Oxford Business College

International Foundation Programme

It's not where you come from,

it's where you choose to go

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<p align="center">**<u>SECTION A: Study Plan</u>**
COURSE DESCRIPTION</p>

<p align="center">**<u>Aims</u>**</p>

The aims of the Oxford Business College Foundation Programme are two-fold: academic and linguistic:

<p align="center">**<u>Academic aims</u>**</p>

- To provide students with a qualification which enables them to enter a British university
- To develop students' academic level to a standard acceptable for entry into a British university
- To expand students' knowledge and understanding of their chosen field and develop their ability to apply this knowledge to a variety of situations
- To train students to study effectively in a British academic environment

<p align="center">**<u>Linguistic aims</u>**</p>

- To improve students' general English language ability to at least an IELTS band score of 6-6.5
- To train students to produce English essays of an appropriate formal style and understand academic texts

<p align="center">**<u>Entry requirements</u>**</p>

The Oxford Business College maintains strict entry criteria for the Foundation Programme.

- The minimum pre-requisite for English language ability is IELTS 4.5 or equivalent, though an IELTS score of between 5.0 and 5.5 is recommended
- The completion of secondary or high school education is required
- The minimum age is eighteen

<p align="center">**<u>Functional Skills</u>**</p>

To improve students' functional skills, an orientation week is held prior to the start of their programme of study. Workshops are held on Reporting Skills, I.T, Study Skills and Numeracy. Students are awarded a certificate in recognition of an improvement to their functional skills following the orientation week.

Duration

The Foundation Programme has a duration of either two or three terms (six or nine months) in total.

The pre-course Business English Language Preparation programme is advised for the following students:

- **Students with an IELTS level of 4 or 4.5 take the pre-course English Language Programme for one term (three months)**
- **Students with an IELTS level 3 to 3.5 are required to take the pre-course English Language Programme for two terms (six months)**

Core Programme

The Oxford Business College Foundation Programme contains a mandatory English language programme consisting of:
- **Business Foundation Support**
- **English for Academic Purposes**
- **IELTS Training**

Specific Routes

The Foundation Programme contains three academic routes:

- **Foundation in Business**
- **Foundation in Law**
- **Foundation in Engineering**

Each specific route contains six modules in addition to the mandatory programme. Students study two or three specific-route modules per term.

The specific routes are:

1. **Business/ Accounting route**
   i. **Computer Technology**
   ii. **Core Mathematics 1 & 2**
   iii. **Business Market and the Economy**
   iv. **Business Law**
   v. **Business Environment**

   vi. **Business Accounting**

 2. **Law route**
   i. **Computer Technology**
   ii. **Core Mathematics 1 & 2**
   iii. **The Business Environment**
   iv. **Business Law**
   v. **English Legal System**
   vi. **General Political Theory**

 3. **Engineering route**
   i. **Computer Technology**
   ii. **Core Mathematics 1 & 2**
   iii. **Introduction to Mathematics for Engineering**
   iv. **Introduction to Engineering Mechanics**
   v. **Engineering**
   vi. **Physics**

<u>Assessments</u>

All modules are rigorously assessed by a combination of course work and formal, end-of-module examinations.

- **English language ability is assessed with full, internal English examinations**
- **These examinations are held once per term**

<u>Contact hours</u>

Each term at the Oxford Business College lasts for a minimum of 10 weeks (excluding half-term breaks and holidays). Some terms may last for 11 or 12 weeks.

- **The Foundation six-month programme involves a minimum of 24.5 hours of classroom-based tuition per week.**
- **The Foundation nine-month programme involves a minimum of 20 hours of classroom-based tuition per week.**
- **Students are expected to complete at least 10 hours of homework per week**
- **The minimum total number of hours per term is 220.5/180 hours. Some terms will have more hours than this minimum**

Sample Academic Study Plan (9 months)

Term 1
Business route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Core Mathematics 1 & 2	4.30 hours	4 hours
Business Market and the Economy	4.30 hours	4 hours

Law route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Core Mathematics 1 & 2	4.30 hours	4 hours
General Political Theory	4.30 hours	4 hours

Engineering route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Core Mathematics 1 & 2	4.30 hours	4 hours
Introduction to Engineering Mechanics	4.30 hours	4 hours

Term 2

Business route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Computer Technology	4.30 hours	4 hours
The Business Environment	4.30 hours	4 hours

Law route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Computer Technology	4.30 hours	4 hours
The Business Environment	4.30 hours	4 hours

Engineering route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Computer Technology	4.30 hours	4 hours
Physics	4.30 hours	4 hours

Term 3

Business route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Business Law	4.30 hours	4 hours
Business Accounting	4.30 hours	4 hours

Law route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Business Law	4.30 hours	4 hours
Legal Principles	4.30 hours	4 hours

Engineering route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Engineering	4.30 hours	4 hours
Introduction to Mathematics for Engineering	4.30 hours	4 hours

Sample Academic Study Plan (6 months)

Term 1

Business route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Core Mathematics 1 & 2	4.30 hours	4 hours
Business Market and the Economy	4.30 hours	4 hours
Business Law	4.30 hours	4 hours

Law route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Core Mathematics 1 & 2	4.30 hours	4 hours
General Political Theory	4.30 hours	4 hours
Business Law	4.30 hours	4 hours

Engineering route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Core Mathematics 1 & 2	4.30 hours	4 hours
Introduction to Engineering Mechanics	4.30 hours	4 hours
Physics	4.30 hours	4 hours

Term 2
Business route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Computer Technology	4.30 hours	4 hours
The Business Environment	4.30 hours	4 hours
Business Accounting	4.30 hours	4 hours

Law route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Computer Technology	4.30 hours	4 hours
The Business Environment	4.30 hours	4 hours
Legal Principles	4.30 hours	4 hours

Engineering route

Module	Contact hours per week	Homework per week
Business Foundation Support, English for Academic Purposes and IELTS Training.	9 hours	5 hours
Study Skills	2 hours	1 hour
Computer Technology	4.30 hours	4 hours
Engineering	4.30 hours	4 hours
Introduction to Mathematics for Engineering	4.30 hours	4 hours

Assessment Grid

The Oxford Business College Foundation Programme awards A, B, C and F grades to each module of the course. Most of the coursework and examinations are essay-based and are assessed according to the Oxford Business College assessment grid.

Essay-based coursework and examinations:

Essay-based assessments are graded according to the following grid:

1. Presentation and style: Marks are awarded in the following five areas:

A	B	C	F
Language fluent; Grammar and spelling accurate and text is cohesive with good signposting	Language mainly fluent; Grammar and spelling mainly accurate, reasonably cohesive and signposted	Meaning apparent but language not always fluent; Grammar and/or spelling contain errors, limited cohesion and very little signposting	Meaning unclear and/or grammar and/or spelling contain frequent errors, incohesive and without any signposting

2. Conforming to instructions of objectives

A	B	C	F
Task has been completed in full; little or no digression; generally coherent	Task has been adequately fulfilled, covering all the content elements; reasonably coherent overall	Reasonable attempt at task, maybe a simple account with little elaboration or a fuller attempt combining some repetition	Noticeable irrelevance and/or incoherence in the task

3. Content and knowledge

A	B	C	F
Comprehensive knowledge of topic with areas of specialisation in depth and awareness of a variety of ideas/ contexts and Frameworks.	Has given a factual and/or conceptual knowledge base and appropriate terminology	Evidence of limited knowledge of topic and some use of appropriate terminology	Lacks evidence of knowledge relevant to the topic and/or significantly misuses terminology

4. Analysis & Synthesis

A	B	C	F
Can analyse a range of information with minimum guidance; can apply major theories and compare alternative methods/ techniques for obtaining data. Can reformat a range of ideas/ information towards a given purpose	Can analyse with guidance using given classification principles Can collect/collate and categorise ideas and information in a predictable and standard format	Can analyse a limited range of information with guidance using classification and/or principles Partially collects, collates and categorises information in a structured way	Fails to analyse information No organisation of ideas and information

5. Reflection/ evaluation

A	B	C	E
Can select appropriate techniques of evaluation and can evaluate the relevance and significance of data collected	Can evaluate the reliability of data using defined techniques	Limited and only partially accurate evaluation of data using defined techniques	Fails to evaluate or use techniques of evaluation or evaluations are totally invalid

The overall mark is an average of the five individual grades.

Non-essay-based coursework and examinations

For certain modules, assessment is not essay-based; in these subject areas, raw scores are converted into grades using the following scheme:

Raw score	Grade awarded
70% or more	A
60-69%	B
50-59%	C
49% or less	F

SECTION B: CORE PROGRAMME MODULES

Business English Language Preparation Programme

Length of course	Between 9 and 18 weeks
Hours per week	20 hours per week
Minimum total hours	180 per term

Aims

- Expand the students' grammatical, functional and lexical base.
- Train the students to apply their knowledge of grammar and vocabulary to writing and speaking.
- Train the students rigorously in all four skills of English so that they reach Oxford Business College's entry criterion of IELTS band 4.5 for entry onto the Foundation Programme.
- Prepare students linguistically for the University Foundation Programme.

Learning outcomes

Upon completion of the programme, students should be able to:

- Use intermediate-level vocabulary and grammar accurately and appropriately in written and spoken English
- Deal successfully with a range of intermediate listening and reading texts of a general nature
- Achieve an IELTS score of at least 4.5-5 in the internal IELTS examination programme.
- Understand basic business vocabulary and expressions
- Communicate successfully in common business settings

Outline Syllabus

General English	The key English language skills of Reading, Writing, Speaking and Listening are developed through a range of learning methods, using graded texts, written exercises, tutor and peer-based speaking activities and audio listening material. This is consolidated by a systematic expansion of students' vocabulary base and instruction in fundamental grammar principles.
Reading and Writing for Business	Specialist business texts and written exercises introduce students to key business terminology, allowing them to develop confidence in a variety of written communication contexts.
Business Conversation	Role-plays and exercises encourage students to consolidate use of vocabulary acquired throughout the programme, and exposure to a wide variety of audio recordings help students develop the listening skills necessary to succeed on the college's Foundation programme.
IELTS	Students are introduced to the four parts of the IELTS exam and develop the skills necessary to improve performance to the level required for enrolment on the Oxford Business College Foundation programme.

Diagnostic and progress tests

All students take a diagnostic test to determine their level of proficiency in Reading, Writing, Speaking, Listening, Grammar and Vocabulary. Progress in all areas is tested weekly and IELTS practice tests are undertaken every third week. This process of continuous assessment allows both tutor and students to measure progress and highlights areas where remedial work is necessary.

Learning activities outside the classroom

Regular yet manageable levels of homework allow students to develop the academic discipline necessary to succeed when progressing onto the Foundation programme. Individual learning methods are addressed and encouragement and practice in these methods is given in class to encourage a pro-active approach to independent learning outside the classroom.

Business English Language Preparation Programme (Foundation Level)

6-month programme

Length of course	18 weeks
Hours per week	6 hours per week
Minimum total hours	54 per term

Aims

- Consolidate and expand the students' lexical and grammatical resources
- Train the students to apply this knowledge to spoken and written english
- Train the students to comprehend and correctly use academic english
- Provide thorough and rigorous ielts-based skills' training.
- Support foundation programme tutors with english for specific purposes learning material

Learning outcomes

On completion of the module, students should be able to:

1) gain an IELTS score of at least 6 for entry into a British university

2) use intermediate and upper-intermediate grammatical structures and vocabulary in their spoken English

Outline Syllabus

Business Foundation Support	Students are taught the specialist vocabulary, grammar and pronunciation necessary to succeed in all modules included within the Business Management, Engineering and Law programme modules.
English for Academic Purposes	Training is given in understanding written and spoken forms of academic English. Students develop a range of skills including effective listening and note taking, delivering individual and group presentations, skimming and scanning texts, reading for detail and producing effective compositions and reports.
IELTS Training	Course material covers all aspects of the IELTS Reading, Writing, Speaking and Listening sub- tests, supported by regular homework exercises.

Diagnostic and progress tests

All students take an internal IELTS test at the start of the course to determine their close level of proficiency. Progress is tested in class and via regular homework exercises.

Mandatory English Programme (Foundation)

9-month programme

Length of course	27 weeks
Hours per week	10 hours per week
Minimum total hours	90 per term

Aims

- Consolidate and expand the students' lexical and grammatical resources
- Train the students to apply this knowledge to spoken and written English
- Train the students to comprehend and correctly use academic English
- Prepare the students to sit the IELTS examination
- Provide thorough and rigorous IELTS-based skills' training
- Support Foundation Programme tutors with use of English for Specific Purposes learning material

Learning outcomes

On completion of the module, students should be able to

- Gain an IELTS score of at least 6 for entry into a British university
- Use intermediate and upper-intermediate grammatical structures and vocabulary in their spoken English

Outline syllabus

Business Foundation Support	Students are taught the specialist vocabulary, grammar and pronunciation necessary to succeed in the modules included on the Business Management, Engineering and Law programme modules.
English for Academic Purposes	Training is given in understanding academic English in written and spoken forms. Students develop a range of skills including effective listening and note taking, delivering individual and group presentations, skimming and scanning texts, reading for detail and producing effective compositions and reports.
IELTS Training	Course material covers all aspects of the IELTS Reading, Writing, Speaking and Listening sub-tests, supported by regular homework exercises.

All students take an internal IELTS test or equivalent at the start of the course to determine their level of proficiency. Progress is tested in class and via regular homework exercises.

Sample material from tests

Pre-Foundation Level Grammar Function test

Complete the sentences using your own ideas

1: Past and Earlier Past

When I_____home last night, I found that somebody_____my car.

2: Advice for the present or future

    a) "I'm always tired"
    b) "You___

3: Obligation

I_____to go to school from Monday to Friday

4: Shorter action interrupting longer action.

Yesterday, I_____when_____

5: Possible situation and consequence.

If_____, _____

Speaking and listening (5-10 minutes)   **Student name:**

Instructions to tutors:
Speak a little slower than normal and as clearly as possible. Feel free to repeat a question once or twice to give students time to accustom themselves to the sound of your voice. However, don't spend too long on any one question – if they don't understand the alternatives, move on to the next question. Feel free to make notes next to the questions. Proceed as far as students are able!

Introduce yourself: "Hello I'm/my name's ……. I'll be one of your teachers."

What's your name?
Can you spell it?
Where are you from?
(Where in …..?)
What do you do? (What's your job?) (Where do you work?)
Are you single or married? (What's your husband/wife's name?)
Do you have any children? (What are their names? How old are they?)
Do you come from a large family?
Tell me about it/your family
What do you like doing in your free time? (When you're not working?) (What are your hobbies?)
Tell me about your home town/Describe your home town
What are we doing now?
What did you do yesterday?
What are you going to do later/tomorrow?
Do you like speaking English?
How long have you been studying (learning) English?
Do you speak any other languages?

Comments and recommendation: (beginner/elementary/pre-intermediate/higher)

Foundation Level IELTS Test

Present a written argument to an educated reader with no specialist knowledge of the following topic. Use the blank paper provided.

Some people feel that certain workers like nurses, doctors and teachers are undervalued and should be paid more, especially when other people like film actors or sports stars are paid huge sums of money that are considered by some people to be out of proportion to the importance of the work they do.
. How far do you agree?

. What factors should be considered when deciding how much people are paid?

Use your own ideas, knowledge and experience and support your arguments with examples and with relevant evidence.

You should write a maximum of 250 words

Study Skills 1 & 2

Course title	Study Skills
Length of course	3 terms
Hours per week	2 hours per week
Minimum total hours per week	60 hours over three terms

Aims

This module provides a comprehensive introduction to study skills in a way that can enhance the student's learning processes in British colleges and universities. The aim of this course is to increase students' efficiency in organizing study time, methods used for assimilating information, academic writing, oral presentation and test preparation.

Learning outcomes

On completion of the module, students should be able to:

1) Apply techniques to manage their study time.
2) Write effective assignments that meet all the academic criteria.
3) Prepare and deliver an oral presentation in English.
4) Make notes from academic lectures and audio-visual materials.
5) Learn different approaches to assimilate, read and evaluate information effectively.
6) Participate actively and appropriately in group work and discussions.
7) Understand revision skills and examination technique.
8) Recognize the importance of reflection and critical thinking.

Outline Syllabus

1.	**Introduction to Study Skills**	The meaning and significance of study skills; studying at British colleges and universities.
2.	**Time Management**	Key factors in time management; strategies and approaches to time management.
3.	**Information Skills**	Sources of information; evaluating information sources.
4.	**Academic Reading Skills**	The importance of reading skills; reading techniques (skimming, scanning and deep reading); strategies for effective reading.
5.	**Writing Skills**	Writing reports and assignments; paraphrasing, referencing and creating a bibliography.
6.	**Making Notes**	Significance of making-notes; tips to make good notes; note referencing and plagiarism.
7.	**Presentation Skills**	Preparing and planning a presentation; giving a presentation.
8.	**Working in Groups**	Effective student group work; the organization of meetings; managing group work; common problems in group work and potential solutions.
9.	**Examination Skills**	Information about examinations; revision; practical tips and advice; malpractice and unfair practices.
10.	**Reflection**	Significance of reflection; what is a reflective learner; strategies for reflection; personal development planning.
11.	**Critical Thinking**	The meaning and significance of critical thinking; strategies for critical thinking (description, analyses and evaluation).

Indicative reference

Cottrell, S. 2019. *The Study Skills Handbook (macmillan study skills)* 5th edn., Red Globe Press: UK.

Driscoll, J., 1994. Reflective practice for practise. Senior Nurse, 14(1), p.47.

Gibbs, G (1988). Learning by doing: a guide to teaching and learning methods. Oxford: Further Education Unit, Oxford Polytechnic. Honey, P and Mumford, A (1986). In Mumford, A, Effective Learning. London: IPD.

Honey, P. and Mumford, A., 1986. Using your learning styles. Chartered Institute of Personnel and Development.

Kolb, D.A., 1984. The process of experiential learning. Experiential learning: Experience as the source of learning and development (pp. 20-38). Prentice-Hall, Inc.

Schön, D.A., 2017. The reflective practitioner: How professionals think in action. Routledge.

Assessment weighting and patterns

There is an assessment at the end of each unit:

	Assessment component	Time allowed	Percentage
1	Production of an essay or report.		25%
2	Production of Personal Development Planning (PDP)		25%
3	Note-taking exam from audio-visual material to 300-word summary.	1 hour	25%
4	An academic oral presentation.	15 minutes per student	25%

Sample assignment questions

Reflect on and critically think about your study experiences at Oxford Business College (OBC). Write about your last year at school. How did you feel in your first few weeks at OBC? Did your priorities change from when you were at school back home and OBC? How has your learning style changed since coming to the UK?

SECTION C: ROUTE-SPECIFIC MODULES

1. Computer Technology

Route	All routes
Length of course	1 term
Hours per week	4.30 hours per week
Total hours	45

Aims

The aim of this module is to develop the students' understanding of the components of computer systems and develop the skills required to use the computer for different purposes and set up and maintain computer systems.

Learning outcomes

On completion of the module, students should be able to:

1) Understand the components of computer systems.
2) Understand and be able to use different software in Microsoft office (MS, Excel and PowerPoint).
3) Develop understanding of database concepts and how to access database.
4) Be able to set up and maintain computer systems.

Outline syllabus

1.	System unit components	Processors; motherboard; BIOS; power supply; fan and heat sink; hard drive configuration and controllers (e.g. IDE, EIDE, master, slave); ports (e.g. USB, parallel, serial); peripherals (e.g. printer, camera, scanner, plotter); internal memory (RAM, ROM, cache); specialized cards (e.g. network, graphic cards).

2.	Operating system software	Operating system examples (e.g. Windows, MAC OS); command line and GUI operating systems; operating system functions and services (e.g. machine and peripheral management); device drivers and features.
3.	Word Processing using Microsoft Word	Text entry and editing; moving and pasting; document format; time spacing, margins and tabs; blocking and previewing; search and replace; spelling and thesaurus; bulleted and numbered lists; using tables; borders and shading; pictures and frames.
4.	Spreadsheets using Microsoft Excel	Entering and editing data; cell addresses and screen display; use of formulae and functions; format of worksheets; copying information and relative and fixed addresses.
5.	Presentations using Microsoft PowerPoint	Planning a presentation; creating; adding; editing and deleting slides; changing the design template or color scheme; printing out the slides; viewing and delivering the presentation.
6.	Accessing Database	Database structure and design; field data types; entry of data via forms; appending; deleting and replacing records; browsing and finding records; sorting records; definition of queries and filters; report formats.
7.	Software maintenance	Upgrade software; installation of patches; scheduling of maintenance tasks; utility software aimed at users (e.g. defragmentation, clean-up, system profilers); other third-party utility software (e.g. spyware removal).
8.	Hardware maintenance	Cleaning equipment; install and configure new peripherals (e.g. printers); install and configure additional or replacement device (e.g. hard drive, graphics card, sound card); health and safety issues.

9.	File management	Create folders; back-up procedures; delete files.
10.	Review	

Indicative reference

Anderson, K., et al. 2011. *BTEC Level 3 National IT Student*. 3rd edn. Edexcel.
Heathcote, P.M., & Richards, R.P. 2004. *Key Skills in Information Technology - Levels 2 and 3*. Payne-Gallway Publishers Ltd.

Assessment weighting and patterns

	Component	Time allowed	Percentage
1	Assignment CW1		20%
2	Assignment CW2		30%
3	Final exam		50%

Sample examination questions

Assignment

Scenario

You are currently employed as an ICT support technician for company X in London. The manager has asked you to deliver a PowerPoint presentation that explains different components of the computer system. The presentation will be used to train new staff that have little understanding of the computer system. Your presentation should address the following points by using diagrams where relevant:

Tasks

1. **List the hardware components and explain the function of each component**
2. **List the system unit components and explain the function of each component.**

3. **Compare the features and functions of two different operating systems (Windows and MAC).**
4. **Describe the purpose of different software utilities.**

- **Final exam**

RAM is an example of
A. Secondary memory.
B. Primary memory.
C. Both (a) and (b).
D. None of the above.

What is the function of a disk drive?
A. To print sheets of paper.
B. To read from or write information to a floppy disk.
C. To display information or pictures on a screen.
D. To calculate numbers.

The brain of any computer system is
A. ALU.
B. Memory.
C. CPU.
D. Control unit.
E. None of the above.

Which of the following is an example of an addition formula?
A. =B4+D7.
B. 2+3+6=11.
C. F3*G7.
D. B9/B6.

2. Core Mathematics 1 & 2

Route	All routes
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

The aim of this module is to develop the students' understanding of mathematics and mathematical processes; extend their range of mathematical skills and techniques and use them in more difficult, unstructured problems; and develop an understanding of coherence and progression in mathematics and how different areas of mathematics can be connected.

Summary

This module introduces algebra and functions, coordinate geometry, series and sequences. It provides an introduction to differentiation and integration, in order to develop mathematical applications in science and engineering and business-related subjects.

Learning outcomes

On completion of the module, students should be able to:

- Provide the rules on how to factorise expressions which enable one to solve equations
- Provide a knowledge of indices to differentiate and integrate the expressions
- Distinguish linear, quadratic and cubic equations
- How to model the movement of objects by a quadratic function
- Introduce methods to solve the simultaneous equations
- Provide a knowledge of analysis methods to analyse complex graphs
- How to interpret linear graphs from real life examples
- Provide a knowledge of how arithmetic series can be used in engineering and business
- Introduce how differential calculus is used in many branches of science, engineering and business
- Provide a knowledge to understand how the area and volume can be found by using integration

- Distinguish the under and over estimate of an area by trapezium rule and integration rule

Summary of unit content

Algebra and Functions (C1 and C2), Quadratic Functions (C1), Equations and inequalities (C1), Sketching curves (C1), Coordinate geometry in the (x,y) plane (C1 and C2), Sine and cosine rule (C2), Arithmetic sequences and series (C1), Differentiation and integration (C1 and C2).

Outline syllabus

Algebra and Functions –C1	**Core Mathematics I** Simplify expressions and collect like terms Law of indices Expand and Factorise Use and manipulation of surds
Algebra and Functions –C2	**Core Mathematics II** Algebraic division Use of the Factor Theorem The Remainder Theorem
Quadratic Functions C1	Plot the graph of a quadratic function Solve a quadratic function using factorisation Complete the square of a quadratic function Use of quadratic formula Calculate the discriminant of a quadratic expression Sketching graphs
Equations and Inequalities C1	Solve simultaneous equations by elimination and substitution method Introduce linear and quadratic inequalities
Sketching Curves C1	Sketch cubic graphs Sketch the graphs of the reciprocal function Introduce how to find intersection points Introduce transformations by simple translations and stretches
Coordinate Geometry C1	**Core Mathematics I** Understand the link between the equation of a line and its gradient and intercept Calculate the gradient of a line joining a pair of points Find the equation of a line joining a pair of points Find the equation of a line passing through a pair of points

Coordinate Geometry C2	**Core Mathematics II** Find the mid-point of a line Find the distance between a pair of points Know how to find the equation of a circle Use the properties of a circle to solve geometric problems
The sine and cosine rule C2	Use the sine rule to find a missing side and angle Use the cosine rule to find a missing side and angle Pythagoras' Theorem Find the area of a triangle using an appropriate formula
Sequences and Series C1	Know how to find the nth term of an arithmetic sequence, U_n Know how to find the sum to n terms of an arithmetic series, Sn Solve problems on arithmetic series using the formulae for U_n and S_n
Differentiation C1	Estimate the gradient of a curve Calculate the gradient function Calculate the gradient of a curve at any point Find the equation of the tangent and normal to a curve at Specified point and calculate the second differentiation
Differentiation C2	Know the differences between an increasing and decreasing function How to find a stationary point How to distinguish between a maximum, a minimum and a point of inflexion How to solve problems
Integration C1	Integrate simple functions Find the constant of integration by substituting in a given point
Integration C2	Integrate simple function within defined limits Use integration to find areas under curves Use integration to find the area between a curve and a line Trapezium rule

Indicative Reading List:

Books:

Parsons, R. 2012. *AS/A Level Maths for Edexcel – Core 1*. CGP Books: UK

Parsons, R. 2012. *AS/A Level Maths for Edexcel – Core 2*. CGP Books: UK

Assessment weighting and patterns

	Assessment component	Time allowed	Percentage
1	1st Examination	2 hours	30%
2	2nd Examination	2 hours	30%
3	Assignment – CW1	5 weeks	40%

1st Examination: 2nd Examination:	**30 %** **Paper 1: Non-calculator** **30%** **Paper 2: Calculator**	
A 2-hour closed book examination with questions that require the following:	• Factorising expressions • Calculations of simultaneous equations • Solving, analysing and distinguishing of equations (quadratic and cubic) • Finding the equation of a tangent/normal • Sketching curves with using transformation rules • Calculating the set of values by using inequalities • Finding the gradient of a curve by differentiation • Calculating the area under the curve by using integration and trapezium rule • Calculating the area of a triangle using an appropriate formula • Calculating a maximum and minimum point of a curve and finding coordinates • Finding the distance between two points and calculating the diameter of a circle from two points	

	• Calculating a maximum and minimum point of a curve and finding coordinates • Finding the distance between two points and calculating the diameter of a circle from two points
Coursework	**40%**
Coursework that requires the students to	• Classify and identify the sine and cosine rules on engineering questions • Calculate the area under the curve by using integration and trapezium rule and explain overestimate or underestimate. • Calculate the f(x) by using integration for the dy/dx equations • Describe and transfer definite and indefinite integrals on the calculation of area questions • Analyse the differentiation and integration rules on engineering, science or business questions

Non-Calculator Paper
Question 1:

(a) Write down the value of $16^{\frac{1}{4}}$.

(1)

(b) Simplify $(16x^{12})^{\frac{3}{4}}$.

(2)

Question 2:

The point A (−6, 4) and the point B (8, −3) lie on the line L.

(a) Find an equation for L in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

(b) Find the distance AB, giving your answer in the form $k\sqrt{5}$, where k is an integer.

(3)

Question 3:

(a) Write $\dfrac{2\sqrt{x}+3}{x}$ in the form $2x^{p}+3x^{q}$ where p and q are constants.

(2)

Given that $y = 5x - 7 + \dfrac{2\sqrt{x}+3}{x}$, $x > 0$,

(b) find $\dfrac{dy}{dx}$, simplifying the coefficient of each term.

(4)

Question 1:

The gradient of a curve C is given by $\dfrac{dy}{dx} = \dfrac{(x^2+3)^2}{x^2}$, $x \neq 0$.

(a) Show that $\dfrac{dy}{dx} = x^2 + 6 + 9x^{-2}$.

The point $(3, 20)$ lies on C.

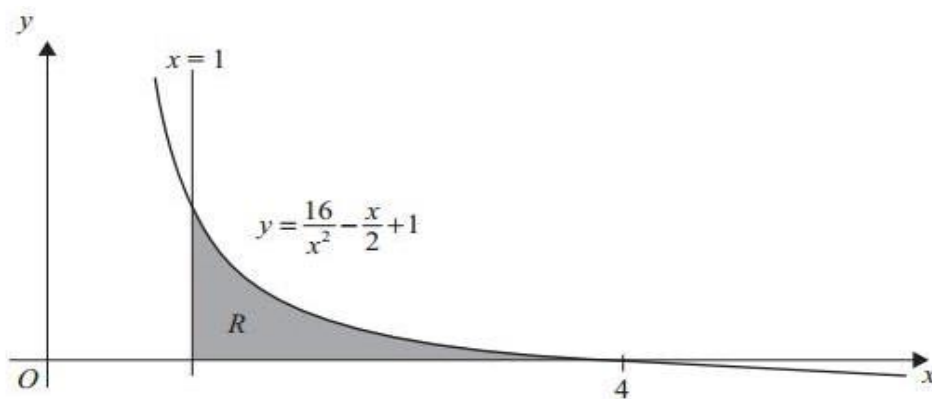(b) Find an equation for the curve C in the form $y = f(x)$.

Question 2:

Figure 1

Figure 1 shows the graph of the curve with equation

$$y = \frac{16}{x^2} - \frac{x}{2} + 1, \qquad x > 0$$

The finite region R, bounded by the lines $x = 1$, the x-axis and the curve, is shown shaded in Figure 1. The curve crosses the x-axis at the point $(4, 0)$.

(a) Complete the table with the values of y corresponding to $x = 2$ and 2.5

x	1	1.5	2	2.5	3	3.5	4
y	16.5	7.361			1.278	0.556	0

(2)

(b) Use the trapezium rule with all the values in the completed table to find an approximate value for the area of R, giving your answer to 2 decimal places.

(4)

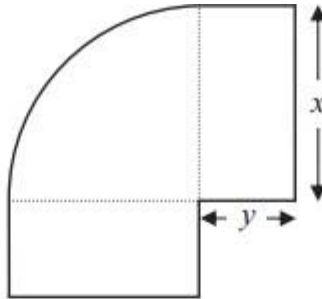(c) Use integration to find the exact value for the area of R.

(5)

Figure 3

Figure 3 shows a flowerbed. Its shape is a quarter of a circle of radius x metres with two equal rectangles attached to it along its radii. Each rectangle has length equal to x metres and width equal to y metres.

Given that the area of the flowerbed is 4 m^2,

(a) show that

$$y = \frac{16 - \pi x^2}{8x}$$

(3)

(b) Hence show that the perimeter P metres of the flowerbed is given by the equation

$$P = \frac{8}{x} + 2x$$
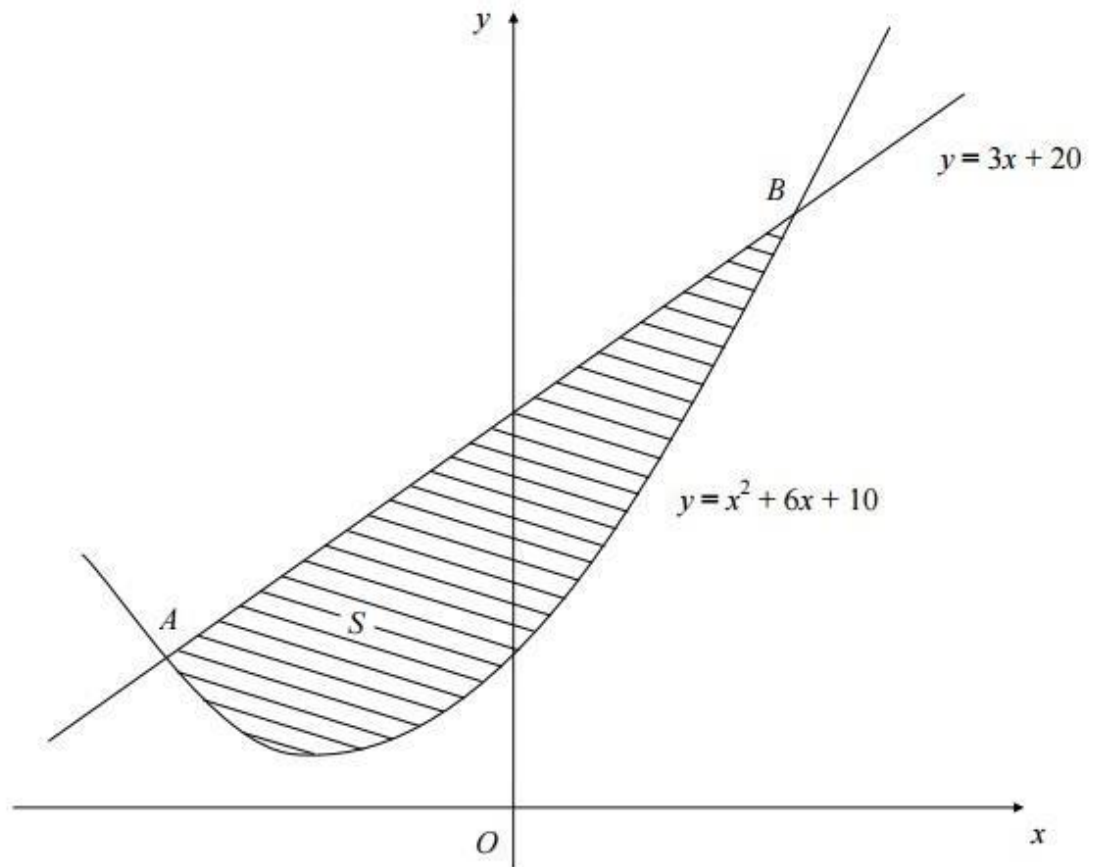
(3)

(c) Use calculus to find the minimum value of P.

(5)

(d) Find the width of each rectangle when the perimeter is a minimum.
Give your answer to the nearest centimetre.

(2)

Figure 2

The line with equation $y = 3x + 20$ cuts the curve with equation $y = x^2 + 6x + 10$ at the points A and B, as shown in Figure 2.

(a) Use algebra to find the coordinates of A and the coordinates of B.

(5)

The shaded region S is bounded by the line and the curve, as shown in Figure 2.

(b) Use calculus to find the exact area of S.
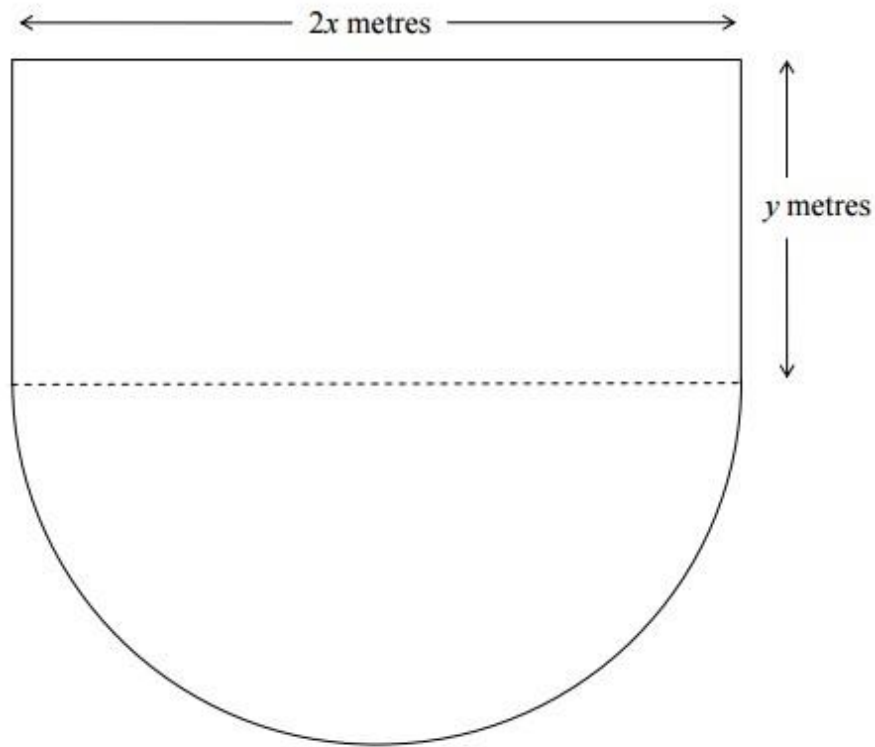
(7)

Question 2:

Figure 3

Figure 3 shows the plan of a stage in the shape of a rectangle joined to a semicircle. The length of the rectangular part is 2x metres and the width is y metres. The diameter of the semicircular part is 2x metres. The perimeter of the stage is 80 m.

(a) Show that the area, A m^2, of the stage is given by

$$A = 80x - \left(2 + \frac{\pi}{2}\right)x^2.$$

(4)

(b) Use calculus to find the value of x at which A has a stationary value.

(4)

(c) Prove that the value of x you found in part (b) gives the maximum value of A.

(2)

(d) Calculate, to the nearest m^2, the maximum area of the stage.

(2)

Grade criteria

To get a C you need 50%, for B you need 60%, and for an A you need 70% overall.

	Class Test / Assignment Grade 40%	Exam grades 60%
C / Pass	**At least 20 out of 40** <u>*and…*</u>	**at least 30 out of 60**
B	At least 24 out of 40 <u>*and…*</u>	at least 36 out of 60
A	At least 28 out of 40 <u>*and…*</u>	at least 42 out of 60

Coursework / Assignment deadlines throughout term
Exam and assignments week ends in Week 10

Grade descriptors

The Oxford Business College Foundation Programme awards A, B and C for this module.

Non-essay-based coursework and examinations

For certain modules, assessment is not essay-based; in these subject areas, raw scores are converted into grades using the following scheme:

Raw score	Grade awarded
70% or more	A
60-69%	B
50-59%	C
49% or less	F

3. The Business Environment

Route	Business/Law
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

- To give learners the fundamental knowledge of a range of business organisations.
- Factors that shape the nature of organisations operating in an increasingly complex business world.

Learning outcomes

On completion of this unit a learner should:

- Know the range of different businesses and their ownership.

- Understand how businesses are organised to achieve their purposes.

- Know the impact of the economic environment on businesses.

- Know how political, legal, social and other PESTLE factors impact on businesses

Outline Syllabus

Topics covered in the Module	Directed reading
Range of different businesses: local; national; international; global; public; private; not-for-profit/voluntary; sectors of business activity (primary, secondary and tertiary) **Business purposes**: supply of products or services; difference between profit and not-for-profit organisations	**Selected reading/case studies will be given prior to every session.**

Ownership: public, private and voluntary sectors; types of ownership (sole trader, partnerships, private and public limited companies, government departments, government agencies, worker cooperatives, charitable trusts); main implications of different types of ownership on businesses (extent of liability, limitations to operation for public and charitable organisations) **Key stakeholders**: customers; employees; suppliers; owners; trade unions; employer associations; local and national communities; governments; influence of stakeholders on organisations	
Organisational structures: purpose (division of work, lines of control and communication); types of structure (functional, geographic, product, type of customer); diagrammatic representation of structure (organization charts); span of control **Functional area**: finance; marketing; production; customer service; sales; human resources. **Strategic planning**: mission and values; development of strategic aims and objectives; cascading of objectives throughout the organisation; strategic planning process; use of SMART (specific, measurable, achievable, realistic, time-bound) objectives.	
Influencing factors: stakeholders; business environment; business type and ownership. **Different aims**: private sector aims (break-even, survival, profit maximisation, growth); public sector aims (service provision, cost limitation, value for money, meeting government standards, growth of range of provision)	
Strategic planning: mission and values; development of strategic aims and objectives; cascading of objectives throughout the organisation; strategic planning process; use of SMART (specific, measurable, achievable, realistic, time-bound) objectives **Influencing factors:** stakeholders; business environment; business type and ownership. **Different aims**: private sector aims (break-even, survival, profit maximisation, growth); public sector aims (service provision, cost limitation, value for money, meeting government standards, growth of range of provision)	

Economic: importance of stability; impact on business of changes in the economic environment (growth, recession, ripple effect); levels of inflation; availability and cost of credit; labour; changes in government policy (legal, fiscal, monetary) **Demand**: influenced by affordability; competition; availability of substitutes; level of Gross Domestic Product (GDP); needs and aspirations of consumers **Supply**: Influenced by availability of raw materials and labour; logistics; ability to produce profitably; competition for raw materials; government support	
Changes in supply and demand: supply and demand curves; elasticity of demand; price sensitivity; influence of branding on price sensitivity **Global interaction**: levels and types of interdependence (supply chains, ownership of businesses, movement of capital and business operations, reducing ability of national governments to regulate global businesses)	
Political: political stability; government support for different types of organisations eg private, voluntary, public; fiscal eg levels and types of taxation; direct support eg grants, loans; providing infrastructure eg transport; internet; enhancing skills of the working population eg education, training, research; organisations to support businesses eg Business Link; membership of international trading communities eg European Union	
Legal: providing framework for business eg company law; protecting consumers and employees eg contract law, employment law, consumer protection; ensuring fair and honest trading eg competition law. **Social**: demographic issues eg population growth or decline; changes in structure eg ageing; households and families; education; attitude to work; religions; attitudes to male and female roles; ethics.	

Indicative references

Bevan, J., et al. 2009. *BTEC Level 3 National Business Student Book 1*. Pearson. ISBN 9781846906343

Bevan, J., et al. 2009. *BTEC Level 3 National Business Student Book 2.* Pearson. ISBN 9781846906350

Coupland-Smith, H., & Mencattelli, C., 2009. *BTEC Level 3 National Business Teaching Resource Pack*. Pearson. ISBN 9781846906367

Dransfield &Needham. *GCE AS Level Business* ISBN 0435401149

Jewell, B., 2000. *An Integrated Approach to Business Studies*. Longman. ISBN 0582405424

Letts., 2004. *Revise AS Business Studies*. Letts Educational Ltd. ISBN 1843154242

Marcouse, Surridge, Watson & Swift. 2008. *Business Studies for A Level.* Hodder. ISBN 0340966904

Marcouse, I., & Lines, D., 2002. *Business Case Studies AS and A Level* 3rd edn. Longman. ISBN 0582406366

Palmer & Hartley. 2006. *The Business Environment*. McGraw-Hill. ISBN 0077109902

Worthington & Britton. 2006. *The Business Environment*. Financial Times/Prentice Hall. ISBN 0273704249

Journals

Business Review Magazine (Phillip Allan Publishers – see www.phillipallan.co.uk)

The Economist (The Economist Newspaper Group Inc)

Quality Newspapers especially the business sections

Websites

www.bbc.co.uk/business	BBC Business website
www.bbc.co.uk/news	BBC News website
www.becta.org.uk	British Educational Communications and Technology Agency
www.bized.ac.uk	Business education website with materials and quizzes
www.careers-in-business.com	Information on a variety of business careers
www.carol.co.uk	Online company annual reports
www.direct.gov.uk	Gateway to public services
www.eubusiness.com	Online business information service
www.learnthings.co.uk	Learn things – providers of interactive digital resources

www.nln.ac.uk	National Learning Network
www.projectalevel.co.uk	Project A Level – revision resources for learners
www.rdn.ac.uk/news/headlines	Resource Discovery Network – a gateway o internet resources for learning, teaching and research
www.s-cool.co.uk	A-level and GCSE revision material
www.statistics.gov.uk	Official UK statistics www.thetimes100.co.uk Free materials and case studies the European Union

Sample examination questions

You are required to select **<u>two</u>** organisations from different sectors and from different parts of the world and investigate their differences; how they are run, organised and influenced. You will also investigate the impact of **two contrasting** Economic Environments on **<u>one</u>** of your selected organisations and explain how the Political, Economic, Social, Technological, Legal and Environmental factors are impacting on the organization you choose. You will also review/ re-assess the influence of stakeholders on your chosen organisation's strategy.

Task 1

2.1 Describe the type of business, purpose and ownership of two chosen contrasting businesses

To complete this you must investigate **two businesses** that are very different to each other. You must present the findings of your investigation in an appropriate and coherent manner.

For each of the two businesses you must describe and explain:

- The type of business it is in terms of which industrial sector it is in and whether it operates on a local, national or international scale.
- What the business does. Meaning, does it make a profit, provide a service or have another purpose. In explaining this you must clarify exactly what need the business meets in order to fulfil this purpose.
- Explain details about the ownership of the business and why this type of ownership suits the business being examined.

2.1 Identify the different stakeholders who have influence in your two contrasting businesses.

Explain what is meant by a stakeholder. For each of the businesses you examined identify and describe their stakeholders

2.1 Describe the different stakeholders' objectives.

Outline the objectives of the identified stakeholders – This will be reviewed and assessed in *(Task 4)*

Task 2

2.1 Describe how two businesses are organised

You will be required to find out how each of the two businesses are organised in terms of:
 a. **Who is in charge?**
 b. **Is there a line of control?**
 c. **How are functional areas carried out?**

Produce diagrams to show the organisational structure of each organisation

2.2 Explain how their style of organisation helps them to fulfil their purposes

For each organisation explain how the organisation structure helps them meet their purposes.

Task 3:

3.1 Describe the influence of two contrasting economic environments on business activities within a selected organisation

Explain how a business of your choice has been managed during the last 20 years. This will include periods during which the economy was growing and when it was shrinking. Think about:

- Factors that can influence the demand for a product or service.
- Changes in the level of supply of a product or service.
- Levels of inflation during the period.
- Government policy in relation to business.
- Global and environmental issues.

3.2 Describe the role of Governments policies and the impact of Global Environmental issues on the businesses

- Discuss Government Policy in relation to businesses.
- Discuss global and environmental issues.

Task 4:

41. Describe how PESTLE factors are impacting on the business activities of your selected organisation(s) and their stakeholders.

This requires you to carry out a PESTLE analysis of both businesses you have examined in Task 1.

Discuss how political, economic, social, technological, legal and environmental influences have impacted on the two organisations.

4.2 Following your PESTLE analysis, re-assess the point of view of different stakeholders seeking to influence the aims and objectives of two contrasting organisations.

Within **each** organisation various stakeholders have varying degrees of control over the organisation. They may also have opposite views on events affecting the organisations. Share what you find out about these issues.

Explain and show how changes in the economy have affected the organisations in recent years.

Explain what future trends might have an impact on the businesses and how these changes may impact on the strategy of the organisations.

Assessment weighting and patterns

The Assignment should be in **Report** format between [**NOT** Essay format], **1200 and 1500 words** not including bibliography or appendices, with clear headings and numbered sub-sections. As a minimum, it should contain:

- **Title Page including Name, Date and Word Count**
- **Introduction / Overview of the selected organisation and the project.**
- **Analysis by Task and Sub-Task Headings**
- **Appendices - if any (it is highly recommended that there are)**

- **All pages except the Title Page should be appropriately numbered.**
- **All facts / theories / quotations should be referenced using the Harvard System.**
- **Use a sensible standard Font such as Times New Roman or Arial in size 10 to 12.**
- **There is no page-limit.**

As with all your coursework, you must attend every session and be on time.

This course will be run as if you were working in a company with the task of producing reports.

Sessions will be like meetings where you are expected to think, contribute and make decisions.

You will be assessed on the reports and class contribution you make.

You should be expected to do research to find information, to organise it and to present it in a professional manner.

Grade Descriptors

Raw score	Grade awarded
70% or more	A
60-69%	B
50-59%	C
49% or less	F

4. Business Law

Route	Business/Law
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

- To prepare students for entry to a Degree in a business- related subject
- To relate basic knowledge and legal principles to a business context

Learning outcomes

On completion of the module, students should:

- Understand the nature of English Law, the Key institutions, personnel and functions of the English Legal system
- Be able to differentiate between types of business, i.e. sole-traders business partnerships, limited liability companies and PLCs
- Understand the principles of the law of contract, including how to apply legal principles, and analyse effectively the legal consequences of a given problem and citation
- Understand and be able to apply legislation affecting businesses
- In doing this, students should be able to elaborate and develop legal rules through example and citation, and be able to communicate relevant legal materials and develop legal arguments in an effective and analytical manner.

Outline syllabus

1	The English legal system	- classification of English Law - the court system - civil procedure - sources of English Law
2	Business organisations	- the legal personalities - sole trader - partnerships - limited companies - PLCs
3	Law of contract	- formation - terms - vitiating factors - discharge - remedies
4	Legislation affecting businesses	- Sale of Goods Act - Supply of Goods & Services Act - Consumer Protection Act - Consumer Credit Act - Equality Act 2010

Recommended Textbooks

Turner, C., 2010. *Key Facts Contract Law.* 978-1-444-11086-9
BPP Business Law 978-0751721171

Assessment

	Assessment component		Percentage
1a	Assignment (the English Legal System)		20%
1b	Assignment (business organisations)		10%
1c	Assignment (contract Law)	60%	20%
1d	Assignment (legislation)		10%
2a	Exam (English Law and business organisations)	40%	20%
2b	Exam (contract law and legislation)		20%

Grade criteria

To pass this unit you must get at least half of the marks for each assignment <u>and</u> half the marks in the class tests.

To get a C you need 50%, for a B you need 60% overall, and for an A you need 70% overall.

	Assignment grade weighting 60%	Class exams weighting 40%
C / Pass	**At least 30 out of 60** *<u>and…</u>*	**at least 20 out of 40**
B	At least 36 out of 60 *<u>and…</u>*	at least 24 out of 40
A	At least 42 out of 60 *<u>and…</u>*	at least 28 out of 40

Coursework / Assignment deadlines throughout term
Exam and assignments week ends in Week 10

Example assessment (100%)

1a	**Assignment (the English Legal System) 20%** Explain the difference between Criminal Law and Civil Law. Where do these laws come from? Describe the English court system, including the personnel involved and civil procedure.
1b	**Assignment (Business organisations) 10%** Explain the concept of a legal personality. Describe sole traders, partnerships, Ltd companies and PLCs, showing who is liable in law.
1c	**Assignment (contract Law) 20%** Describe the main requirements for the formation of a legal contract, including agreement (offer and acceptance), consideration, intention to form legal relations and capacity. Explain how factors such as invitations to treat, written evidence and communication affect forming a contract. Explain how different types of consideration affect the validity of a contract. Explain the difference between: conditions and warranties; express and implied terms. Explain the factors that might vitiate a contract, and how a contract might be discharged. What remedies are available in case of breach?
1d	**Assignment (legislation) 10%** Describe the following, and explain in each case how they affect what businesses can do. ● Sale of Goods Act (1979) ● Supply of Goods & Services Act (1982) ● Consumer Protection Act (2008) ● Consumer Credit Act (1974) ● Equality Act 2010
2a	**Exam (English law and business organisations) 20%** You have one hour without notes or help to explain the main points you have learned for Assignments 2a and 2b.
2b	**Exam (Contract law and legislation) 20%** You have one hour without notes or help to explain the main points you have learned for Assignments 2c and 2d.

5. Business Markets and the Economy

Route	Business
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

The aim of this unit is for the learners to:
- Consider the structure of the UK economy
- Explain how business markets operate and shape the behaviour of business activity.
- Look at the potential problems that may arise when markets are unregulated and managed.

Learning outcomes

On completion of this unit a learner should:

1. Understand the purposes of organisations and their goals

2. Know the characteristics of the UK economy

3. Understand the operation of market factors

4. Understand how markets are regulated in the UK economy.

Outline Syllabus

Topics covered in the Module	Directed reading
Unit introduction/Assignments requirements **Types of business organisation**: sole traders; partnerships; companies (public, private); co-operatives; charities; state enterprises; international businesses;	Selected reading/case studies will be given prior to every session.
Objectives: profit maximisation, profitability; sales (value, volume); growth; internationalisation; market share; market power; welfare; stakeholders; coordinating activity to achieve goals	
Structure: economic system; size; population; income; growth; employment; inflation; deflation; international trade; the structure of industry; sectors (primary, secondary, tertiary); role of the state; government policies	
Trends: business cycle; trends in size, population, income, growth, employment, inflation, international trade; foreign investment; market concentration; mergers and acquisitions **Market types**: perfect competition; imperfect competition (monopoly; oligopoly, imperfect)	
Market factors: demand; supply; costs; revenues; price determination; profit; output determination; elasticity; inelasticity; equilibrium	
Role of government: market failure; justification for intervention; market regulation; deregulation; unfair competition; competition policy; Competition Commission;	
Role of Government: Privatisation; private finance initiative; government policies; subsidies; taxation	
International factors: European Union; the single market (free trade, harmonisation, capital, labour, technical standards, simplified trading); monetary union; social chapter	

Indicative reference

Textbooks

Gillespie, A., 2002. *Business in Action*. Hodder Arnold. ISBN 0340848200 Mankiw N

Marcouse, I., et al. 2003. *Business Studies*. Hodder Arnold. ISBN 0340811102

Sawyer, M. 2004. *The UK Economy*. 16th edn. OUP: Oxford. ISBN 0199266514

Sloman, J., & Sutcliffe, M., 2004. *Economics for Business*. Financial Times/Prentice

Hall.   ISBN 0273683357

Taylor, M., 2006. *Economics*. Thomson Learning. ISBN 1844801330

Newspapers/Journals:

The Economist
Business sections of broadsheet newspapers
The Financial Times.

Websites:

www.bbc.co.uk/business
www.bbc.co.uk/news
www.direct.gov.uk/en/index.htm
www.esrc.ac.uk/ESRCInfoCentre/facts/index27.aspx?ComponentId=7102
www.ofgem.gov.uk/Pages/OfgemHome.aspx Office of the Gas and Electricity
www.statistics.gov.uk
www.thetimes100.co.uk
www.ukpublicspending.co.uk
www.direct.gov.uk

Sample examination questions

Task

1.1 Identify the Objectives of two organisations (different to those selected in the Business Environment task).

You are required for the purpose of this assignment to identify two different organisations and their objectives.

Organisations with contrasting aims should be selected. It would be reasonable to expect selection of a profit maximising partnership and a welfare maximising organization such as a hospital.

You may refer to annual reports about the organisations but you may also refer to softer objectives that are subsidiary to the main objectives. 'Providing good customer service' and being a 'good corporate citizen' are examples of softer objectives which include the values of the organisation.

1. Investigate two types of business organisations

2. Investigate the legal forms of business ownership

3. Identify the range of stakeholders and their interest in the organisations

4. Review how the businesses are controlled by the state

5. Discuss reasons for state ownership of businesses

6. Collect data on the goals of the organisations

7. Investigate how organisations operate in order to achieve their goals

1.2 Explain how organisations meet their objectives

You will need to consider the two organisations selected and look at how they meet their objectives. For example, if profit maximising is identified, then there should be some discussion of pricing policies and cost management. Current market examples can be found. Apple products, for example, attract a premium price compared with equivalent non-Apple products and there is almost no price competition suggesting there is price skimming.

Assessment weighting and patterns

Scope of the unit assessment	Awarded percentage
Final Report – CW1	**60%**
Class assessments – CW2	**40%**

The Assignment should be in Report format [**NOT** Essay format], with clear headings and numbered sub-sections. There should be from 1200 – 1500 words not including bibliography or appendices. As a minimum, it should contain:

- Title Page including Name, Date and Word Count
- Introduction / Overview of the selected organisation and the project
- Analysis by Task and Sub-Task Headings
- Appendices - if any (it is highly recommended that there are)
- All pages except the Title Page should be appropriately numbered.
- All facts / theories / quotations should be referenced using the Harvard System.
- Use a sensible standard Font such as Times New Roman or Arial in size 10 to 12.
- There is no page-limit.

You must attend every session and be on time.

This course will be run as if you were working in a company with the task of producing reports.

Sessions will be like meetings where you are expected to think, contribute and make decisions.

You will be assessed on the reports and class contribution you make.

You should be expected to do research to find information, to organise it, and to present it in a professional manner.

6. Business Accounting

Route	Business
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

- Establish a sound foundation for future studies in accountancy and business studies.
- Introduce basic accounting concepts and skills.
- To understand the purpose of accounting, and the associated processes and its role in the managing of a business.
- Develop the skills and knowledge needed to understand financial information.

Learning outcomes

On completion of this unit a learner should:

- Understand the purpose of accounting and the categorisation of business income and expenditure
- Be able to prepare a cash flow forecast
- Be able to prepare profit and loss accounts and balance sheets
- Be able to review business performance using simple ratio analysis

Outline Syllabus

Understand the purpose of accounting and the categorisation of business income and expenditure	• Purpose • Capital Income • Revenue Income • Capital Expenditure • Revenue Expenditure
Be able to prepare a Profit and Loss Account and a Balance Sheet	• Purpose of Profit and Loss Account • Trading Account • Gross Profit • Net Profit • Purpose of Balance Sheet • Assets • Liabilities • Working Capital
Be able to prepare a Cash Flow Forecast	• Cash Flow Forecast • Opening and Closing Cash Balance • Receipts • Payments
Be able to review business performance using simple ratio analysis	• Profitability • Liquidity • Efficiency

Indicative Reading

Broadcast M. & Cullen J. *Managing Financial Resources*, Butterworth & Heinemann

Horngren Charles et al. 2002. *Introduction to Financial Accounting*, 9th edn. Pearson: London

Renals, J., 2006. *Understanding A/S Accounting for AQA*, Manchester University Press: Manchester

Assessment

	Assessment component	Time allowed	Percentage
1	Coursework/Homework		40%
2	Examination	2 hours	40%
3	Quizzes		10%
4	Reporting Skills		10%

Grade criteria

To get a C you need 50% overall, for a B you need 60% and for an A you need 70%.

	Class Test / Assignment Grade 40%	Exam grade 40%	Quizzes 10%	Reporting Skills 10%
C / Pass	**At least 20 out of 40** *and...*	**at least 20 out of 40** *and...*	**at least 5 out of 10** *and...*	**at least 5 out of 10** *and...*
B	At least 24 out of 40 *and...*	At least 24 out of 40 - *and...*	at least 6 out of 10	at least 6 out of 10
A	At least 28 out of 40 *and...*	At least 28 out of 40 - *and...*	At least 7 out of 10	At least 7 out of 10

Coursework / Assignment deadlines throughout term
Exam and assignments week ends in Week 10

Sample assessment

Please see below the breakdown of the coursework or homework

		Format of the coursework
1	Describe the purpose of accounting for an organisation Explain the difference between capital and revenue items of expenditure and income	Essay questions
2	Prepare a Manufacturing Account for a sole trader Prepare a Trading Account for a sole trader Prepare a Profit and Loss Account for a sole trader Prepare a Balance Sheet for a sole trader	Non-essay questions
3	Analyse the performance of a business using profitability, liquidity and efficiency ratios for a sole trader	Combination of non-essay questions and essay questions

4	Elaborate a 12-month Cash Flow Statement to enable an organisation to manage its cash Provide recommendations to the owner of the company to manage its cash better	Oral Presentation

7. English Legal System

Route	Law
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims
- The aim of this module is to prepare students for entry to university undergraduate courses, generally in a law-related subject.
- The principles that underlie the English Legal System,
- To introduce the mechanics of the legal process in an international context.
- Explore the law in England and Wales
- Develop knowledge of the principles of criminal and civil law
- The impact of European and Human
- Rights Law, and its application to practical business situations.
- Consider the opportunities for law reform.

Learning outcomes

On completion of the module, students should be able to:

- Show an understanding of the nature and history of English Law, the key institutions, key players and functions of the English Legal System in an international context
- Display a knowledge of the sources of law, including the European dimension
- Understand the principal divisions and classification of law in society and the idea of liability under private and public law

- Develop a knowledge and understanding of the distinction between civil and criminal law and the different legal processes
- Have a critical awareness of the application of legal principles and to analyse effectively the application of the law to given problem scenarios
- Communicate relevant legal materials and develop legal arguments in an effective and analytical manner
- Recognise areas of legal controversy and debate and suggest possible alternatives and the desirability of such changes

Outline Syllabus

Two units will be covered during the course:

Unit 1	• 1. The legal framework and operation of the law • 1.1 Classification into International law and national law • 1.2 Classification by system – common law and civil law systems • 1.3 Classification by source of the law – common law, equity and statute • 1.4 The operation of the legal system- judicial precedent and the supremacy of parliament • 1.5 The impact of European Union Law and the Convention of Human Rights • 2. The Legal Professions and the Courts • 2.1 participants in the legal process • 2.2 The judicial hierarchy in England and Wales • 2.3The appointment and removal of judges • 3 What is meant by 'tribunal'? • 3.1 Characteristics of Tribunals in England and Wales 3.2 Administrative and domestic tribunals
Unit 2 Part A	• 1. What is a person and a legal person? • 1.1 The legal person: rights and a duties • 2. The Constitutional framework of the State • 2.1. The nature of a constitution • 2.2 Sources of the UK's constitution • 2.3 Devolution and the UK's constitution • 2.4. Constitutional principles • 2.4.1 The rule of law • 2.4.2 The separation of powers • 2.4.3 Parliamentary sovereignty • 3. Human Rights and Administrative Law • 3.1 Individual Liberty and Police Powers • 3.2 Freedom of Assembly and Association • 3.3 Official secrecy, censorship regulations and freedom of expression • 3.4 Judicial challenges and remedies in administrative law
Unit 2 Part B	• 1. The distinction between criminal and civil liability • 2. The nature and elements of a simple contract • 2.1 The distinction between express and implied terms • 2.2 Implied terms within Sale and Supply of Goods Legislation

	2.3 The discharge of contracts and remedies for breach of contract 3 Civil and Criminal Liability under Consumer Protection legislation 3.1 nature of Third Party Rights for defective/dangerous goods and services

Sample examination questions

Explain the different sources of law in England giving examples.
Guidance:
Your answer should be clearly structured with a brief introduction, a main body and a brief conclusion.

Word Limit: 1800 - 2200

Indicative Reading

Bradney, A., and Cownie, F. et al., 2010. *How to Study Law* 6th edn. Paperback Sweet & Maxwell Ltd. (includes English & EU legal system)
Darbyshire, P., 2013. *Nutshell English Legal System* (Paperback) Sweet and Maxwell, ISBN 9780414026438
Finch, E., and Fafinski, S., *Law Express: Criminal Law*. Pearson Education Limited ISBN: 9781292012841
Partington, M., 2012. *Introduction to the English Legal System*. OUP: Oxford
Slapper, G., 2013. *How the Law Works*. Routledge ISBN 9780415816335
Turner C., and Hodge S., 2012. *Unlocking Torts.* 3rd edn. Hodder: London.
Turner C., 2013. *Unlocking Contract Law* 4th edn. Hodder: London.

Assessment weighting and patterns

	Assessment component	Time allowed	Percentage
1	Assignment		100%

8. General Political Theory

Route	Law
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

- The course is intended as an introduction to political science which will provide the students with an overview of the main aspects and issues related to politics.

- Students will be introduced to the main theories and approaches to the world of politics.

- Achieve a sound knowledge of the principal characteristics of politics while reflecting critically on the literature of the different political cultures and traditions.

- Acquire ability to use models and theories to gain insight into the complexity of politics.

Learning Outcomes

- Students should be able to understand the main theories and approaches to political science, to understand the different forms of government and evaluate terms like 'authority', 'power', 'civil society'.

- Students should also be able to analyze the complexity and the dynamics of democracy and to assess the relevance and influence of political forces like the pressure groups and political parties.

- Students will have the capacity of evaluating the role of the Media in today's politics and to achieve an overall understanding of the society in contemporary politics through this analysis.

Syllabus Outline

What is politics?	An analysis of the term and of the concept. Analysis and explanation of terms like ''authority'', ''power'', ''civil society''
The nature of democracy	Its origins and its main characteristics. Presidential and Parliamentary systems: analysis of their structure by comparison and contrast.
Constitution	The origins, characteristics, role and functions in today's political systems.
Authoritarian systems	Their characteristics, purposes, ideological frame. (*First essay due*)
Party Systems and Elections	An analysis of the main party systems and electoral modalities.
Ideologies	Relevance and influence in politics. An analysis of main ideologies like liberalism, Fascism, Nazism, Marxism, Anarchism and Feminism. Radicalism in politics: analysis of the main forms of radicalization in the political discourse.
Pressure groups and political parties	An analysis of the role and functions of those political realities in our contemporary society. (*Second essay due*)
Faith and Politics	An analysis of the relationship between Faith and Politics and to what extent Faith can influence the political discourse.
Media and Politics	An analysis of the relationship between the world of the Media and politics in order to assess how politics has changed its modalities since the advent of mass-media. (Second *essay due*)
Contemporary society and politics	An analysis of contemporary society and the different social issues that have an influence on the political world. (*Presentation due*)

Sample assessment questions

1. Analyze the main characteristics of *direct* and *representative* democracy'
2. A comparative analysis between Parliamentary and Presidential systems
3. To what extent Pressure Groups are relevant in democracy?
4. Outline the main characteristics of an authoritarian regime'
5. Do elections really change things?
6. Assess the relevance of the constitution in a political system
7. Are ideologies still relevant in contemporary politics?

8. Analyze the two-party system
9. Analyze the multi-party system
10. Assess the relationship between Faith and Politics in contemporary society

Indicative Reading

Heywood, A. 2002. Politics. Palgrave: London
Crick, A. Democracy. 2000. A Very Short Introduction. OUP: Oxford
MacLean, G. and Wood, D. 2010 Politics. OUP: Oxford
Krieger, J. 2001.The Oxford Companion to Politics. OUP: Oxford

Useful online sources:
www.economist.com
www.amnestyinternational.org
www.bbc.com
www.cnn.com

Modes of Assessment

Assignment I	35%
Assignment II	35%
Presentation	30%

9. Engineering

Route	Engineering
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Unit aim

- Understand the nature and demands of different types of engineering
- Develop an understanding of engineering technologies and the science that underpins them;
- Understand the context in which engineers work, including the environmental impact of engineering activities and the production of engineered products and engineering services.

Summary

This module introduces the understanding of engineering, logical and systematic thinking and solution methods for engineering problems. It provides an introduction to the engineering branches and the engineering sector.

Summary of unit content

Engineering materials, processes and techniques, the role of the engineer and applied engineering systems.

Learning outcomes

On completion of the module, students should be able to:
- To gain the technical knowledge, skills and understanding associated with the subject
- To understand the nature of different areas of engineering and the role of a professional engineer responsible for the design and/or manufacturing
- To develop a knowledge and understanding of the range of engineering technologies, and the complex sub-groups that make up engineering and related industries
- To introduce the techniques and procedures used in engineering and its practical and technological aspects
- To understand the materials and manufacturing processes and techniques in order to develop new products
- To introduce Engineering techniques and principles as applied in some important

systems and how a systems approach can be used to solve engineering problems
Outline Syllabus

Unit 1: Engineering materials, processes and techniques	Engineers need to be familiar with a wide range of materials, manufacturing processes and techniques in order to fully develop new products. Define the range of materials with which the student should become familiar: Metals, alloys, polymers, elastomers, adhesives, composites, ceramics and glass, new materials
Unit 1: Engineering materials, processes and techniques	Describe the properties of materials: Mechanical and physical Explain the measurements methods of property that can be made Demonstrate stress-strain and load extension graphs. Explain Young's modulus and Hooke's Law (This topic links to Applied Engineering Unit) Joining materials together Materials processing
Unit 1: Engineering materials, processes and techniques: **Activities**	The students will be given activities as below A small engineering company, Thames Magnetic Components, has commissioned you to carry out some research into materials suitable for use in the cores of a new range of industrial transformers that they intend to manufacture. They have asked you to summarise the essential electromagnetic properties of a suitable core material and explain how these properties differ from those used in the range of permanent magnets that make up their current product range. Write a briefing paper to represent your report include relevant diagrams and technical specifications.
Unit 1: Engineering materials, processes and techniques	Physical properties: Explain resistivity Thermal properties: Specific heat capacity and thermal conductivity
Unit 2: The Role of the Engineer	Provide a broad introduction to the role of the engineer To understand the engineering activities and team responsibilities for the design, development and manufacture of engineered products or services To choose an engineered product or service and investigate the role of an engineer who has contributed towards the design or manufacture of that engineered product

Unit 2: The Role of the Engineer	To introduce the Engineering software applications and control systems
	To introduce the Legislation and standards in engineering as CE, Health and Safety at Work Act 1974
Unit 3: Applied Engineering Systems	To introduce Engineering techniques and principles that are applied in some important systems and how a systems approach can be used to solve engineering problems
	Calculation methods of stress, strain, modulus of elasticity, factor of safety
	Tensile testing
	Frame structures
Unit 3: Applied Engineering Systems	Calculate Force, work done, average power, electrical power
	Electro-mechanical system elements
	Power and lighting systems
	Sensors and transducers
Unit 3: Applied Engineering Systems	Health and safety factors
	The health and safety at work act Identifying potential hazards
	Production and manufacturing processes
	Electrical safety
Unit 3: **Activities**	The students will be given activities as below
	Activity 1: A long-range radar system uses a high-vacuum cathode ray tube in the display unit and a high-power magnetron in the transmitter. What Health and Safety issues might be related to the manufacture, operation and maintenance of this system?

Indicative Reading

Chapman, C. 2002. *Resistant Materials.* Collins: London

Timings, RL. 1998. *Fundamentals of Engineering.* Longman: USA

Tony, C. 2008. *Marketing for Engineers, Scientist and Technologist.* John Wiley & Sons: London

Tooley, M. 2009. *Engineering A Level.* Heinemann: UK

Tooley, M. and Dingle, L. 2004. *Higher National Engineering.* Newnes: UK

Assessment weighting and patterns

	Assessment component	Time allowed	Percentage
1	1st Examination: Unit 1	1.5 hours	30%
2	2nd Examination: Unit 3	1.5 hours	30%
3	Assignment: Unit 2	4 weeks	40%

Examination	**60 %**
A **1.5** hrs closed book examination with questions that require	**Unit 1: Engineering materials, processes and techniques** • The examination paper will have one or more themes. A theme will be a common engineered product. The product(s) will provide opportunities for the students to answer questions about the choice and application of particular materials, joining techniques and processing methods in the context of a specific application. The students are expected to demonstrate their subject knowledge and understanding. • Calculation of specific heat capacity • Thermal conductivity **Unit 3: Applied Engineering Systems** • Calculation of stress, strain, Modulus of elasticity • Determine the internal forces and resultant forces • Calculation of density or mass • Define stress, strain, fracture, ductile, etc. • Analysing of load/extension graph for an elastic material • Analysing framed structures • Calculation of current, voltage and resistance • Calculation of work and energy

Coursework	**40%**
Coursework that requires the students to	Where it is practicable a visit to a local manufacturing company would be beneficial. This would give the students the opportunity to see some processes being used in a commercial setting, manufacturing products for the real world. **Unit 2: The Role of the Engineer** To investigate either the design of an engineered product or service and/or the manufacture of an engineered product or the implementation of a service. The student work must include the evidence of: • Current available technologies used by the engineer including why they were selected as being appropriate to the process • How appropriate legislation and standards influenced the design and/or manufacture of the engineered product or service • How appropriate health and safety standards used by the engineer influenced the design and/or manufacture of the engineered product or service • Evaluation of performance of the engineered product or service the student has investigated for its being fit for purpose

Websites: materials may be drawn from these	www.bsgroup.com	The British Standards Institution
	www.cetechnologies.c.uk	CE Technologies Ltd
	www.environment-agency.gov.uk	The Environment Agency
	www.lsis.org.uk	The learning and Skills Improvement Agency
	www.theiet.org	The Institution of Engineering and Technology

Sample Examination Question:

The questions in this paper relate to a petrol powered motorcycle, shown below in Figure 1.

A number of different processes are used to manufacture the motorcycle.

Complete the following table by giving

- **one** hazard/risk involved in each process
- **one** precaution/control measure which will prevent this risk resulting in an injury

Each answer **must** be different.

The first line of the table has been completed for you.

Process	Hazard/Risk	Precaution/Control Measure
Testing exhaust pipe	Inhalation of exhaust gases	Work in a ventilated area
Spot welding		
Use of epoxy adhesives		
Soldering		
Milling		

(Total for Question 1 = 8 marks)

Grade criteria

To get a C you need 50%, for a B you need 60%, and for an A you need 70% overall.

	Class Test / Assignment 2 Grade 30%	Class Test / Assignment 2 Grade 30%	Exam grade 40%
C / Pass	**At least 15 out of 30** _**and…**_	**At least 15 out of 30** _**and…**_	**At least 20 out of 40**
B	At least 18 out of 30 _and…_	At least 18 out of 30 _and…_	At least 24 out of 40
A	At least 21 out of 30 _and…_	At least 21 out of 30 _and…_	At least 28 out of 40

Coursework / Assignment deadlines throughout term
Exam and assignments week ends in Week 10

10. Physics

Route	Engineering
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

The aim of this module is to:
- Provide the students with a clear and a logical presentation of the concepts and principles of Electricity, Magnetism and simple harmonic motion.
- To prepare the students to analyse the engineering designs using physics and its applications, to develop an understanding about on-going development of new ideas in physics;
- To develop knowledge and understanding of electricity, fields and electromagnetic induction with their relations.

Summary

This module introduces electric current, direct and alternating current with their relations. It provides an introduction to simple harmonic motion, fields, capacitors and electromagnetic induction that represents how physics is used in scientific, engineering research and development; and an understanding how physics is the basis for modern technology.

Learning outcomes

On completion of the module, students should be able to:
- Provide the essential principles of electricity and circuits
- Distinguish between AC and DC
- Provide the essential principles of Fields (Electric field, magnetic field and gravitational field)
- Determine the relations between electric and magnetic field to explain electromagnetic induction
- Encourage quantitative and analytical skills for analysing data and solving problems in scientific, engineering research and development
- Provide the essential principles to explain oscillations and resonance

Syllabus Outline

Content	Learning Objectives
Electric current	To introduce current and charge: The definition of an electric current? How to calculate the charge flow in a circuit The charge carriers Potential difference and power Current/Voltage characteristics Ohmic and non-ohmic conductors Resistivity Electrical components and their characteristics
Direct current circuits	To introduce circuits rules for series and parallel circuits The principles behind the rules Potential difference rules Resistance heating
Direct current circuits	To introduce and demonstrate Emf and internal resistance Measurement of internal resistance More circuit calculation The potential divider
Alternating currents	To explain the alternating current and the rms value of an alternating current How to observe alternating current The heating effect of an alternating current Using an oscilloscope Using an oscilloscope as a dc voltmeter
Simple harmonic motion	In mechanics and physics simple harmonic motion is a type of periodic motion where the restoring force is directly proportional to the displacement and acts in the direction opposite to that of displacement. This unit has a connection with Engineering Mechanics as in mechanics the motion of an object is analysed in terms of forces. In physics the characteristic features of simple harmonic motion are analysed in terms of energy and resonant frequency. What is meant by one complete oscillation? To define amplitude, frequency and period

	What is the phase difference between two oscillators that are out of step? The principle of simple harmonic motion More about sine waves What equations relates displacement to time for a body moving with simple harmonic motion? The oscillation of a mass-spring system What conditions must be satisfied for a mass-spring system or simple pendulum to oscillate with simple harmonic motion? The theory of the simple pendulum Forced oscillations and resonance Mechanical energy of the system
Gravitational fields	To introduce Gravitational field strength Gravitational potential Newton's law of gravitation Planetary fields Satellite motion
Electric fields	To introduce Field patterns Static electricity Electric field strength Electric potential Coulomb's Law Point charges Comparison between electric and gravitational fields
Capacitors	In terms of electron flow, explain what happens when a capacitor charges up Explain the pd across the plates of a capacitor related to the charge on its plate Explain the use of capacitors for Energy stored in a charged capacitor Charging and discharging a capacitor through a fixed resistor
Magnetic Fields	To introduce current-carrying conductors in a magnetic field Moving charges in a magnetic field Charged particles in circular orbits
Electromagnetic Induction	To introduce generating electricity Energy changes The laws of electromagnetic induction The alternating current generator

Indicative Reading

Books:

Adams, S., and Allday, SA. 2000. *Advanced Physics (Advanced Science).* OUP: Oxford

Akrill, T., and George, G. 2009. *Edexcel Physics for A2*. Hodder Education

Benn, M., and George, G. 2008. *Edexcel Physics for AS.* Hodder Education

Johnson, K., et al. 2000. *Advanced Physics for You*. Nelson Thornes:

Pople, S., *AS and A level Physics Through Diagrams*: *Oxford Revision Guides*. OUP: Oxford

Assessment

|	Assessment component	Time allowed	Percentage
1	1st Examination	2 hours	30%
2	2nd Examination	2 hours	30%
3	Assignment – CW1	5 weeks	40%

Assessment

1st Examination:	**30 %**
2nd Examination:	**30 %**
A **2** hrs closed book examination with questions that require	• Definitions of electric field strength, electric field and magnetic field • Calculation and evaluation of questions on series and parallel circuits, Coulomb's Law, capacitance, electric field, electromotive force and magnetic field • Discuss the direction of current, force and field lines in electromagnetic induction • Discuss how motor works • Calculations and evaluation of questions on resonance, free and forced vibration
Coursework	**40%**
30% coursework that requires the students to	The students would be given a product list such as: Electric car, transformer, engine, motor, solar panels, Battery, etc. • Research a design concept with a listed procedure • Write and explain the chosen design briefly • Classify the concept in terms of used technology and relations with physics • Demonstrate the developed critical and creative thinking skills • Write and explain qualitative and quantitative ideas • Deliver the presentation • Write an academic report
Example:	If the motor is chosen, the student needs to explain how a motor works when related to the electromagnetism, Fleming's left-hand rule, permanent magnet, number of terms, etc.

Question 1:

When a mass M attached to a spring X, as shown in **Figure 1**, is displaced downwards and released it oscillates with time period T. An identical spring is connected in series and the same mass M is attached, as shown in **Figure 2**.

What is the new time period?

Figure 1	Figure 2
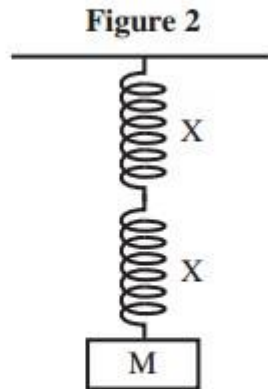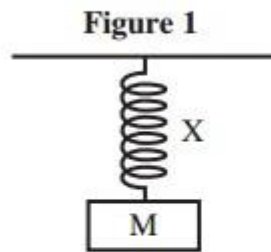
A $\dfrac{T}{2}$

B $\dfrac{T}{\sqrt{2}}$

C $\sqrt{2}T$

D $2T$

Question 2:

Two stars of mass M and $4M$ are at a distance d between their centres.
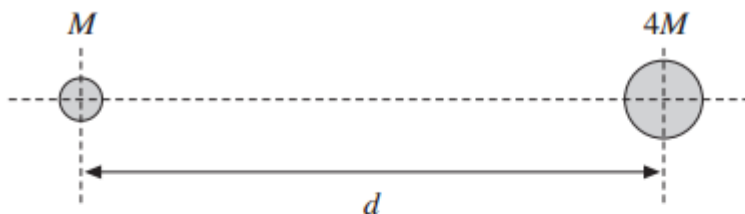
The resultant gravitational field strength is zero along the line between their centres at a distance y from the centre of the star of mass M.

What is the value of the ratio $\dfrac{y}{d}$?

A $\dfrac{1}{2}$

B $\dfrac{1}{3}$

C $\dfrac{2}{3}$

D $\dfrac{3}{4}$

Which path, **A** to **D**, shows how an electron moves in the uniform electric field represented in the diagram?

electric field

initial direction
of electron

A

B

boundary of
electric field

D

C

(a) **Figure 2** shows an electron at a point in a uniform electric field at an instant when it is stationary.

Figure 2

(a) (i) Draw an arrow on **Figure 2** to show the direction of the electrostatic force that acts on the stationary electron.

(1 mark)

(a) (ii) State and explain what, if anything, will happen to the magnitude of the electrostatic force acting on the electron as it starts to move in this field.

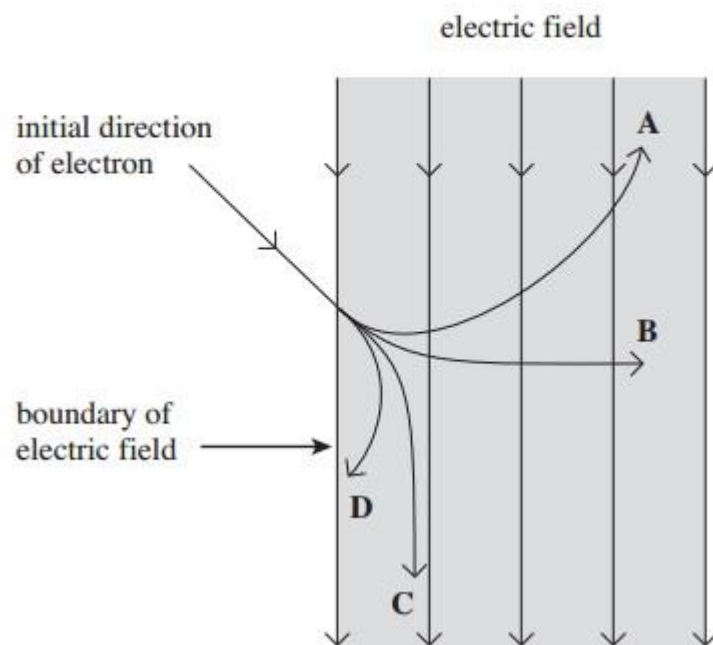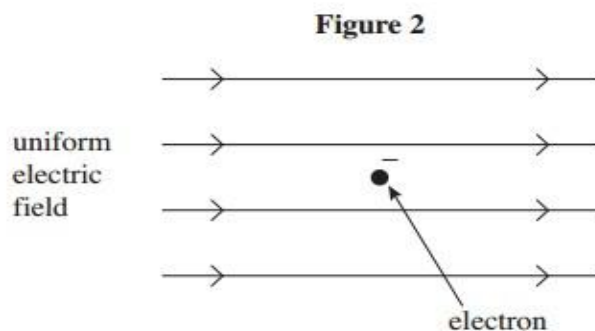...

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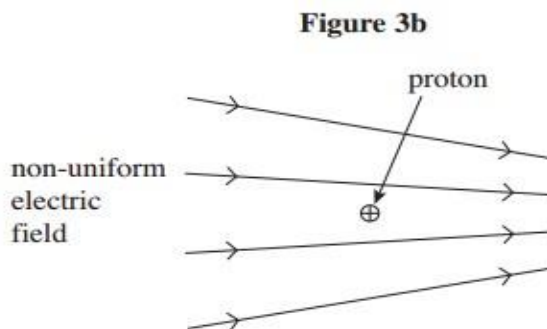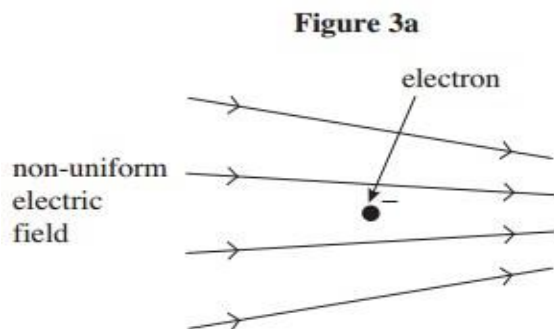...

(2 marks)

(b) **Figure 3a** shows a stationary electron in a non-uniform electric field. **Figure 3b** shows a stationary proton, placed in exactly the same position in the same electric field as the electron in **Figure 3a**.

Figure 3a   **Figure 3b**

2 (b) (i) State and explain how the electrostatic force on the proton in **Figure 3b** compares with that on the electron in **Figure 3a**.

....

....

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(2 marks)

2 (b) (ii) Each of the particles starts to move from the positions shown in **Figure 3a** and **Figure 3b**. State and explain how the magnitude of the **initial** acceleration of the proton compares with that of the electron.

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(2 marks)

2 (b) (iii) Describe and explain what will happen to the acceleration of each of these particles as they continue to move in the electric field.

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Grade criteria

To get a B you need 60% overall, and for an A you need 70% overall.

	Class Test / Assignment grade	Exam grade	Attendance
C / Pass	**At least 20% out of 40% - _and…_**	**At least 20% out of 40% - _and…_**	**At least 10 out of 20%**
B	At least 24% out of 40% - _and…_	At least 24% out of 40% - _and…_	At least 12 out of 20%
A	At least 28% out of 40% - _and…_	At least 28% out of 40% - _and…_	At least 14 out of 20%

Coursework / Assignment deadlines throughout term

Exam and assignments week ends in Week 10

11. Introduction Mathematics for Engineering

Route	Engineering
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

- The aim of this module is to build on the knowledge of Core Mathematics with development of methods and techniques applicable to science and engineering degree programs. It introduces mathematics as a logical and structured discipline.

Summary

This module introduces trigonometric principles, differential and integral calculus.

It provides an understanding of calculus when related to the Core Maths II to analyse mathematical methods in science and engineering.

Learning outcomes

On completion of the module, students should be able to:
- Provide the study of trigonometric principles
- Provide the essential principles and applications of the differential and integral calculus
- Give an ability to apply the basis techniques for the more advanced mathematical structures
- Give evidence that all students acquired the mathematical knowledge and skills

Summary of unit content

Graphs of trigonometric functions, Trigonometric identities and simple equations, Further trigonometric, Differentiation and Integration.

Syllabus Outline

Content	Learning Objectives
Graphs of Trigonometric Functions C2 Maths	Introduction to trigonometric identities Calculation of the sine, cosine of any angle Introduce to exact trigonometric ratios for 30º, 45º and 60º Sketching the graphs of sine, cosine and tangent functions Sketching simple transformations of these graphs
Trigonometric identities and simple equations C2 Maths	Explain and demonstrate the relationships between $\tan\theta$ and $\sin^2\theta+\cos^2\theta=1$ Show simple trigonometric equations of the form $\sin(\theta)=k$ Solve more complex trigonometric equations of the form $\sin(n\theta+\alpha)=k$
Trigonome try C3 Maths	Introduction to functions secant θ, cosecant θ and cotangent θ The graphs of $\sec\theta$, $\csc\theta$, $\cot\theta$ How to solve equations and prove identities involving $\sec\theta$, $\csc\theta$ and $\cot\theta$ How to sketch and use the inverse trigonometric functions
Differentiati on C3	Differentiate a composite function using the chain rule Differentiate functions that are multiplied together by using the product rule Differentiate rational functions using the quotient rule
Differentiation C3	Differentiate variations on the function of e^x and $\ln(x)$ Differentiate variations on the functions $\sin x$, $\cos x$, and $\tan x$.
Differentiati on C4	Introduce how to find the gradient of a curve whose equation is expressed in a parametric form Differentiate implicit relationships Differentiate power functions such as a^x
Differentiati on C4	Use the chain rule to connect the rates of change of two variables Set up simple differential equations from information given in context
Integration C4	Introduce how to integrate: Standard mathematical functions Using the reverse of the chain rule Using the trigonometric identities Using partial fractions
Integration C4	Integration by parts To find areas and volumes To solve differential equations
Integration C4	The relationship between trapezium and integration to calculate the area.

Indicative Reading

Heylings, M.R., 2009. *A Level Mathematics for Edexcel: Core C3/C4.* OUP: Oxford

Pledger, K., & wilkins, D., 2008. *Edexcel AS and A Level Modular Mathematics - Core Mathematics 2 (C2).* Heinemann

Pledger, K., 2008. *Edexcel AS and A Level Modular Mathematics - Core Mathematics 3* Heinemann

Pledger, K., 2009. *Edexcel AS and A Level Modular Mathematics – Core Mathematics 4.* Heinemann

Sadler, A.J., & Thorning, D.W.S. 1987. *Understanding Pure Mathematics.* OUP: Oxford

Assessment weighting and patterns

	Assessment component	Time allowed	Percentage
1	1st Examination	1.5 hours	60%
2	Assignment	5 weeks	40%

1st Examination:	**60 %** **Calculator**
A **1.5** hrs closed book examination with questions that require	- Prove trigonometric identities - Analysis and evaluation of definite and indefinite integrals - Integration will be used to: -find the area between a curve, the x-axis, and two given ordinates; -find the area between a curve and the x-axis, where the ordinates are given by the points where the curve crosses the axis; -find the area between two curves. - Analysis and evaluation of differential equations - Formulating of mathematical information in the solution of engineering problems - Sketching trigonometric functions - Sketching simple transformations of these graphs - solve equations and prove identities involving $\sec\theta$, $\mathrm{cosec}\,\theta$ and $\cot\theta$ - Solve differential equations by using the chain rule, product rule and quotient rule - Use the chain rule to connect the rates of change of two variables - Set up simple differential equations from information given in context - Calculate areas and volume by using integration
Coursework	**40%**
40% coursework that requires the students to	- Identify trigonometric identities - Analyse the relations between differentiation and integration - Analyse and transfer definite and indefinite integrals on the calculation of area questions - Evaluate the differential equations - Analyse the differentiation and integration rules on engineering, science or business questions

Question 1:

Rabbits were introduced onto an island. The number of rabbits, P, t years after they were introduced is modelled by the equation

$$P = 80e^{\frac{1}{5}t}, \qquad t \in \mathbb{R}, t \geqslant 0$$

(a) Write down the number of rabbits that were introduced to the island.

(1)

(b) Find the number of years it would take for the number of rabbits to first exceed 1000.

(2)

(c) Find $\dfrac{dP}{dt}$.

(2)

(d) Find P when $\dfrac{dP}{dt} = 50$.

(3)

Question 2:

(a) Express $5\cos x - 3\sin x$ in the form $R\cos(x + \alpha)$, where $R > 0$ and $0 < \alpha < \frac{1}{2}\pi$.

(4)

(b) Hence, or otherwise, solve the equation

$$5\cos x - 3\sin x = 4$$

for $0 \leqslant x < 2\pi$, giving your answers to 2 decimal places.

(5)

Question 3:

(i) Given that $y = \dfrac{\ln(x^2 + 1)}{x}$, find $\dfrac{dy}{dx}$.

(4)

(ii) Given that $x = \tan y$, show that $\dfrac{dy}{dx} = \dfrac{1}{1+x^2}$.

(5)

Question 4:

(i) Differentiate with respect to x

   (a) $x^2 \cos 3x$

(3)

   (b) $\dfrac{\ln(x^2 + 1)}{x^2 + 1}$

(4)

(ii) A curve C has the equation

$$y = \sqrt{(4x+1)}, \quad x > -\tfrac{1}{4}, \quad y > 0$$

The point P on the curve has x-coordinate 2. Find an equation of the tangent to C at P in the form $ax + by + c = 0$, where a, b and c are integers.

(6)

Grade criteria

To get a C you need 50%, for a B you need 60%, and for an A you need 70% overall.

	Class Test / Assignment grade 40%	Exam grade 60%
C / Pass	**At least 20 out of 40** _and…_	**At least 30 out of 60** _and…_
B	At least 24 out of 40 - _and…_	At least 36 out of 60 _and…_
A	At least 28 out of 40 - _and…_	At least 42 out of 60 _and…_

Coursework / Assignment deadlines throughout term

Exam and assignments week ends in Week 10

12. Introduction of Mechanics for Engineering

Route	Engineering
Length of course	1 term
Hours per week	4.30 hours per week
Minimum total hours	45 hours

Aims

The aim of this module is to provide students with a knowledge of mechanics, to extend their range of mathematical skills and techniques of mechanics and to use them in more difficult and unstructured problems. The module will prepare students for developing mathematical applications in science and engineering. It will give them an ability to apply the basic mechanical rules on the engineering questions and develop an understanding of how different areas of mechanics and engineering can be connected.

Summary

This module introduces the relationship between forces, linear motion and energy and the conditions of static equilibrium of a body. It provides an introduction to the principles of analyses and design of engineering systems that represents how engineering projects should be designed and managed. It also provides an understanding of how different areas of mathematics and mechanics can be connected with engineering modules.

Learning outcomes

On completion of the module, students should be able to:
- Distinguish between scalar and vector quantities and giving physical events
- Apply principles of static equilibrium including limiting equilibrium
- Determine the effects of loading in static engineering systems
- Determine work, power and energy transfer in dynamic engineering systems
- Determine the effect of forces on an object's movement
- Develop and design free-body diagrams for a range of simple engineering devices, components and systems
- Provide the essential principles of the kinetics of simple engineering components
- Identify the various forces acting on engineering components and devices
- Demonstrate the equilibrium conditions on engineering devices
- How to model an object moving vertically or horizontally.

Content	Learning Objectives
Mathematical models in mechanics	Explain the terms: Particle, lamina, rigid body, rod (light, uniform, non-uniform), inextensible string, smooth and rough surface, light smooth pulley, bead, wire, peg. Students should be familiar with the assumptions made in using these models.
Forces in a plane	Introduction to type of forces on a particle Resolution of forces. Equilibrium of a particle under coplanar forces. Weight, normal reaction, tension and thrust, friction.
Vectors	Explain scalar and vector quantities Addition of vectors Resolution of a force into components Unit vectors Addition of forces by summing X and Y components Application of vectors to displacements, velocities, accelerations and forces in a plane. Students may be required to resolve a vector into two components or use a vector diagram. Statics of a particle in equilibrium by resolving the forces horizontally and vertically.
Kinematics of a particle moving in a straight line	**Motion in a straight line with constant acceleration.** Graphical solutions may be required, including displacement-time, velocity-time, speed-time and acceleration-time graphs. Knowledge and use of formulae for constant acceleration will be required. Solve problems involving motion in a straight line with constant acceleration Model an object moving vertically under gravity Understand distance-time graphs and speed-time graphs
Dynamics of a particle moving in a straight line or plane	**The concept of a force. Newton's laws of motion.** Simple problems involving constant acceleration in scalar form or as a vector of the form ai + bj **Simple applications including the motion of two connected particles.** Problems may include (i) the motion of two connected particles moving in a straight line or under gravity when the forces on each particle are constant; problems involving smooth fixed pulleys and/or pegs may be set;

	(ii) (ii) motion under a force which changes from one fixed value to another, eg a particle hitting the ground; (iii) (iii) Motion directly up or down a smooth or rough inclined plane. Solve problems involving the forces acting on a body moving in a straight line with constant velocity or constant acceleration Resolve a force into its components
Dynamics of a particle moving in a straight line or plane	**Momentum and impulse**. The impulse-momentum principle. The principle of conservation of momentum applied to two particles colliding directly. Knowledge of Newton's law of restitution is not required. Problems will be confined to those of a one-dimensional nature. **Coefficient of friction** An understanding of $F = \mu R$ when a particle is moving.
Statics of a particle	Only simple cases of the application of the conditions for equilibrium to uncomplicated systems will be required. An understanding of $F \leq \mu R$ in a situation of equilibrium. Limiting Equilibrium Find unknown forces acting on a particle which remains at rest in equilibrium Include relevant forces such as weight, tension and normal reaction in a force diagram Consider the magnitude and direction of the friction fore and use this together with other forces to solve harder problems involving rough surfaces
Moments	Moment of a force. Simple problems involving coplanar parallel forces acting on a body and conditions for equilibrium in such situations. Calculate the magnitude of the turning effect of a force applied to a rigid body Solve problems about bodies in equilibrium Solve problems about non-uniform bodies.
Centres of mass	Centre of mass of a discrete mass distribution in one and two dimensions. Centre of mass of uniform plane figures, and simple cases of composite plane figures. Simple cases of equilibrium of a plane lamina. The lamina may (i) be suspended from a fixed point; (ii) free to rotate about a fixed horizontal axis; (iii) be put on an inclined plane.
Work and energy	Kinetic and potential energy, work and power. Use the principle of conservation of mechanical energy and the work-energy principle to solve problems about a moving particle.

	Problems involving motion under a constant resistance and/or up and down an inclined plane may be set.
Collisions	Momentum as a vector. The impulse-momentum principle in vector form. Conservation of linear momentum.
	Direct impact of elastic particles. Newton's law of restitution. Loss of mechanical energy due to impact.
	Students will be expected to know and use the inequalities $0 \leq e \leq 1$ (where e is the coefficient of restitution).

Indicative Reading

Sadler, A.J., & Thorning D.W.S., 1996. *Understanding Mechanics.* 2nd edn. OUP: Oxford
Parsons, R., Merchanics 1 & 2 Student Book.
Lee, S., 2008. An Introduction to Mathematics for Engineers: Mechanics
Nelson, E.W., et al. 2010. Schaum's Outline of Engineering Mechanics Dynamics

Assessment weighting and patterns

	Assessment component	Time allowed	Percentage
1	1st Examination	1.5 hours	60%
2	Assignment	5 weeks	40%

Coursework / Assignment deadlines throughout term
*Exam and assignments week ends in Week 10*

Assessment

| Examination:	60 %
A **2** hrs closed book examination with questions that require	- Evaluation of free-body diagrams and formulating equilibrium conditions - Analysis of energy forms and energy transfers - Calculation of translational motions with categorizing - Analysis of uniform and non-uniform bodies in equilibrium - Comparing of different experimental assumptions - Analysis of external forces on rough inclined surfaces - Resolve a vector into two components or use a vector diagram - Statics of a particle in equilibrium by resolving the forces horizontally and vertically
Coursework	**40%**
	- Demonstrate the external forces on the engineering devices in vertical, horizontal and inclined - Describe equilibrium conditions of engineering systems with demonstrating the acting forces in free-body diagram - Arrange formulae for calculation of moment and forces - Arrange formulae for calculation of collision - Plan the outline of an academic report - Analyse the measurement results with comparing calculation results

Question 1:
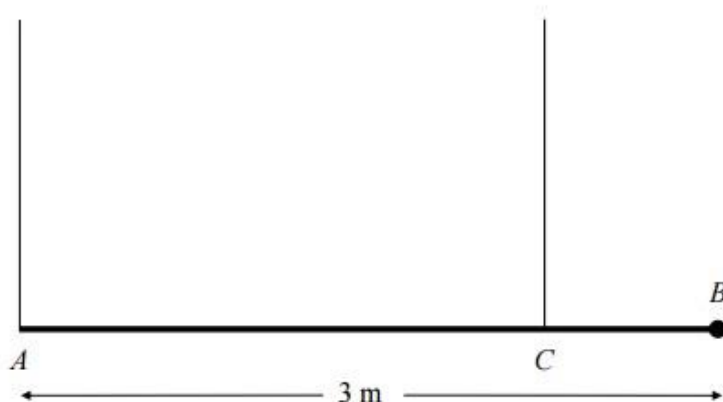
Figure 1

A plank *AB* has mass 40 kg and length 3 m. A load of mass 20 kg is attached to the plank at *B*. The loaded plank is held in equilibrium, with *AB* horizontal, by two vertical ropes attached at *A* and *C*, as shown in Figure 1. The plank is modelled as a uniform rod and the load as a particle. Given that the tension in the rope at *C* is three times the tension in the rope at *A*, calculate

(*a*) the tension in the rope at *C*,

(2)

(*b*) the distance *CB*.

(5)

Question 2:

Figure 2
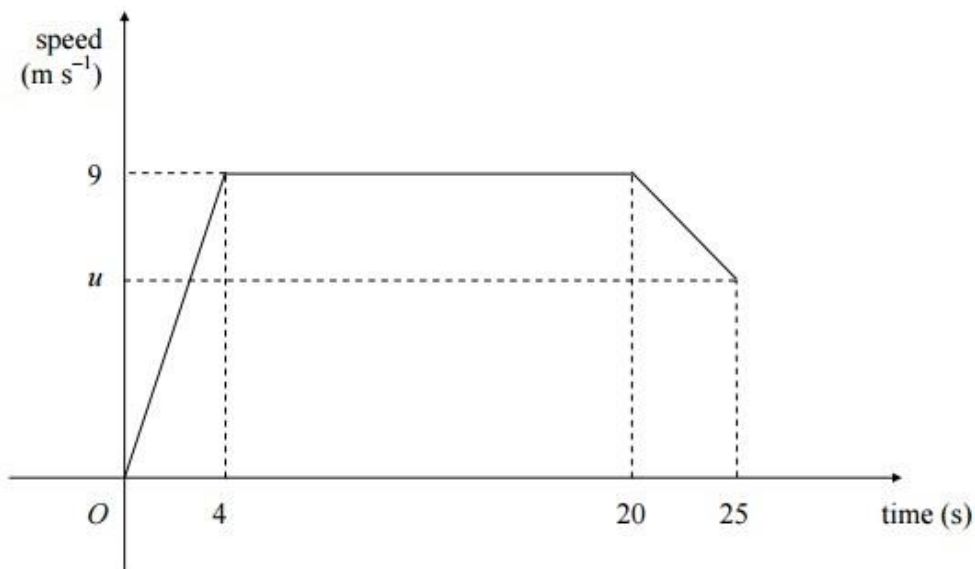
A sprinter runs a race of 200 m. Her total time for running the race is 25 s. Figure 2 is a sketch of the speed-time graph for the motion of the sprinter. She starts from rest and accelerates uniformly to a speed of 9 m s^{-1} in 4 s. The speed of 9 m s^{-1} is maintained for 16 s and she then decelerates uniformly to a speed of u m s^{-1} at the end of the race. Calculate

(a) the distance covered by the sprinter in the first 20 s of the race,

(2)

(b) the value of u,

(4)

(c) the deceleration of the sprinter in the last 5 s of the race.

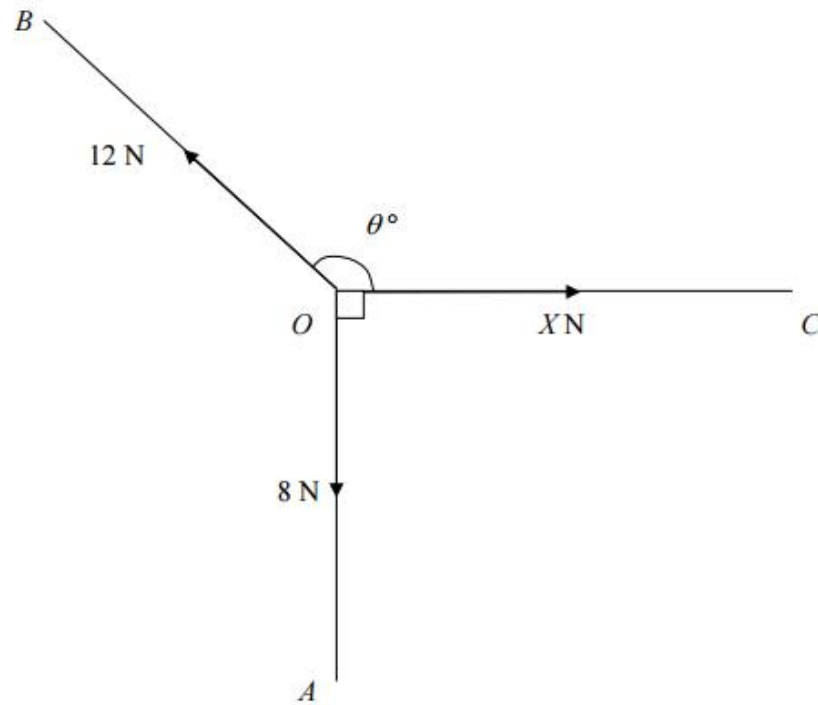(3)

Question 3:

Figure 4
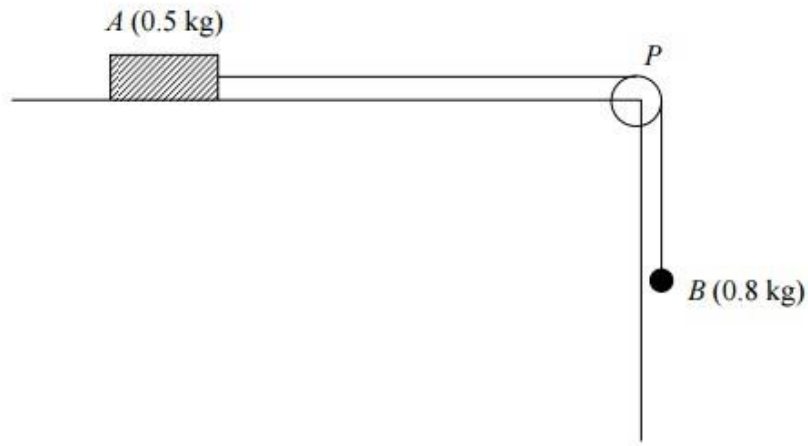
A block of wood *A* of mass 0.5 kg rests on a rough horizontal table and is attached to one end of a light inextensible string. The string passes over a small smooth pulley *P* fixed at the edge of the table. The other end of the string is attached to a ball *B* of mass 0.8 kg which hangs freely below the pulley, as shown in Figure 4. The coefficient of friction between *A* and the table is μ. The system is released from rest with the string taut. After release, *B* descends a distance of 0.4 m in 0.5 s. Modelling *A* and *B* as particles, calculate

(*a*) the acceleration of *B*,

(3)

(*b*) the tension in the string,

(4)

(*c*) the value of μ.

(5)

(*d*) State how in your calculations you have used the information that the string is inextensible.

(1)

Question 1 (assignment)

Figure 1

In Fig. 1, $\angle AOC = 90°$ and $\angle BOC = \theta°$. A particle at O is in equilibrium under the action of three coplanar forces. The three forces have magnitude 8 N, 12 N and X N and act along OA, OB and OC respectively. Calculate
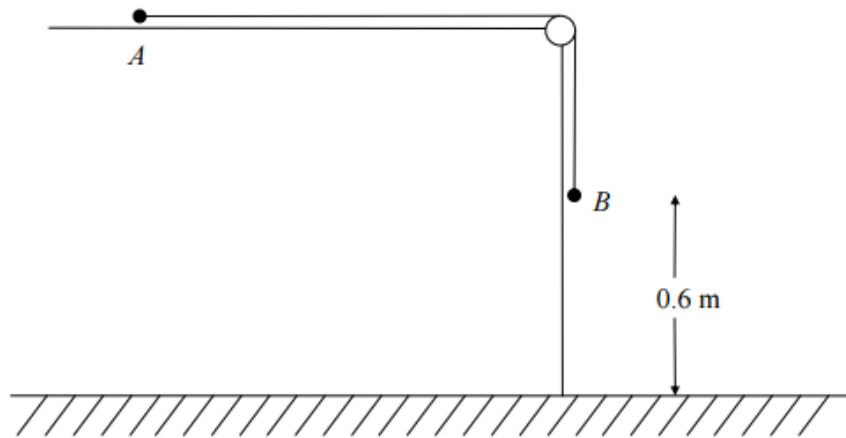
(a) the value, to one decimal place, of θ,

(3)

(b) the value, to 2 decimal places, of X.

(3)

Question 2 (assignment)

Figure 4

A particle A of mass 0.8 kg rests on a horizontal table and is attached to one end of a light inextensible string. The string passes over a small smooth pulley P fixed at the edge of the table. The other end of the string is attached to a particle B of mass 1.2 kg which hangs freely below the pulley, as shown in Fig. 4. The system is released from rest with the string taut and with B at a height of 0.6 m above the ground. In the subsequent motion A does not reach P before B reaches the ground. In an initial model of the situation, the table is assumed to be smooth. Using this model, find

(*a*) the tension in the string before B reaches the ground,

(5)

(*b*) the time taken by B to reach the ground.

(3)

In a refinement of the model, it is assumed that the table is rough and that the coefficient of friction between A and the table is $\frac{1}{5}$. Using this refined model,

(*c*) find the time taken by B to reach the ground.

(8)

A ball is projected vertically upwards with a speed u m s^{-1} from a point A which is 1.5 m above the ground. The ball moves freely under gravity until it reaches the ground. The greatest height attained by the ball is 25.6 m above A.

(a) Show that $u = 22.4$.

(3)

The ball reaches the ground T seconds after it has been projected from A.

(b) Find, to 2 decimal places, the value of T.

(4)

The ground is soft and the ball sinks 2.5 cm into the ground before coming to rest. The mass of the ball is 0.6 kg. The ground is assumed to exert a constant resistive force of magnitude F newtons.

(c) Find, to 3 significant figures, the value of F.

(6)

(d) State one physical factor which could be taken into account to make the model used in this question more realistic.

(1)

Grade criteria

	Class Test / Assignment grade 40%	Exam grade 60%
C / Pass	**At least 20 out of 40** *and…*	**At least 30 out of 60**
B	At least 2 out of 4 – *and…*	At least 36 out of 60% *and…*
A	At least 28 out of 40 *and…*	At least 42 out of 60 *and…*

Coursework / Assignment deadlines throughout term
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