



SWANSEA METROPOLITAN UNIVERSITY

PRIFYSGOL FETROPOLITAN ABERTAWE

**SWANSEA METROPOLITAN UNIVERSITY
FACULTY OF APPLIED DESIGN AND ENGINEERING**

Foundation Engineering

Student Handbook

2012/13

1. INTRODUCTION

The faculty of Applied Design and Engineering (FADE) offers both a 3 year and a 4 year programme towards its established portfolio of BEng (Hons) degree programmes. The four year programmes follow the same structure as the 3 year programmes from level 4 onwards, once the first year has been completed; i.e. a 4 year programme differs only in the pre-addition of its first year. The 4 year programmes cater for students who do not satisfy the normal entry requirements of the 3 year programmes

This document describes this first year of all 4 year BEng degree programmes.

2. YEAR 1 OF A 4 YEAR BENG PROGRAMME

2.1 Rationale, Aims and Outcomes

2.1.1 Rationale

This initial year is designed to enable students with an inadequate or inappropriate academic background to pursue an engineering discipline within higher education. It seeks to provide the students with an opportunity to acquire knowledge in essential elements which underpin the remainder of their degree programme within the engineering field of their choice, namely: mathematics, scientific principles, computer studies, communication skills and technology. These subjects are delivered at a level which prepares students for level 4 study.

The portfolio of 4 year BEng programmes offered at Swansea Metropolitan University therefore provides access to higher education which would be denied under normal circumstances. All students are enrolled on a 4 year pathway for a specific BEng programme. though for the first year of their studies they are mainly taught in common with all students on the first year of a 4 year BEng programme.

2.1.2 First Year Level Aims

The first year aims are:

- a) to provide an appropriate level of mathematical and applied scientific/ analytical ability to undertake further study in a specialist area of Engineering.
- b) to introduce basic concepts and principles that apply to specified Engineering pathways.
- c) to develop communication and study skills that will be appropriate for individual and group work applicable for both study at a higher level and employment.

2.1.3 Learning Outcomes

The first year aims are met by providing the student with the ability to:

- (a) demonstrate understanding and confidence in basic concepts and principles that apply to Engineering.
- (b) communicate effectively in both written and verbal forms.
- (c) observe, record, interpret and evaluate data to develop problem solving skills.
- (d) demonstrate the responsibility for self development and study.

3. ADMINISTRATION AND MANAGEMENT

3.1 Course Administration

All 4 year programmes are subject to the same regulations placed upon all other programmes within the University.

3.2 Programme Management

A separate tutor will manage this element of each programme on behalf of each respective programme director. The roles and responsibilities of the year tutor are defined in the quality handbook.

During the first year of all 4 year programmes a joint programme management committee will exist. This joint PMC will discuss all issues and inform the respective programme directors of any issues that are specific to their programme. Thereafter, the programme management for the remaining years (i.e. level 4 to 6) will be covered by the PMC for the respective BEng Programme.

3.3 Entry Requirements

Students who do not meet the entry requirements of the standard 3 year BEng programmes within the faculty but who demonstrate a desire to study an engineering discipline at a higher level are considered for entry to the year. The admissions tutor considers each application on its merits – looking particularly at the student's potential to successfully complete the whole programme.

4. PROGRAMME STRUCTURE

The first year of a 4 year BEng programme is based on 30 weeks attendance at the University. To provide the underpinning necessary to allow students to progress onto the later levels all of the modules are taught throughout the year. This allows for sufficient knowledge in specified themes.

To cater for the slight variation in the programmes being offered within the portfolio, two streams are available within the first year. In general, students entering programmes in the school of Automotive Engineering or the school of Mechanical Engineering and Logistics, students follow the 'Mechanical' stream which emphasises the scientific principles of mechanics, materials, manufacturing and dynamics. Students entering programmes in the school of applied computing or the specific pathway of Motorsport & Automotive Electronic Systems follow the 'Electrical/Computing' stream which emphasises the principles of electronics and programming.

Note: the numbers in parenthesis are the number of CATS points allocated to each module. The year totals 120 credits for each stream.

First Year Course Structure

Mechanical Stream	Electrical /Computing stream
Manufacturing Technology (20)	Introductory Programming (20)
Study Skills and IT (20)	Study Skills and IT (20)
Engineering Science (30)	Electronics (30)
Mathematics (30)	Mathematics (30)
Project (20)	Project (20)

Table 1

5. ASSESSMENT AND PROGRESSION REGULATIONS

5.1 Balance of Coursework, Phase Tests and Examinations

Three approaches may be used to assess a module: all coursework, all phase test, or a combination of coursework and phase test. The assessment strategy for each module is shown below in table 2.

Formal Examinations are avoided in order to allow students time to settle into the rigours of academic life. (It should be noted that students on 4 year programmes receive additional support in terms of contact time and group sizes to encourage success in the first year of their studies)

	PHASE TESTS	ASSIGNMENTS	EXAM
Project		100	
Study Skills and IT		100	
Manufacturing Technology		100	
Engineering Science	50	50	
Mathematics	100		
Electronics	50	50	
Computer Programming		100	

Table 2

5.2 Examining Board

The first year of all BEng 4 year programmes in the faculty is covered by a single examining board, which reports to the examining boards of each respective BEng programme. After the common first year examining board, students will be included in the respective examining boards alongside their three year programme counterparts.

The Examining board operates under the same regulations as all programmes within the university.

5.3 Progression into year 2

In line with all programmes at the university progression rules are governed by those found in the quality handbook. In order to proceed to Year 2 of their respective BEng programmes, students will be normally required to successfully complete all modules. A successful completion is defined as achieving a mark of not less than 40% of those available in each module.

Students who fail modules will be dealt with as per regulations as defined in the quality handbook. For those students who have successfully completed at least 60 CATS points, but

who have not achieved success in gaining all 120 may be offered a place on an alternative HND programme if sufficient underpinning for the higher national award is identified.

Students who have not successfully completed 60 CATS points will be deemed to have failed and will not be eligible for progression. However, they may be invited, at the discretion of the Examining Board to repeat some or all of the assessments in which they were unsuccessful in the next academic year. The Examining Board will specify whether the repeated modules should be studied with or without attendance.

APPENDIX 1

SYLLABI

Module Title:	Project
Date of Validation:	
Module Number:	001
Module Value:	20
Level:	3
Faculty Responsible for Delivery:	Faculty of Applied Design & Engineering
Prerequisites:	

Introduction

The module seeks to enable the student to apply the knowledge gained in the zero year modules to the execution of an engineering project. A strong emphasis will be placed on the application and integration of knowledge gained during the year.

AIMS:

1. To give the students experience of the realities of an engineering project.
2. To build confidence and enable the student to operate effectively as an undergraduate.

OUTCOME STATEMENTS:

Upon successful completion of this module, students will be able to demonstrate:

1. The ability to assimilate and apply their knowledge of engineering to the successful planning and execution of an engineering project appropriate to the area of study.
2. Experience in the generation of solutions to identified engineering projects from concept through to completion.

INDICATIVE CONTENT:

Students will be expected to bring to the module knowledge and skills gained in the other modules in their first year. This will be supplemented by:

(I) Knowledge

1. Project planning
2. Design methodology

3. Design evaluation

(II) Skills

1. Research
2. Design
3. Workshop
4. Computing

Delivery Strategy

The module is delivered in 4 identifiable stages:

- (a) Project planning
- (b) Design
- (c) Project implementation
- (d) Development

The first stage comprises approximately one-third of the total time spent on the module, and includes tuition, study and analysis of:

- Project planning and control
- Research
- Report writing
- Financial estimating

The Second Stage studies

- Technical design

The third and fourth stage comprises the practical work associated with the implementation of the project brief. It is terminated with the preparation of a project report and an exhibition/demonstration (with associated viva) of the project product.

The student will maintain a logbook for his/her project. This will be updated with researched information, designs attempted, results, progress made, etc. It will be examined, discussed and approved or commented on a weekly basis by the Project Supervisor.

Assessment

Stage 1 assessment – 25%

Stage 2 assessment - 15%

Stage 3 & 4 assessment – 60%

Criteria for Stages 1 & 2 Assessment

Project brief (aims and objectives)

Background research

Project plan

Effectiveness of self management

Conceptual ability
Communication skills

Criteria for Stages 3 & 4 Assessment

- (a) **Exhibition and Viva**
Technical knowledge/skill
Level of innovation
Originality
Analytical skills
Quality of result
Evaluation shown
Appropriateness of the display
- (b) **Written Report**
Structure/presentation
Introduction
Research
Methodology/design process
Results
Costings
- c) **Performance of finished item**

The student presents his/her project result (in the form of a display/demonstration, together with a Project Report) to a panel of assessors (Project Supervisors).

The overall 60% weighting for Stages 3&4 assessment is divided into 35% for elements (a) & (b) and 25% for element c).

TEACHING AND LEARNING STRATEGY:

	hours
Lectures and tutorials	100
Student Private Study	100
TOTAL	200

STAFF RESOURCES:

Staff Coordinator: Richard Morgan

Staff Delivering Module: Richard Morgan

Module Title:	Study Skills and IT
Date of Validation:	
Module Number:	005
Module Value:	20
Level:	3
Faculty Responsible for Delivery:	Faculty of Applied Design & Engineering
Prerequisites:	

AIMS:

To enable students to effectively study and communicate...
 To develop students' confidence, and their ability to benefit from working within a group.
 Throughout the course, the students will be introduced to IT techniques.

OUTCOME STATEMENTS:

1. The student will be able to study and research effectively.
2. The student will be proficient in the use of standard IT packages

INDICATIVE CONTENT:

1. defusing anxiety and de-mystifying the learning process
2. ability to plan and execute research efficiently
3. ability to study effectively, including good time- management
4. ability to diagnose and remedy difficulties as they arise
5. note-making
6. essay-writing
7. report-writing
8. making a presentation
9. understanding the elements of non-verbal communication
10. writing an extended essay
11. feeling confident about tackling any communication task
12. Word processing
13. Spreadsheets
14. Powerpoint
15. Internet research

16. evaluation of self and of course

Teaching and Learning Strategy:

	hours
Lectures and tutorials	100
Student Private Study	100
TOTAL	200

Implementation

The lecturer will provide a structure for informed and exploratory discussion, and will encourage students to work in groups as well as individually. Informative materials on relevant topics will be given for student reference. Students will be required to do a modest amount of work outside the contact time, to facilitate research. The ethos will be one of positive encouragement at all times.

Assessment:

Coursework	100%
------------	------

READING LIST:

Kate Williams	Study Skills (1989) MacMillan
Derek Rowntree	Learn How to Study (1993) London Macdonald
Diane Beaver	Lazy Learning (1994) Element
Lee Jarvis	Letter Writing (1994) Foulsham
Tony Buzan	Use Your Head (1995) BBC Books
Peter Aitkin	10 minute Guide to Word '97 Que Computer Publishing
Trudi Reisner	10 minute Guide to Excel Que Computer Publishing

Que Development Group

10 minute Guide to PowerPoint for
Windows '95
Que Computer Publishing

Physical Resources:

Word-processing software
Spreadsheet software

Room Requirements:

PC Laboratory
Lecture Room

STAFF RESOURCES:

Dr Mark Ellis

Module Title: Mathematics

Date of Validation:

Module Number: 009

Module Value: 30

Level: 3

Faculty Responsible for Delivery: Faculty of Applied Design & Engineering

Prerequisites:

Aim:

to provide students with a sound understanding of mathematical principles.

Learning Outcomes:

On completion of the module the student will:

- 1 demonstrate understanding in aspects of mathematical principles to a level that underpins the knowledge required for further study at a higher level.
- 2 use mathematics as an instrument for the solution of basic engineering problems.

INDICATIVE CONTENT:

Introduction to basic fractions, indices and standard form.

Introduction to logarithms

Introduction to the transposition of formulae

Plotting standard graphs usually found in engineering for example, linear, quadratic, reciprocal and exponential functions

Techniques for resolving equations using graphical methods

An introduction to vectors

Evaluation of basic right-angled trigonometrical equations

Simpsons rule

Differential Calculus

The concept of calculus and the gradient at a point on curve

Differentiation of basic functions

Maximum and minimum theory

Integral Calculus

Integration of functions and the relationship with differential calculus
Standard integrals
RMS values

Trigonometry

Solution of any triangle and angles of any magnitude
Introduction to complex numbers and how they plotted the Argan diagram
Basic trigonometric identities

Statistics

Sampling and data presentation, e.g. bar charts, histograms and frequency curves
The normal distribution

Teaching and Learning Strategy:

	hours
Lectures and tutorials	150
Student Private Study	150
TOTAL	300

Assessment:

100% phase tests

READING LIST:**Indicative Reading:**

J. O. Bird & A. J. C. May	Engineering Mathematics
H. G. Davies & G. A. Hicks	Mathematics for Scientific & Technical students

STAFF RESOURCES:

Staff Coordinator:	Dr Kelvin Sutton
Staff Delivering Module:	Dr Kelvin Sutton, Dr Phil Holden

Module Title:	Electronics
Date of Validation:	
Module Number:	010
Module Value:	30
Level:	3 – Electronic and computing stream only
Faculty Responsible for Delivery:	Faculty of Applied Design & Engineering
Prerequisites:	

AIMS:

To provide a basic understanding of electrical and electronic concepts considered necessary as a foundation for an engineering degree courses and to show the relevance of those concepts in everyday applications.

OUTCOME STATEMENTS:

Upon completion of this module the student will be able to:

1. demonstrate a sound grasp of basic electrical and electronic principles in analysing simple problems
2. understand and explain the operation of simple Electrical/Electronic networks.

INDICATIVE CONTENT:

DC Electrical Circuit

Electrical current/voltage. Mechanical analogies. Resistors in series and parallel. Heating effect of current, variation of resistance with temperature-incandescent lamp. Voltage divider and current divider. Simple circuit calculations, use of Ohm's law and Kirchhoff's laws

Signals

DC, sinusoid, square wave. Period and frequency. Use of oscilloscope. Peak, mean and rms.

AC circuits:

Capacitors and inductors. Rate of change of current and voltage, C-R and L-R behaviour to sine and step voltages

Diodes and Rectifiers:

Simple ideas of semiconductors. Simple half-wave rectifiers.

Transistor Amplifiers/Switches:

What is a transistor? Design of simple amplifiers.

Operational Amplifiers:

What is an op. Amp? Design of simple inverting and non-inverting amplifiers.

Digital Circuits:

Representation of information by logic levels. Basic gates, AND, OR, NAND, NOR, NOT, XOR. Simple combinational logic..

Electronic simulation

The use of computer simulation packages to predict the behaviour of electronic circuits

TEACHING AND LEARNING STRATEGY:

	hours
Lectures	50
Tutorials	50
Practical Work Supervised	50
Practical Work Unsupervised	150
TOTAL	300

Implementation:

Lectures will be backed up by directed reading of books, together with problems sheets and CAL packages and discussed in tutorials.

Practical work will be laboratory based and consist of basic laboratory experiments to illustrate the principles, together with mini projects of a design and construction nature to generate interest and a sense of achievement.

Basic ideas will be reinforced by the use of software packages and Open Learning packages.

Assessment:

Phase Tests	50%
Coursework	50%

READING LIST:

Tom Duncan, John Murray	Electronics for Today and Tomorrow (GCSE/A-level) 1988
T. L. Floyd, Charles Merrill	Principles of Electric Circuits 1993

S. A. Knight	Electrical/Electronic Principles 2. 1987
S. A. Knight	Electrical/Electronic Principles 3. 1988
Hughes and Hughes	Engineering Science in SI Units Longman 1995

Room Requirements:

Lecture Room
Laboratory

STAFF RESOURCES:

Staff Coordinator: Mike Vanstone

Staff Delivering Module: Mike Vanstone

Module Title: Engineering Science

Date of Validation:

Module Number: 005

Module Value: 30

Level: 3

Faculty Responsible for Delivery: Faculty of Applied Design & Engineering

Prerequisites:

AIMS:

1. To provide an introduction to the fundamental principles of solid mechanics.
2. To provide an introduction to fundamental principles of fluid mechanics and thermal energy.
3. To establish an understanding of engineering units of measurement.
4. To provide an introduction to electrical science

OUTCOME STATEMENTS:

Upon successful completion of this module, students will be able to:

1. identify and apply appropriate physical principles and relationships in the solution of engineering problems.
2. manipulate equations to produce numerical values in engineering units.

INDICATIVE CONTENT:

1. Units - basic SI units of length, mass and time, area and volume, density and relative density, mass and weight, force, work and power.
2. Mechanics of materials - types and basic structures of materials. Direct stress and strain. Elasticity. Shear stress and strain. Miscellaneous simple problems, including factor of safety.

3. Forces and moments - conditions of static equilibrium, forces and reaction, especially simply supported beams. Moments of a form. Resultant, couples, centre of gravity. Vector rotation. Resolution of forces. Polygon of forces.
4. Motion and friction - displacement, velocity and uniform acceleration. Newton's laws of motion. Torque and angular motion and acceleration. I values ($T = I\alpha$). Work, energy and power, including effects of friction. Basic vibrations - simple harmonic motion (spring - mass systems).
5. Thermal energy - temperature scales. Phases and states. Vapours and gases. Specific heats and latent heats. Gases. Boyle's law, Charles law and combined gas law $p V/T = c$ and $pV = mRT$.
6. Fluids - concepts of viscosity. Hydrostatics - pressures in liquids. volumetric flow calculations and principles of continuity.
7. Electrical current/voltage. Mechanical analogies. Resistors in series and parallel. Heating effect of current, variation of resistance with temperature-incandescent lamp. Voltage divider and current divider. Simple circuit calculations, use of Ohm's law and Kirchhoff's laws

TECHING AND LEARNING STRATEGY:

Lectures/laboratories	150 (hours)
Student private study	150
Total hours	300

Assessment

Examination	50%
Coursework	50%

READING LIST:

Bolton	Engineering Science Arnold
McDonagh, Waterworth and Phillips	Engineering Science vols. 1 and 2 Arnold
McDonagh	Mechanical Science for Technicians vol. 1 Arnold

Equipment Requirements:

Various materials and mechanics apparatus

Room Requirements:

Lecture room, laboratory

STAFF RESOURCES:

Staff Coordinator: Abi Summerfield

Staff Delivering Module: Abi Summerfield, Mark Ellis

Module Title:	Manufacturing Technology
Date of Validation:	
Module Number	012
Module Value:	20
Level:	3
Faculty Responsible for Delivery:	Faculty of Applied Design & Engineering
Prerequisites:	

AIMS:

This module aims to enable the student to understand current manufacturing technology including NC, CAM, CAD, metrology and materials testing.

Objectives:

The student will achieve these aims by :

1. Practical experiments on NC and CAM
2. Precision measurement of manufactured components
3. Evaluation of materials and material measurement techniques

OUTCOME STATEMENTS:

Upon completion of this module the student will be able to:

- 1) Select suitable manufacturing technologies for real parts
- 2) Demonstrate skills in CAD and CAM

INDICATIVE CONTENT:

1. CAD/CAM fundamentals
2. Use of NC in industry
3. Manufacturing processes

TEACHING AND LEARNING STRATEGY:

	hours
Tutorials	50

Practical Work Supervised	50
Practical Work Unsupervised	100
TOTAL	200

Implementation:

This module will work for small groups only -ie tutorials and practical sessions.

Assessment:

Coursework 100%

READING LIST:

C : The complete reference
McGraw-Hill 1987

Physical Resources:

PC's
CAD Room
NC milling machine

Room Requirements:

Lecture Room
Laboratory

STAFF RESOURCES:

Staff Coordinator: Richard Morgan

Staff Delivering Module: Richard Morgan

Module Title:	Computer Programming
Date Of Validation:	
Module Number	
Module Value:	20 credits
Level:	1
Faculty Responsible for Delivery:	Faculty of Applied Design and Engineering

AIMS:

1. To introduce software engineering concepts.
2. Introduce the fundamentals of programming and problem solving through the medium of a visual programming environment.

OUTCOME STATEMENTS:

Upon the successful completion of this module, the student will be able to:

1. Demonstration of an understanding of the components of a programming language
2. The ability to identify and solve a range of given problems by using fundamental programming methodologies

INDICATIVE CONTENT:

Specification of requirements
 Algorithm design – flow charts, pseudocode
 The programming environment - editor, compiler, debugger
 Programming fundamentals – variables, structures, loops, assignments, functions, Boolean algebra, and conditional statements.
 Compilation v Interpretation. Concepts of source and object code.
 Arrays and data structures.
 Specific library functions e.g. graphics routines.
 Binary arithmetic and operators.
 Introduction to Testing

TEACHING AND LEARNING STRATEGY:

	Hours
Lectures	30
Laboratory	30
Student Private Study	140
TOTAL	200

IMPLEMENTATION:

The theoretical content regarding high-level programming languages will be introduced in the lectures and developed in laboratory work. Practical work will involve the design and implementation of programs using a suitable methodology.

ASSESSMENT:

Outcomes	Assessment Criteria To achieve each outcome a student must demonstrate the ability to:
1. Demonstration of an understanding of the components of a programming language.	Write and implement software in a programming language that efficiently allows a mathematical or logical problem to be solved.
2.The ability to identify and solve a range of given problems by using fundamental programming methodologies.	- Write and implement software in a programming language that efficiently allows a mathematical or logical problem to be solved.

Coursework 100%

READING LIST:

Essential:

Halvorson V Microsoft Visual Basic 2005 (Sams, 2004)

Background:

Aitken Peter Teach Yourself VB.NET Web Programming (Sams 2005)

PHYSICAL RESOURCES:

- PCs

ROOM REQUIREMENTS:

- PC laboratory
- Lecture Room

STAFF RESOURCES:

Staff co-ordinator: Gaynor Thomas

Staff delivering this module: Gaynor Thomas
Kevin Palmer