated training sessions which are reinforced with embedded activities in this module. All students learn to use tools such as the similarity checker Turnitin. Debating the use of generative AI tools is now a learning objective within the Computer Laboratory module. Further applications that students need to develop competency in for producing academic output include using MS Office tools such as Word and Excel. Through exploring this diverse range of digital tools, students also develop skills in mathematical and computational processes, as well as a range of research skills, and learn to create engaging web-based content to effectively convey key concepts and information in a clear, concise, accessible, and visually appealing manner.

Employability: Skills in programming and digital capabilities are highly sought after by employers. Students learn to use industry standard software packages such as MS Office suite and MATLAB, and are introduced to programming. They are also introduced to web page design using HTML, CSS and JavaScript. Furthermore, the coursework assignments in this module develop problem-solving, independent working, research and communication skills – these are skills that are valued by employers in all sectors.

Sustainability: When students join the Foundation Year programme they often have a very mechanical approach to problem solving, accepting facts and applying them without question and without consideration of the implication for society or for the environment. Through the introduction of more complex and connected scenarios, such as within independent research projects, the students begin to appreciate that there are often many ways of approaching the same problem and the solutions have differing impacts on society and the environment. The research project coursework assignment allows students to choose their own topic for investigation and to share via a website-based written article; the United Nations Sustainability Development Goals and associated materials will be introduced as part of the "ideas generation phase" for this assignment.

Global and cultural capabilities: The student cohort has a diverse spectrum of social and cultural backgrounds. Students are encouraged to work together, particularly in lab and tutorial sessions where they gain exposure to different points of view, approaches and experiences. On a practical level students encounter scenarios where for instance they have to change the usage of familiar language, such as the use of reserved words in MATLAB. The programming language was constructed using "American English" so simple commands using the word "colour" will not work and students have to use the word "color" instead. This can be a source of frustration but provides a useful exemplar of how different cultural points of view, in this case the choice of spellings for reserved words, forces us to adjust our way of working. When students are working on their research project they may also learn, for example, that engineers work to different standards in different countries and that design codes and health and safety regulations may evolve as a function of location. For instance, Civil Engineering students often carry out research projects related to structural

design. The structural design codes and building regulations in Japan consider the impact of earthquakes, which is not a major consideration when building new homes in the UK. Many other scenarios with these differences in international standards arise and form a basis of discussion in the research projects.

Programmes this module appears in

Programme	Semester	Classification	Qualifying conditions
Aerospace Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Astronautics and Space Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Biomedical Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Chemical and Petroleum Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Chemical Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Civil Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Computer and Internet Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Computer Science with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Electrical and Electronic Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Electronic Engineering with Computer Systems With Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Electronic Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Financial Mathematics with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Mathematics and Physics with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Mathematics with Data Science with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Mathematics with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Mechanical Engineering with Foundation Year BEng (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Physics with Astronomy with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module

Programme	Semester	Classification	Qualifying conditions
Physics with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Physics with Nuclear Astrophysics with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Physics with Quantum Computing with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module