MATHEMATICS A - 2024/5

Module code: ENG0011

Module Overview

This mathematics module is designed to reinforce and broaden basic A-Level mathematics material, develop problem solving skills and prepare students for the more advanced mathematical concepts and problem-solving scenarios in the semester 2 modules.The priority is to develop the students' ability to solve real- world problems in a confident manner. The concepts delivered on this module reflect the skills and knowledge required to understand the physical around us. This is vital as mathematics plays a critical role in the students' future employability and achievement on their respective undergraduate choices.

Module provider

Sustainability, Civil & Env Engineering

Module Leader

WARNER Patricia (Sust & CEE)

Number of Credits: 15

ECTS Credits: 7.5

Framework: FHEQ Level 3

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

Overall student workload

Independent Learning Hours: 40

Lecture Hours: 22

Tutorial Hours: 22

Guided Learning: 44

Captured Content: 22

Module Availability

Semester 1

Prerequisites / Co-requisites

None

Module content

Arithmetic, algebra and simple equations, polynomial equations, partial fractions, trigonometry, functions, binomial series, basic probability, basic statistics, regression and correlation, simple numerical methods and calculus.

Assessment pattern

Assessment type	Unit of assessment	Weighting
Online Scheduled Summative Class Test	Short Timed Online (Open Book) Test within 24Hr Window (20 Minutes) - 1 of 5	5
Online Scheduled Summative Class Test	Short Timed Online (Open Book) Test within 24Hr Window (20 Minutes) - 2 of 5	5
Online Scheduled Summative Class Test	Short Timed Online (Open Book) Test within 24Hr Window (20 Minutes) - 3 of 5	5
Online Scheduled Summative Class Test	Short Timed Online (Open Book) Test within 24Hr Window (20 Minutes) - 4 of 5	5
Online Scheduled Summative Class Test	Short Timed Online (Open Book) Test within 24Hr Window (20 Minutes) - 5 of 5	5
Examination	Invigilated paper based examination (2 Hours)	75

Alternative Assessment

N/A

Assessment Strategy

The assessment strategy is designed to allow students to demonstrate:

- their knowledge of mathematical concepts and rules, and to show their skills in solving a variety of problems, in different contexts, using appropriately selected techniques.

- The in-semester assessments include short written online tests assessing the recent knowledge acquired while the end of module exam has greater in-depth problem-solving testing application of concepts taught.

The summative assessment for this module consists of:

- Test 1, week 1, 20 minutes, available for 24 hours from Friday at 11 am to Saturday 11am, worth 5%

- Test 2, week 3, 20 minutes, available for 24 hours from Friday at 11 am to Saturday 11 am, worth 5%
- Test 3, week 5, 20 minutes, available for 24 hours from Friday at 11 am to Saturday 11 am, worth 5%
- Test 4, week 7, 20 minutes, available for 24 hours from Friday at 11 am to Saturday 11 am, worth 5%
- Test 5, week 9, 20 minutes, available for 24 hours from Friday at 11 am to Saturday 11 am, worth 5%
- End of module exam, sat during exam week, 2 hours, a written exam paper in the exam hall.

All of the above assessments are AI resilient.

Formative assessment

Exam type questions are given to the students at each tutorial.

Feedback

For the short online tests feedback is given with the correct answers. A lot of the feedback for this is as oral discussions and peer assessment during tutorials. A great deal of emphasis is given to these short online tests.by the students They are worth minimal marks but the conversations among the students as to how and why they made their mistakes is so useful.

An online diagnostic test is given to the students during welcome week. This highlights the weaknesses and the topics where emphasis is directed for in-depth delivery.

Within three weeks of the students joining the foundation year there are three assessments with marks. This is such a useful indication of initial engagement / lack of engagement from the start of the course.

For the exam type questions, these are marked and written feedback is given.

While the short online tests have their own value, the end of module written exam has its place. The content delivers the ‘prove that’ and ‘show that’ types of questions which are impossible to assess with short online tests. Practice exam questions are given to the students throughout the semester. These do not contribute towards their final exam mark but enables them to have purposeful written feedback on their written work. It is a long time since they produced any full written solutions to problems, proofs etc.

Module aims

- This module aims to review and consolidate students' knowledge of basic A-level mathematical concepts, emphasising the development of lower level thinking skills which can be applied in a variety of problem solving contexts.
- Review and consolidate students¿ knowledge of basic A Level mathematical concepts.
- Emphasise the development of lower-level thinking skills which can be applied in a variety of problem-solving activities.
- Formulate problems in precise terms, identifying the issues forming complex reasoning.
- Use mathematics to describe the physical world.
- Build up the confidence to tackle any problem, looking at it from different points of view
- Encourage students to communicate mathematically and to share their understanding of the complex situations and problems they are faced with.
- Encourage students to work independently on building up of their own mathematical knowledge and understanding, focusing on becoming successful on their undergrad course and later becoming better engineers.

Learning outcomes

		Attributes Developed
001	Solve different types of equations in various contexts	KCPT
002	Construct and manipulate a variety of Mathematical expressions	KCPT
003	Recognise when to apply an appropriate rule or method	KCPT
004	Apply a problem solving strategy, making use of simple Mathematical concepts	KCPT
005	Solve problems using known procedures in different contexts	KCPT

Attributes Developed

C - Cognitive/analytical

K - Subject knowledge

T - Transferable skills

P - Professional/Practical skills

Methods of Teaching / Learning

The strategy is designed to:

Familiarise students with mathematical concepts and techniques supported by extensive use of examples and applications; students are engaged in the solution of problems and application of techniques in tutorials/problems classes.

The learning and teaching methods include:

Lectures to revise prior learning and bring students from varying backgrounds to a common level of knowledge, and to introduce new concepts and techniques and provide illustrative examples and applications.

Guided self-study to cover certain topics, to develop students' independent learning skills

Problem sheets containing questions for technique selection and skills development.

Tutorials/problems classes for the development of skills in selecting and applying appropriate techniques, using problems sheets; assistance is given both at individual level, and for the group on common areas of difficulty.
Independent learning,

Captured content - Panopto is available for missed lectures or consolidation of concepts taught.

Students are encouraged to ask and answer questions at the lectures. Their previous knowledge is challenged in lectures and more so in tutorials

Tutorials are used to consolidate the concepts taught

Topics delivered in this module are developed further in other modules i.e. computing laboratory sessions

The lectures and tutorials enhance and develop student skills to a greater depth.

The ENG0011 module is the real foundation and bridging step between the students' current knowledge and skills to a fully integrated understanding of the mathematics content in year 1.

Support is given on a one-to-one basis for students who have not studied mathematics for several years or they have missed

sessions through genuine illness.

Online books for suggested reading are available.

Students are encouraged to develop critical thinking skills in order to acquire the ability to analyse facts objectively leading to an informed judgement.

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: ENG0011

Other information

Other Information:

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

Employability – Students undertake focused learning relating to the real-world, enabling them to develop the analytical skills and competencies relevant to their chosen study and subsequent career pathway.

The skills students acquire in the development of their mathematical knowledge are vital to their future job roles. They will use their critical thinking skills and analytical ability to solve problems encountered in a systematic and logical way. With the understanding of their mathematics, they will be able to design and optimise complex systems. They will be designing structures, optimising processes, predicting outcomes, and making informed decisions.

Digital Capability - Students digital capability is promoted through the use of SurreyLearn for the independent study modules, online assessments, use of graphing packages, use of research platforms etc

There are so many resources available to students digitally. The graphing packages give real meaning to functions and their behaviour. Panopto is an excellent resource for consolidation of the concepts and learning objectives taught. The calculator is such a useful piece of equipment as it can be so easily set up to find roots using iterative methods to the greatest degree of accuracy. Students use spreadsheets. The use of the tablets they write on helps with orderly storage and retrieval of solutions when revising. All the module content is on SurreyLearn with so much information about the course content, learning objectives, assessment dates, tutorial sheets and solutions. The formula booklet used in the face-to-face exam is available online as well.

Resourcefulness and resilience: The module is designed in such a way as to encourage and support the progressive development of independent thinking and resourcefulness through scaffolded activities and assessments. The online short test has been designed to foster active participation and reflective engagement. Assessment is balanced and varied with online tests, paper based final exam and formative bi-weekly exam questions taken in tutorials. In the assessments and tutorial worksheets, students are exposed to challenging authentic scenarios which invariably lead to setbacks and frustration. They are encouraged to reflect and 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.

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
Chemistry with Forensic Investigation with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
Chemistry with Foundation Year BSc (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
Medicinal Chemistry 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 Astronomy with Foundation Year BSc (Hons)	1	Compulsory	A weighted aggregate mark of 50% is required to pass the module
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