PRIFYSGOL
glyndŵr
UNIVERSITY

MODULE SPECIFICATION FORM

Module Title:	**Introductory Mathematics**	Level:	**4**	Credit Value:	**10**

Module code: (if known)	**ENG406**	Cost Centre:	**GAME**	JACS2 code:	**G160**

Semester(s) in which to be offered:	**1**	With effect from:	**July 2015**

Existing/New:	**Existing**	Title of module being replaced (if any):	N/A

Originating Academic area:	**Engineering and Applied Physics**	Module Leader:	**B Klaveness**

Module duration (total hours)	100	Status: core/option/elective (identify programme where appropriate):	**Free-standing 10-credit component comprising first half of ENG461 (Engineering Mathematics).**
Scheduled learning and teaching hours	36		
Independent study hours	64		
Placement hours	0		

Percentage taught by Subjects other than originating Subject (please name other Subjects):	**0%**

Programme(s) in which to be offered: **Enginering European Programme** (Non Award Bearing)	Pre-requisites per programme (between levels): **None**

Module Aims:
- To provide a foundation of mathematical knowledge covering a wide range of basic topics.
- To develop an analytical appproach to the derivation of mathematical functions and expressions.
- To develop the application of mathematical principles in the solution of engineering problems, including the use of computer modelling software.

Expected Learning Outcomes

Knowledge and Understanding:
At the completion of this module, the student should be able to:

1. Use algebraic and trigonometric processes to derive and manipulate functions and equations, including the use of vectors and matrices. *(KS 1)*
2. Select and apply appropriate mathematical techniques to the solution of mathematical and engineering problems; techniques to include graphical and statistical analysis methods. *(KS 3)*
3. Use mathematical modelling software to apply the mathematical techniques of 1 and 2 in solving engineering problems. *(KS 4)*

Key skills for employability

1. Written, oral and media communication skills,	7. Intercultural and sustainability skills
2. Leadership, team working and networking skills	8. Career management skills
3. Opportunity, creativity and problem solving skills	9. Learning to learn (managing personal and professional development, self management)
4. Information technology skills and digital literacy	
5. Information management skills	10. Numeracy
6. Research skills	

Assessment:
Please indicate the type(s) of assessment (eg examination, oral, coursework, project) and the weighting of each (%). ***Details of indicative assessment should also be included****.*

Assessment is by means of a formal examination covering all outcomes It is an unseen time-constrained one with a fixed number of questions, typically five, where students are required to answer only three out of the five possible. (This corresponds to 'Assessment 1' of ENG461.)

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting	Duration (if exam)	Word count (if coursework)
Assessment One:	1, 2, 3	Examination	100%	2hrs	

Learning and Teaching Strategies:

The module will be presented to the students through a specified series of lectures, supported by problem-solving practice carried out in interactive tutorials. These tutorials will be supported by practice using computer software both in tutorial time and by directed study outside the classroom.

Formative assessment takes place during tutorials and feedback is given during these tutorials.

Syllabus outline:

Number systems: Numbers, place value, scientific notation and significant figures. Fractions. Use of calculator;

Algebra: Rules and manipulation of algebraic expressions. Language of derivation (and symbols). Solutions of equations. Introduction to polynomials;

Functions and Graphs: Define function. Plotting and interpreting graphs. Slopes, intersection;

Trigonometric functions;

Powers: indices, exponentials and logarithms;

Graphs: Linear graphs from non-linear functions;

Statistics: Define and calculate numeric measures of average and spread.

Complex numbers: Different forms and arithmetic, DeMoivre's theorem, powers and roots, relation between trig and hyperbolic functions;

Vector algebra: Addition and subtraction, unit vectors, scalar and vector products;

Applications: contextualising the application of the topics considered in this module to make them relevant to the chosen technology specialism.

Software: mathematical modelling software to support other elements of this module, emphasising potential as an analytical tool.

Bibliography

Essential reading:
Croft, A. et al. (2008) *Engineering Mathematics*, 3rd Edn., Prentice-Hall.
Singh, K. (2011) *Engineering Mathematics through Applications*, 2nd Edn., Palgrave Macmillan.
Glyn, J. (2010) *Modern Engineering Mathematics*, 4th Edn., Prentice-Hall.

Recommended reading:
Bird, J. (2010) *Engineering Mathematics*, 6th Edn., Newnes.
Stroud, K. (2007) *Engineering Mathematics*, 6th Edn., Palgrave Macmillan.

Key Website References:
mathcentre - Mathematics resources: http://www.mathcentre.ac.uk/;
sigma – Network for excellence in mathematics/statistics support: http://sigma-network.ac.uk/;
Engineering Maths First-Aid Kit:
http://www.nationalstemcentre.org.uk/elibrary/collection/1287/engineering-maths-first-aid-kit;
HELM – Helping Engineers Learn Mathematics: http://www.lboro.ac.uk/research/helm/;
Khan Academy: http://www.khanacademy.org/;
Mathematics Learning Support Centre at Loughborough University:http://mlsc.lboro.ac.uk/resources.php.

July, 2014