Awarding Great British Qualifications

INTERNATIONAL FOUNDATION DIPLOMA FOR HIGHER EDUCATION STUDIES

(L3IFDHES)

NCC Education
Qualification Unit Specification
2024 / 25

LEVEL 3 INTERNATIONAL FOUNDATION DIPLOMA FOR HIGHER EDUCATION STUDIES (L3IFDHES)

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Contents

1. About NCC Education

NCC Education is a UK awarding body, active in the UK and internationally. Originally part of the UK National Computing Centre, NCC Education started offering IT qualifications in 1976 and from 1997 developed its Higher Education portfolio to include Business qualifications, IT qualifications for school children and a range of Foundation qualifications.

With Centres in over forty countries, four international offices and academic managers worldwide, NCC Education strives to employ the latest technologies for learning, assessment, and support. NCC Education is regulated, and quality assured by Ofqual (the Office of Qualifications and Examinations Regulation, see www.ofqual.gov.uk) in England.

1. Why choose this qualification?

NCC Education's Level 3 International Foundation Diploma for Higher Education Studies (L3IFDHES) is designed for speakers of English as a foreign language who are seeking to gain entry to Higher Education qualifications taught and assessed in English.

NCC Education's Level 3 International Foundation Diploma for Higher Education Studies is:

- **Regulated** by Ofqual and Qualification Wales (QiW) under the Regulated Qualifications Framework (RQF).

  For more information, see:
  https://www.gov.uk/what-different-qualification-levels-mean/list-of-qualification-levels

- **Quality assured** and well established in the UK and worldwide.

- **A valuable university preparation qualification** which prepares students with the essential English language skills, mathematics, research, and study skills to progress to an English-based law, finance, accounting, economics, business, or engineering and chosen specialisms to provide direct entry into an undergraduate (First Year) degree at an internationally recognised university.

  Offers pathways in law, computer science, business, engineering, health sciences and higher finance.

  The Level 3 International Foundation Diploma for Higher Education Studies syllabus and assessment is suitable for students aged 16-19 as well as adult learners.

- **Recognised and valued** by many universities, both in the UK and in other countries. There are over 100 university progression routes to UK and overseas universities. For more details of the universities that successful L3IFDHES candidates can progress to, see www.nccedu.com

- **A pathway** to NCC Education's Level 4 Diploma qualifications and greater employment opportunities

2. Structure of the L3IFDHES Qualification

Qualification Title, Credits, Units

NCC Education's new Level 3 International Foundation Diploma for Higher Education Studies (L3IFDHES) has 120 credits.

Total Qualification Time: 1,200 hours

Total Guided Learning Hours: 697

Guided Learning Hours (GLHs) for core units: 482

Candidates whose English language proficiency level as indicated by their score in IELTS (or equivalent) is at least 4.5 and below 5.5 (termed 'Group 1') must pass all 4 core units and either 2 or 3 elective units (depending on the credit value of the elective modules chosen) to be awarded the L3IFDHES certificate.

Candidates whose English language proficiency level as indicated by their score in IELTS (or equivalent) is 5.5 or above (termed 'Group 2') will be exempt from Developing English Language Skills (DELS 2.0) core unit and must pass only 3 core units and either 3 or 4 elective units (depending on the credit value of the elective modules chosen) to be awarded the L3IFDHES certificate.

Group 1 candidates will be taught Developing English Language Skills (DELS 2.0) at IELTS (or equivalent) level 5.5, when candidates achieve Developing English Language Skills (DELS 2.0) they will progress to complete English for Academic Purposes (EAP 2.0).

Group 2 candidates and successful Group 1 candidates will be taught English for Academic Purposes (EAP 2.0) which is at IELTS (or equivalent) level 6.0.

Core Units for Group 1 candidates (for 4.5 ≤ IELTS (or equivalent) < 5.5)

Developing English Language Skills (DELS 2.0) (TQT: 200 hours/ 20 credits)	English for Academic Purposes (EAP 2.0) (TQT: 300 hours/ 30 credits)	Mathematics for University Study (TQT: 100 hours / 10 credits)	Research and Study Skills for University Study (TQT: 200 hours/ 20 credits)

Core Units for Group 2 candidates (for IELTS (or equivalent) ≥ 5.5)

English for Academic Purposes (EAP 2.0) (TQT: 300 hours/ 30 credits)	Mathematics for University Study (TQT: 100 hours / 10 credits)	Research and Study Skills for University Study (TQT: 200 hours/ 20 credits)

Elective Units

Law for University Study (TQT: 200 hours / 20 credits)	Introductory Accounting (TQT: 200 hours / 20 credits)	Introductory Economics (TQT: 200 hours / 20 credits)	Introduction to Programming with Python (TQT: 200 hours / 20 credits)
International Business (TQT: 200 hours / 20 credits)	Physics for University Study (TQT: 200 hours / 20 credits)	Further Mathematics for University Study (TQT: 200 hours / 20 credits)	Chemistry for University Study (TQT: 200 hours / 20 credits)
Biology for University Study (TQT: 200 hours / 20 credits)	Introduction to Computer Science (TQT: 100 hours / 10 credits)	Digital World (TQT: 100 hours / 10 credits)	Art and Design (General) (TQT: 200 hours / 20 credits)
Digital Art (TQT: 200 hours / 20 credits)	Fine Art (TQT: 200 hours / 20 credits)		

Summary of the units' credits, number of topics and the breakdown of the Total Qualification Time:

Unit type	No.	Unit	Credits	No. of topics	Tot. lecture time (hrs)	Tot. tutorial time (hrs)	Tot. seminar time (hrs)	Tot. lab. time (hrs)	Tot. private study time (hrs)	Invigilated Assess. time (hrs)	TQT (hrs)	Tot GLHs
Core	1	Developing English Language Skills (DELS 2.0)	20	12	96	24	0	0	76	3.75	200	123.75
	2	English for Academic Purposes (EAP 2.0)	30	12	144	36	0	0	118	2.25	300	182.25
	3	Research and Study Skills for University Study (RSUS 1.0)	20	12	94	24	0	0	82	0.25	200	118.25
	4	Mathematics for University Study (MUS 1.0)	10	12	25	12	18	0	42	3	100	58
Elective	1	Law for University Study (LUS 1.0)	20	12	36	12	0	0	152	0	200	48
	2	Introductory Accounting (IA 1.0)	20	12	48	12	0	0	136	4	200	64
	3	Introductory Economics (IE 1.0)	20	12	60	16	16	0	104	4	200	96
	4	International Business (IB 1.0)	20	12	36	24	0	0	138	2	200	62
	5	Physics for University Study (PUS 1.0)	20	10	43	10	16	0	127	4	200	73
	6	Further Mathematics for University Study (FMUS 1.0)	20	12	58	12	0	0	126	4	200	74
	7	Chemistry for University Study (CUS 1.0)	20	12	52	12	0	0	132	4	200	68

8	Biology for University Study (BUS 1.0)	20	12	48	12	0	0	136	4	200	64
9	Introduction to Programming with Python (IPP 1.0)	20	12	24	24	0	12	140	3	200	60
10	Introduction to Computer Science (ITCS 4.0)	10	12	25	24	0	0	48	3	100	52
11	Digital World (DW 1.0)	10	12	24	24	0	12	40	3	100	60
12	Art and Design (General)	20	12	42	22	0	0	136	0	200	64
13	Fine Art	20	12	24	12	24	0	140	0	200	60
14	Digital Art	20	12	44	0	53	0	103	0	200	97

3. Assessment for the Qualification

1. Assessment Objectives

All assessment for the qualification is intended to allow candidates to demonstrate they have met the relevant Learning Outcomes. Moreover, NCC Education's assessment is appropriate to the assessment criteria as stated in this specification and is regularly reviewed to ensure it remains consistent with the specification.

2. Overview of Qualification Unit Assessment

Unit	Assessment Method		
	Written Exam	Written Assignment	Oral Presentation Exam
Developing English Language Skills 2.0 (DELS 2.0)	Reading (25%) Listening (25%) Writing (25%)		Speaking (25%)
English for Academic Purposes 2.0 (EAP 2.0)	Reading (25%) Listening (25%)	Writing (25%)	Speaking (25%)
Mathematics for University Study	100% (2 exams)		
Research and Study Skills for University Study		75%	25%
Law for university study		Essay (75%) Case brief (25%)	
Introductory Accounting	100% (2 exams)		
Introductory Economics	100% (2 exams)		
Introduction to Programming with Python	30% Local Exam (MCQ)	70%	
International Business	40% (1 exam)	60% (1 assignment)	
Physics for University Study	100% (2 exams)		
Further Mathematics for University Study	100% (2 exams)		
Chemistry for University Study	100% (2 exams)		
Biology for University Study	100% (2 exams)		
Introduction to Computer Science	100% Global Exam (includes 70% Structured Questions and 30% MCQ)		
Digital World	30% Local Exam (MCQ)	70%	
Art and Design (General)		100%	
Fine Art		100%	
Digital Art		100%	

The overall unit mark is computed from the weighted mean of its components. The pass mark for a unit is 40%.

An examination is an assessment that will take place on a specified date and usually in an NCC Education Centre. An assignment requires candidates to produce a written response to a set of one or more tasks, meeting a deadline imposed by the Centre. Local Examinations and Global Assignments are marked by the centre.

NCC Education Centres can provide candidates with a specimen assessment paper as well as a limited number of past examination and assignment papers.

Past examination and assignment papers may be made available only following results release for the corresponding assessment cycle. Results release dates and past examination and assignment release dates can be found in the Activity Schedules on Quartz, NCC Education's student registration system.

4. Administration

1. Assessment Cycles

Four assessment cycles are offered throughout the year Spring, Summer, Autumn, and Winter. Details of each assessment cycle with corresponding dates can be found within the Activity Schedules.

2. Language of Assessment

All assessment is conducted in English.

3. Candidates

NCC Education's qualifications are available to those Centre candidates who satisfy the entry requirements as stated in this specification.

4. Qualification Entry Requirements

Students must meet the following entry requirements:

- Completed their GCSE/IGCSE 'O' Levels or an equivalent* qualification in their own country and passed 5 subjects with minimum grades of 'C', '4' or equivalent* in each. These should include Mathematics and English.

- Have a valid score of 4.5 or above in the International English Language Testing System (IELTS) examination or equivalent for students whose first language is not English. Alternatively, students can take the free NCC Education Standard English Placement Test which is administered by our Accredited Partner Centres.

* Centres need to provide evidence to justify any equivalency decision (both qualification equivalency and grade equivalency) they make pertaining to any enrolments via non-GCSE or non-standard routes.

5. Eligibility Period

The maximum period of time that NCC Education allows for the completion of your programme is three years. Please contact your Accredited Partner Centre if you have any queries relating to this.

6. Resits

If a candidate fails an assessment, they will be provided with opportunities to resit during the eligibility period.
If a candidate has passed an assessment, they are eligible for 1 additional re-take only. The highest mark for the assessment will be awarded.

5. Syllabus

1. Developing English Language Skills (DELS 2.0)

Title	Developing English Language Skills (DELS 2.0)
Unit reference number	L/615/0156
Credits	20
Level	3
Type	Core

Guided Learning Hours	123.75 hours	**Total Qualification Time**	200 hours

Learning Outcomes: ***CEFR Level B2*** The Learner will:	**Assessment Criteria:** ***CEFR Level B2*** The Learner can:
1. Be able to communicate fluently, accurately and effectively, speaking on a range of topics, with appropriate control of grammar, vocabulary and register	1.1 Demonstrate confident and accurate use of a range of tenses and grammatical structures 1.2 Participate in discussion of familiar issues, giving relevant and meaningful contributions appropriate to the conversation and participants 1.3 Demonstrate use of natural stress and intonation 1.4 Demonstrate, when participating in discussion, being understood without any recurring or major difficulty on the part of the listener 1.5 Prepare and present simple information to others confidently and clearly
2. Be able to read with independence and comprehend the main content and overall meaning of a range of general texts in English	2.1 Readily grasp the essential meaning of general English texts 2.2 Locate relevant details in a long text 2.3 Demonstrate the ability to understand stances, viewpoints and conclusions made in a range of general English texts 2.4 Understand clearly written and straightforward instructions
3. Be able to write factual, descriptive, and explanatory texts, accurately using a range of linguistic structures and vocabulary, to	3.1 Demonstrate the ability to write a summary of information given or researched 3.2 Demonstrate the ability to write in a range of different styles appropriate to tasks 3.3 Demonstrate the ability to accurately use different linguistic structures to complete written tasks on a range of familiar topics

complete clearly defined tasks	3.4 Demonstrate the ability to organise, develop and link points together for a range of clearly defined writing tasks
4. Be able to apply a range of listening strategies in order to understand spoken language on familiar and some unfamiliar topics	4.1 Demonstrate the ability to pick out key information when listening to a range of speakers 4.2 Understand the main points of a linguistically complex lecture or talk 4.3 Demonstrate the ability to predict the content of a conversation or speech on a general topic, based on listening to a brief introduction or extract 4.4 Demonstrate the ability to utilise their listening skills in order to participate meaningfully in discussion of familiar issues

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Introductions	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Ask and answer questions about everyday life using auxiliary verbs • Using the present simple and present continuous tenses • Recognising and using parts of speech in sentences • Understanding how to use question words • Asking and answering questions correctly • Writing questions using the correct tenses • Talking about important people • Using the various forms of the verb 'to have' • Understanding the gist of a conversation • Summarising an interview in writing • Writing a letter about themselves • Discussing everyday activities ***Learning Outcome: 1, 3, 4***
2.	The Past	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Speak fluently about meeting someone; • Use 'past simple' and 'past continuous' tenses; • Correctly pronounce –ed endings; • Correctly use the forms of used to; • Discuss events in the past tense; • Write about an event in the past; • Ask people about memorable events in their past; • Present a summary of a paragraph; • Write a paragraph about memory; • Consider how to deal with stress before an exam; • Understand the importance of time management while studying; • Understand how to develop an answer in a speaking exam ***Learning Outcome: 1, 2, 3, 4***

3.	Food and Family	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Find people's opinions in a text; • Understand someone's opinion in an interview; • Use family-related vocabulary; • Accurately use future tenses to write predictions; • Use context to understand meanings of words; • Develop notes into an essay about a person. • Assessment Preparation ***Learning Outcome: 1, 2, 3, 4***
4.	Money and Work	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Use notes to talk about shopping; • Use the present perfect and past simple tenses to discuss experiences; • Use the present perfect tense to talk about how long they have done things; • Develop notes into a talk about a trip; • Use strong adjectives to describe experiences; • Write an informal email. • Assessment Preparation ***Learning Outcome: 1, 2, 3, 4***
5.	Transport and Places	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Use transport-related vocabulary to answer questions; • Differentiate between the /ʃ/, /dʒ/ and /tʃ/ sounds; • Understand a description of a route through a city; • Talk about transport in a city; • Accurately use comparative and superlative forms; • Understand how to use linking in pronunciation; • Make notes based on a talk given by an expert; • Use phrases for agreeing and disagreeing; • Use language of recommendations; • Use research and summary skills; • Improve note-taking skills while listening to presentations; • Use articles correctly; • Use information to predict content in a dialogue • Listen for specific vocabulary • Answer simple questions about familiar topics • Expand on short answers ***Learning Outcome: 1,2, 3, 4***

6.	Success	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Understand the differences between can, could and able to; • Improve how they stress syllables in a sentence; • Use phrases and vocabulary related to jobs to conduct a job interview; • Use –ed and –ing adjectives; • Discuss a topic after reading about it; • Accurately use modal verbs of obligation. • Listen for details in a dialogue • Write names and numbers accurately • Express feelings • Agree and disagree ***Learning Outcome: 1, 2, 3, 4***
7.	Sport and Exercise	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Use sports-related vocabulary; • Answer multiple-choice and gap-fill questions when listening to an interview; • Understand the order of events in a story by paying attention to tense; • Use a variety of tenses accurately to talk about past experiences; • Use the context of a text to work out the meaning of key phrases; • Identify four ways of pronouncing the letter 's'; • Use skimming strategies to understand the overall meaning of a text. • Assessment Preparation ***Learning Outcome: 1, 2, 3, 4***
8.	Film and TV	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Speak fluently and accurately about a TV programme; • Form and use the passive voice; • Take notes to summarise an audio interview; • Use film-related vocabulary to write a review; • Pronounce various diphthongs accurately; • Use modal verbs to make deductions; • Use scanning strategies to find and understand key words in a text. • Assessment Preparation ***Learning Outcome: 1, 2, 3, 4***
9.	Home, school, and work	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Improve their education-related vocabulary; • Use language of agreeing and disagreeing to discuss issues in education; • Use the first conditional to talk about the future; • Use the second conditional to talk about their ideal homes; • Use appropriate language to write a letter of complaint; • Analyse comprehension questions; • Look at synonyms of key terms in a text; • Give long spoken answers; • Take notes while listening. ***Learning Outcome: 1, 2, 3, 4***

10.	The Modern World	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Understand the form and meaning of the third conditional; • Write sentences using modal verbs for recommendation in the past; • Make adjectives and adverbs from nouns; • Read paragraphs for specific details; • Understand which quantifiers are used with countable and uncountable nouns; • Use appropriate language to write about the advantages and disadvantages of an aspect of technology; • Summarise a text; • Use common linking words in speaking; • Recognise a speaker's views and feelings. ***Learning Outcome: 1, 2, 3, 4***
11.	Travel	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Use precise vocabulary for talking about air travel; • Use narrative tenses to describe incidents; • Correctly pronounce irregular verbs in the past tense; • Understand how adverbs and adverbial phrases are used in writing; • Give a presentation using effective non-verbal communication; • Use adjectives and adverbs in order to make a presentation more persuasive; • Use descriptive vocabulary to talk about an article or book; • Assessment Preparation ***Learning Outcome: 1, 2, 3, 4***
12.	The Environment	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.36 hrs	• Use the future perfect and future continuous tense to talk about the future of the environment; • Accurately use future tenses to talk about plans and predictions; • Use future tenses accurately to ask questions; • Accurately use modifiers with strong adjectives to talk about the weather; • Identify the format and question types in the IELTS speaking exam; • Use the zero and first conditionals to talk about risks and consequences; • Understand the meaning of expressions and phrasal verbs with take; • Coherently structure an essay; • Assessment Preparation ***Learning Outcome: 1, 2, 3, 4***

Assessment Type
• Reading exam (25%), 1 hour • Listening exam (25%), 1 hour • Writing exam (25%), 1.5 hours • Speaking exam (25%), 10-15 mins
See also Section 3 above

2. English for Academic Purposes (EAP 2.0)

Title	English for Academic Purposes (EAP 2.0)
Unit reference number	Y/615/0158
Credits	30
Level	3
Type	Core

Guided Learning Hours	182.25 hours	**Total Qualification Time**	300 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Be able to utilise different 'pre', 'while' and post reading strategies to understand academic texts	1.1 Predict the content of various academic texts prior to reading them fully 1.2 Identify the overall function of an academic text 1.3 Identify the specific function of sentences, paragraphs and sections in academic texts 1.4 Demonstrate comprehension of a range of academic texts
2. Be able to demonstrate an appropriate academic vocabulary	2.1 Identify subject-specific vocabulary in a range of academic texts 2.2 Demonstrate active use of a range of subject-specific vocabulary 2.3 Use subject-specific vocabulary accurately
3. Be able to structure and write sentences, paragraphs and full texts that meet the academic requirements	3.1 Demonstrate an understanding of what is required in a range of academic writing tasks at this level 3.2 Demonstrate the ability to use the structure and linguistic conventions of well written academic sentences 3.3 Demonstrate the ability to use the structure and linguistic conventions of well written academic paragraphs 3.4 Demonstrate the ability to link sentences, paragraphs and sections together to produce overall cohesion in academic writing 3.5 Follow a step by step process to produce a final draft piece of academic writing

4. Be able to utilise 'pre', 'while' and post listening strategies to understand different speakers and academic topic information	4.1 Demonstrate the ability to recognise linguistic signposts and reference markers when listening to different speakers and to different delivery styles 4.2 Demonstrate the ability to utilise notes made whilst listening to a range of different speakers 4.3 Identify key information when listening to a range of speakers and delivery styles
5. Be able to communicate fluently, accurately and effectively, speaking on a range of academic topics, with appropriate grammar range, lexical resource, pronunciation and register	5.1 Demonstrate fluency whilst speaking including talking at length, without pauses, hesitation or self-correction, be able to be understood and using linking devices. 5.2 Demonstrate good lexical resource using a range of words and paraphrasing, collections, less common vocabulary and avoiding errors. 5.3 Demonstrate confident grammar range and accuracy using the full range of sentence structures, grammar tenses and avoiding errors. 5.4 Demonstrate accurate word and sound pronunciation, be understood throughout, use natural stress and intonation and without affecting understandability by their accent or difficulty on the part of the listener. 5.5 Prepare and present detailed information to others confidently and clearly 5.6 Participate in discussion of a broad range of issues, giving relevant and meaningful contributions appropriate to the conversation and participants
6. Be able to recognise the various types of critical reasoning to identify, describe and analyse arguments of one's own and others, and solve problems systemically.	6.1 Efficiently assess different sources of evidence. 6.2 Demonstrate knowledge and understanding of the basic concepts and principles of critical reasoning 6.3 Identify, analyse, clearly reconstruct and critique different types of arguments presented in texts, and identify and avoid common pitfalls in arguments 6.4 Take a reflective and critical approach to one's own claims as well as those of others, and to construct their own arguments with clarity, precision and persuasion.

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Language for Academic English (1)	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	To recognise and use the following language points: • Narrative tenses • Relative clauses • Auxiliary verbs • Forming questions • Word formation • Comparatives • Superlatives • Present perfect simple and continuous • Adverbs and adverbial phrases • Future perfect and continuous tenses • Future tenses • Zero and 1st conditionals ***Learning Outcome: 3, 5***
2.	Language for Academic English (2)	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	To recognise and use the following language points: • Unreal conditionals • Gerunds and infinitives • 'used to' • Modal verbs • 'would rather' • The passive voice • Reporting verbs • Countable and uncountable nouns • Quantifiers • Articles • Transitive and intransitive verbs • Discourse markers ***Learning Outcome: 3, 5***
3.	Academic Speaking Skills	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Structure a presentation • Use voice effectively when speaking • Use slides effectively in presentations • Use non-verbal communication effectively • Build rapport while presenting • Deal with questions after a presentation • Prepare for seminars and discussions • Interact in a seminar discussion • Summarise a seminar • Ask for clarification • Use stress and intonation effectively • Reflect on a seminar discussion • Respond to feedback ***Learning Outcome: 5***

4.	Critical Evaluation	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Interpret a text • Understand relevance of ideas • Evaluate arguments • Create persuasive arguments • Identify problems and solutions • Synthesise information • Analyse data • Identify cause and effect ***Learning Outcome: 6***
5.	Introduction to Academic English	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Understand the meaning and importance of EAP • Consider the values of academic integrity • Discuss how they would react in different situations • Understand the importance of avoiding academic misconduct • Consider the different features of an academic journal • Understand how to write a reference list entry • Consider which types of sources are suitable for academic study • Ask questions to evaluate sources • Recognise plagiarism • Understand how to avoid plagiarism • Understand how and when to cite sources in a piece of writing. • Consider the different ways that sources can be cited. • Consider what information is included in a reference list. • Understand why a reference list is important. • Write a reference list entry. • Understand how to summarise effectively. • Understand how to paraphrase effectively. • Consider various note-taking methods. • Understand how to take notes effectively. ***Learning Outcome: 1, 2, 3, 4, 5***
6.	Initial Skills	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Understand structures of academic written texts; • Use simple, compound and complex sentences in academic writing; • Use the basic elements of a paragraph in academic writing; • Use the passive voice in academic writing; • Employ pre-listening strategies;

			• Listen for gist and for specific information; • Understand and use academic word lists; • Use prediction strategies as a pre-reading technique. ***Learning Outcome: 1, 2, 3, 4, 5***
7.	Tackling Academic Tasks	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Using word transformations in academic writing • Using signposting in academic writing • Practising cohesion within paragraphs • Considering the use of punctuation in academic writing • Recognising signposts in a lecture • Examining solutions to spelling difficulties • Examining strategies for exploiting handouts in a lecture • Exploiting the use of visual aids in lectures • Considering the use of dictionaries • Understanding how affixes and roots show word meanings • Practising skimming skills to extract the main idea from a text • Practising scanning skills to search for specific information in a text ***Learning Outcome: 1, 2, 3, 4, 5***
8.	Exploiting Academic Materials	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Examining paraphrasing and summarising other writers' work • Understanding the issue of plagiarism and how to reference a source • Considering thesis statements • Considering how to respond to questions and instructions in academic writing • Understanding the paralinguistic features of a lecture • Examining the use of inference in lectures • Understanding attitude and opinion in lectures • Understanding how to deal with less-frequent vocabulary • Understanding how to use the contents and index pages of a text • Making inferences from written work ***Learning Outcome: 1, 2, 3, 4, 5***

9.	Polishing Academic Skills	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Organising details and examples in a written text • Providing feedback on a piece of writing • Considering paragraph divisions within a text • Examining how referencing is used by lecturers • Considering the structure of academic lectures • Working out the meaning of unknown vocabulary • Practising intensive reading • Considering the use of linking words in a text • Practising note-taking techniques • Developing an academic style ***Learning Outcome: 1, 2, 3, 4,***
10.	Enhancing Techniques	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Examining techniques for adding and hiding opinion in writing • Considering the importance of proof reading • Correcting written work based on criteria • Developing a system of abbreviations for note-taking • Discovering how best to record new vocabulary • Finding further reading material on a subject • Examining opinions in writing • Literature reviews • Reporting results • Analysing results ***Learning Outcome: 1, 2, 3, 4, 5***
11.	Research Project	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Revising qualitative vs. quantitative research • Supervised Study 1: Discussing and reviewing research proposal • Critical thinking self-assessment • Revising evaluation of sources - PARCA Model • Supervised Study 2: Gathering sources • Peer-evaluating sources using the PARCA Model • Report Writing Revision / Error Correction • Revising language for describing trends • Supervised Study 3: Paraphrasing complex sources • Supervised Study 4: Paraphrasing complex sources • Revising hedging in academic writing • Research Project Checklist Completion ***Learning Outcome: 1, 2, 3, 4, 6***

12.	Assessment Preparation	1/12 Lectures: 12 hrs Tutorials: 3 hrs Private study: 9.82 hrs	• Mock Reading Assessment • Feedback from Mock Reading Assessment • Mock Listening Assessment • Feedback from Mock Listening Assessment • Critical Thinking Case Study 1 • Mock Speaking Assessment • Feedback from Mock Speaking Assessment • Critical Thinking Case Study 2 • Mock Writing Assessment • Feedback from Mock Writing Assessment • Discipline Specific Critical Thinking Case Study • Writing and Speaking Assessment Preparation: Focus on Planning Tasks (Essay planning & Short Presentation Planning) ***Learning Outcome: 1, 2, 3, 4***

Assessment Type
• Reading exam (25%), 1 hour • Listening exam (25%), 1 hour • Writing assignment (25%) • Speaking exam (25%), 10-15 mins
See also Section 3 above

3. Mathematics for University Study

Title	Mathematics for University Study
Unit reference number	F/615/0154
Credits	10
Level	3
Type	Core

Guided Learning Hours	58 hours	**Total Qualification Time**	100 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Be able to develop fundamental knowledge, skills and understanding of number and algebra and be able to perform and solve a range of algebraic calculations, equations, and inequalities	1.1 Distinguish integers and natural, whole, rational and irrational numbers 1.2 Order positive and negative integers, decimals and fractions using logical operators and the number line 1.3 Understand and use place value in performing calculations 1.4 Conduct addition, subtraction, multiplication and division of positive and negative integers, decimals, fractions, and mixed numbers applying the correct order of operations 1.5 Define prime numbers and use prime factorisation to express whole numbers 1.6 Calculate and recognise the uses of Least Common Multiple (LCM) and Highest Common Factor (HCF) 1.7 Recognise the simple terms used in household finance including profit, loss, cost price, selling price, debit, credit, balance, income tax and interest rate and the methods to calculate them 1.8 Calculate numbers raised to positive integer powers and roots with both integer and fractional indices 1.9 Interpret and perform calculations (with and without a calculator) involving the standard form A x 10^n, where $1 \leq A < 10$ and n is an integer 1.10 Solve problems by working interchangeably between fractions, decimals and percentages 1.11 Recognise and use the correct standard units of measures 1.12 Round numbers and measures to an appropriate degree of accuracy 1.13 Apply and interpret limits of accuracy 1.14 Understand the difference between an expression, an equation and a formula 1.15 Simplify a range of algebraic expressions involving powers 1.16 Simplify algebraic expressions by multiplying and

	dividing expressions 1.17 Factorise algebraic expressions using a range of techniques 1.18 Simplify and solve algebraic fractions 1.19 Transpose formulae 1.20 Solve linear and quadratic equations 1.21 Solve simultaneous equations
2. Acquire, select, and apply mathematical techniques to solve sequence, ratio, proportion, rates of change and geometry problems	2.1 Accurately recall facts, terminology and definitions 2.2 Use and interpret notation correctly 2.3 Accurately carry out routine procedures or set tasks requiring multi-step solutions.
3. Be able to mathematically, solve, reason, make deductions and inferences and draw conclusions within mathematics and other contexts	3.1 Translate problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes 3.2 Make and use connections between different parts of mathematics 3.3 Interpret results in the context of the given problem 3.4 Evaluate methods used and results obtained 3.5 Evaluate solutions to identify how they may have been affected by assumptions made.
4. Comprehend, interpret, and communicate mathematical information in a variety of forms appropriate to the information and context.	4.1 Make deductions, inferences and draw conclusions from mathematical information 4.2 Construct chains of reasoning to achieve a given result 4.3 Interpret and communicate information accurately 4.4 Present arguments and proofs 4.5 Assess the validity of an argument and critically evaluate a given way of presenting information
5. Recognise and apply the fundamentals of statistics and be able to present data in graphical form	5.1 Perform statistical calculations relating to central tendency and dispersion 5.2 Calculate the arithmetic mean for a range of data samples, frequency distributions and grouped data 5.3 Calculate the modal and median values of data sets 5.4 Calculate the range, quartiles, quantiles, mean deviation, variance and standard deviation 5.5 Present data using tables, pie charts and bar charts 5.6 Construct frequency distributions 5.7 Present data as histograms, ogives and time series graphs 5.8 Present linear and quadratic equations in graphical form 5.9 Provide graphical solutions to simultaneous equations

6. Recognise and apply the fundamentals of probability	6.1 Calculate probability using the addition and multiplication rules 6.2 Calculate the probability of compound events 6.3 Use tree diagrams to determine probability 6.4 Calculate probabilities of permutations and combinations

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Number: Structure and calculation	1/12 Lectures: 3 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Ordering positive and negative integers, decimals, and fractions; use of the symbols $=, \neq, <, >, \leq, \geq$; use of the number line • Applying the four operations, including formal written methods, to integers, decimals, simple fractions (proper and improper), and mixed numbers – all both positive and negative • Place value (e.g., when working with very large or very small numbers, and when calculating decimals) • Terms used in household finance (e.g., profit, loss, cost price, selling price, debit, credit, balance, income tax, VAT, and interest rate. • Relationships between operations, including inverse operations (e.g., cancellation to simplify calculations and expressions) • Conventional notation for priority of operations, including brackets, powers, roots, and reciprocals • Prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem; prime factor decomposition including product of prime factors written in index form • Systematic listing strategies including the product rule for counting, using lists, tables, and diagrams • Positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; square numbers up to 15×15; estimate powers and roots of any given positive number; calculation with roots and with integer indices; calculation with fractional indices. • Exact calculations with fractions; exact calculations with multiples of π; exact

			calculations with surds; simplifying surd expressions involving squares; rationalising denominators • Calculating (with and without a calculator) and interpreting the standard form A x 10^n, where $1 \leq A < 10$ and n is an integer ***Learning Outcome: 1***
2.	Number: Fractions, decimals, and percentages	1/12 Lectures: 1 hr Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Ordering and working interchangeably with terminating decimals and their corresponding fractions (e.g., 3.5 and $\frac{7}{2}$ or 0.375 and $\frac{3}{8}$); change recurring decimals into their corresponding fractions and vice versa) • Ratio problems (identify and work with fractions) • Fractions and percentages as operators including interpreting percentage problems using a multiplier ***Learning Outcome: 1, 2, 3***
3.	Number: Measures and accuracy	1/12 Lectures: 1.5 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Use of units of mass, length, time, money, and other measures (including standard compound measures) using decimal quantities where appropriate; metric conversion factors for length, area, volume and capacity; Imperial/metric conversions • Estimating answers; calculations using approximation and estimation, including answers obtained using technology; evaluation of results obtained • Numbers and measures rounded to an appropriate degree of accuracy (e.g., to a specified number of decimal places or significant figures); inequality notation to specify simple error intervals due to truncation or rounding; limits of accuracy; upper and lower bounds ***Learning Outcome: 1***
4.	Algebra: Notation, vocabulary, and manipulation	1/12 Lectures: 1.5 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Interpreting algebraic notation; coefficients written as fractions rather than decimals; brackets • Giving answers in the simplest form • Substitution of numerical values into formulae and expressions, including scientific formulae • Expressions, equations, formulae, inequalities, identities, terms, and factors • Algebraic expression simplification and manipulation by collecting like terms, multiplying a single term over a bracket, taking out common factors, simplifying

			expressions involving sums, products and powers, including the laws of indices • Algebraic expression simplification and manipulation (including those involving surds) by expanding products of two binomials, factorising quadratic expressions of the form $x^2 + bx = c$, including the difference of two squares. • Algebraic expression simplification and manipulation (including those involving surds and algebraic fractions) by expanding products of two or more binomials, factorising quadratic expressions of the form $x^2 + bx = c$ • Standard mathematical formulae • Rearranging formulae to change the subject; use of formulae from other subjects in words and using symbols. • Equations vs inequalities • Showing algebraically whether or not expressions are equivalent; use algebra to support and construct arguments including proofs. • Interpreting simple expressions as functions with inputs and outputs (where appropriate); interpreting the reverse process as the 'inverse function'; interpreting the succession of two functions as a 'composite function' ***Learning Outcome: 1, 3***
5.	Algebra: Graphs	1/12 Lectures: 1.5 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Coordinates in all four quadrants • Plotting graphs of equations that correspond to straight-line graphs in the coordinate plane; using the form $y = mx + b$ to identify parallel lines; finding the equation of the line through two given points, or through one point with a given gradient; using the form $y = mx + b$ to identify perpendicular lines • Identification and interpretation of gradients and intercepts of linear functions graphically and algebraically • Identification and interpretation of roots, intercepts and turning points of quadratic functions graphically; algebraic deduction of roots; deducing turning points by completing the square • Recognising, sketching, and interpreting graphs of linear functions and quadratic functions including simple cubic functions, the reciprocal function $y = \frac{1}{x}$ with $x \neq 0$,

			exponential functions $y = k^x$ for positive values of k, and the trigonometric functions for angles of any size • Sketching translations and reflections of a given function • Plotting and interpreting graphs, and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration including reciprocal and exponential graphs • Calculation or estimation of gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpreting results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts • Recognition and use of the equation of a circle with centre at the origin • Finding the equation of a tangent to a circle at a given point ***Learning Outcome: 1, 2, 3, 4, 5***
6.	Algebra: Solving equations and inequalities	1/12 Lectures: 1.5 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Solving linear equations in one unknown algebraically, including those with the unknown on both sides of the equation • Finding approximate solutions using a graph • Solving quadratic equations algebraically by factorising, including those that require rearrangement as well as completing the square and by using the quadratic formula • Finding approximate solutions using a graph • Solving two simultaneous equations in two variables (linear/linear) algebraically including linear/quadratic • Finding approximate solutions using a graph • Finding approximate solutions to equations numerically using iteration • Translating simple situations or procedures into algebraic expressions or formulae • Deriving an equation (or two simultaneous equations), solve the equation(s) and interpret the solution • Solving linear inequalities in one or two variables, and quadratic inequalities in one variable • Representing the solution set on a number line, using set notation and on a graph ***Learning Outcome: 1, 2, 3***

7.	Algebra: Sequences	1/12 Lectures: 1.5 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Generating terms of a sequence from either a term-to-term or a position-to-term rule • Using sequences of triangular, square and cube numbers and simple arithmetic progressions including Fibonacci-type sequences, quadratic sequences, simple geometric progressions, other sequences • Deducing expressions to calculate the nth term of linear sequences including quadratic sequences ***Learning Outcome: 1, 2, 3***
8.	Ratio, proportion, and rates of change	1/12 Lectures: 1.5 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• The change between related standard units (e.g., time, length, area, volume/capacity, mass) and compound units (e.g., density, pressure, speed, rates of pay, prices) in numeric and algebraic contexts • The use of scale factors, scale diagrams and maps including geometrical problems. • Expressing one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 • The use of ratio notation, including reduction to simplest form • Dividing a given quantity into two parts in a given part: part or part: whole ratio • Expression of the division of a quantity into two parts as a ratio • Application of ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations), including better value or best-buy problems. • Expression of a multiplicative relationship between two quantities as a ratio or a fraction • Use of proportion as equality of ratios • Relating ratios to fractions and to linear functions • Percentage as 'number of parts per hundred' • Percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively • Expression of one quantity as a percentage of another • Comparing two quantities using percentages • Percentages greater than 100% • Problems involving percentage change, including percentage increase/decrease

			and original value problems, and simple interest including in financial mathematics • Problems involving direct and inverse proportion, including graphical and algebraic representations • Use of compound units such as speed, rates of pay, unit pricing, density and pressure, including making comparisons • Compare lengths, areas and volumes using ratio notation, including trigonometric ratios • Scale factors • x inversely proportional to y is equivalent to x is proportional to $\frac{1}{y}$ • Construction and interpretation of equations that describe direct and inverse proportion • Interpretation of the gradient of a straight-line graph as a rate of change • Graphs that illustrate direct and inverse proportion • Interpretation of the gradient at a point on a curve as the instantaneous rate of change • Application of the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic, and graphical contexts • Setting up, solving, and interpreting the answers in growth and decay problems, including compound interest, and working with general iterative processes ***Learning Outcome: 2, 3, 4***
9.	Geometry and measures: Properties and constructions	1/12 Lectures: 3 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Use of conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons, and polygons with reflection and/or rotation symmetries • Standard conventions for labelling and referring to the sides and angles of triangles • Draw diagrams from written description • Use of the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle), and using these to construct given figures and solve loci problems • perpendicular distance from a point to a line is the shortest distance to the line • Constructing various angles of (30°, 45°, 60°, etc.)

			• Application of the properties of angles at a point, angles at a point on a straight line, vertically opposite angles • Use of alternate and corresponding angles on parallel lines • Derivation and use the sum of angles in a triangle (e.g., to deduce and use the angle sum in any polygon, and to derive properties of regular polygons) • Derivation and application of the properties and definitions of special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite, rhombus, triangles and other plane figures using appropriate language • Names and properties of isosceles, equilateral, scalene, right-angled, acute-angled, obtuse-angled triangles • Names and use of polygons: pentagon, hexagon, octagon, and decagon. • Use of the basic congruence criteria for triangles (SSS, SAS, ASA, RHS) • Application of angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs • Identification, description and construction of congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement, including fractional and negative scale factors • Description of the changes and invariance achieved by combinations of rotations, reflections and translations, including using column vector notation for translations • Identification and application of circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment • Application and proof of the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results, including: (1) angle subtended by an arc at the centre is equal to twice the angle subtended at any point on the circumference, (2) angle subtended at the circumference by a semicircle is 90°, (3)

			angles in the same segment are equal, (4) opposite angles in a cyclic quadrilateral sum to 180°, (5) tangent at any point on a circle is perpendicular to the radius at that point, (6) tangents from an external point are equal in length, (7) the perpendicular from the centre to a chord bisects the chord, and (8) alternate segment theorem. • Solving geometrical problems on coordinate axes • Identification of properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres • Construction and interpretation of plans and elevations of 3D shapes ***Learning Outcome: 2, 3, 4***
10.	Geometry and measures: Mensuration, calculation, and vectors	1/12 Lectures: 5 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Use of standard units of measure and related concepts (length, area, volume/capacity, mass, time, money etc.) • Measurement of line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings, including the eight compass point bearings and three-figure bearings. • Formulae to calculate: area of triangles, parallelograms, trapezia, volume of cuboids and other right prisms (including cylinders) • A circle's circumference = $2\pi r = \pi d$ and area = πr^2 • Perimeters of 2D shapes, including circles • Areas of circles and composite shapes, including surface area and volume of spheres, pyramids, frustums, cones and composite solids (including solutions in terms of π) • Calculation of arc lengths, angles and areas of sectors of circles • Application of the concepts of congruence and similarity, including the relationships between lengths in similar figures, including the relationships between lengths, areas and volumes in similar figures • The formulae for: Pythagoras' theorem $a^2 + b^2 = c^2$, and the trigonometric ratios: $\sin\theta = \frac{opposite}{hypotenuse}$, $\cos\theta = \frac{adjacent}{hypotenuse}$, $\tan\theta = \frac{opposite}{adjacent}$ • Application of the above formulae to find angles and lengths in right-angled triangles

			and, where possible, general triangles in two and three dimensional figures • The exact values of $\sin\theta$ and $\cos\theta$ for θ = 0°, 30°, 45°, 60° and 90° • The exact values of $\tan\theta$ = 0°, 30°, 45°, and 60° • Application of the sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ and the cosine rule $a^2 = b^2 + c^2 - 2bc\ cosA$ to find unknown lengths and angles • Application of the rule: Area = $\frac{1}{2}ab\sin C$ to calculate the area, sides or angles of any triangle • Description of translations as 2D vectors • Application of addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors • Use of vectors to construct geometric arguments and proofs ***Learning Outcome: 2, 3, 4***
11.	Introductory probability	1/12 Lectures: 2 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Recording, describing and analysing the frequency of outcomes of probability experiments using tables and frequency trees • Writing probabilities as fractions, decimals or percentages. • Application of the ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments • Relating relative expected frequencies to theoretical probability, using appropriate language and the 0 to 1 probability scale • Application of the property that the probabilities of an exhaustive set of outcomes sum to 1 • Application of the property that the probabilities of an exhaustive set of mutually exclusive events sum to 1 • Empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size • Enumeration of sets and combinations of sets systematically, using tables, grids, Venn diagrams, including using tree diagrams • Constructing theoretical possibility spaces for single and combined experiments with

			equally likely outcomes and using these to calculate theoretical probabilities • Calculating probabilities of independent and dependent combined events, including using tree diagrams and other representations, and knowing the underlying assumptions • Calculating and interpreting conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams • Calculating probabilities using the addition and multiplication rules • Calculating the probability of compound events • Using tree diagrams to determine probability • Calculating permutations and combinations ***Learning Outcome: 3, 6***
12.	Introductory statistics: measures of central tendency and measures of dispersion, and presentation of data	1/12 Lectures: 2 hrs Seminars: 1.5 hrs Tutorials: 1 hr Private study: 3.5 hrs	• Inferring properties of populations or distributions from a sample, whilst knowing the limitations of sampling • Interpreting and constructing tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, and know their appropriate use, including tables and line graphs for time series data choosing suitable statistical diagrams. • Constructing and interpreting diagrams for grouped discrete data and continuous data, i.e., histograms with equal and unequal class intervals and cumulative frequency graphs, and knowing their appropriate use • Interpretation, analysis and comparison of the distributions of data sets from univariate empirical distributions through: appropriate graphical representation involving discrete, continuous and grouped data including box plots and through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers) including quartiles and inter-quartile range • Applying statistics to describe a population • Use and interpretation of scatter graphs of bivariate data • Recognising correlation (knowing it does not indicate causation, drawing estimated lines of best fit, making predictions and

			interpolating/extrapolating apparent trends whilst knowing the dangers of doing so) • The terms: positive correlation, negative correlation, no correlation, weak correlation and strong correlation. • Calculation of the arithmetic mean for a range of data samples • Calculation of the arithmetic mean for a range of frequency distributions • Calculation of the arithmetic mean for grouped data • Calculation of the modal value of data sets • Calculation of the median value of data sets • Calculation of the range, quartiles and quantiles • Calculation the mean deviation • Calculation of the variance • Calculation of the standard deviation • Present data using tables, pie charts and bar charts • Construct frequency distributions • Present data as histograms, ogives and time series graphs ***Learning Outcome: 3, 4, 5***

Assessment Type
Two 1.5-hour closed-book, supervised, paper-based global exams (100%) • Exam 1; covers Topics 1-7 (50%) • Exam 2; covers Topics 8-12 (50%)
See also Section 3 above

4. Research and Study Skills for University Study

Title	Research and Study Skills for University Study
Unit reference number	J/504/0969
Credits	20
Level	3
Type	Core

Guided Learning Hours	118.25 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Understand the nature and requirements of study at this level, and the skills needed to succeed.	1.1 Recognise and demonstrate independent learning abilities appropriate to Higher Education. 1.2 Identify the main components of study skills. 1.3 Identify their own strength and development areas in study and presentation skills. 1.4 Use effective time management when studying. 1.5 Set SMART goals when studying.
2. Be able to gather key information effectively from a variety of appropriate sources.	2.1 Identify information sources of appropriate quality for academic study. 2.2 Identify the key information from a range of different sources. 2.3 Read, interpret and summarise unfamiliar content. 2.4 Record notes of key points when listening to information being given. 2.5 Critically review and use their notes to summarise accurately information gained. 2.6 Use their notes to present a summary to others.
3. Be able to use critical thinking both to analyse and to construct arguments.	3.1 Understand the key concepts and principles of critical thinking and reasoning. 3.2 Use critical and analytical thinking when reading and writing. 3.3 Develop criteria for evaluating an argument or a line of reasoning in a piece of writing. 3.4 Develop criteria for evaluating the evidence in a piece of writing. 3.5 Identify and draw valid conclusions. 3.6 Construct their own arguments with clarity, precision and persuasion.

4. Be able to produce a piece of academic work appropriate for this level.	4.1 Describe the common steps in producing academic work. 4.2 Create a plan to meet the requirements of an academic assignment. 4.3 Develop sections of an assignment towards a final draft. 4.4 Check and evaluate own work against given criteria/requirements. 4.5 Explain the role of referencing and plagiarism 4.6 Demonstrate correct referencing in an academic essay/report. 4.7 Apply learning from assessment feedback to academic work
5. Understand the context, nature, and elements of research.	5.1 Explain the role of theory, values, and ethical and political considerations in research. 5.2 Develop a strategy for a research project/report. 5.3 Describe and apply the essential elements of research: literature review, devising research questions, preparing a proposal, research methods, ethics, data collection and analysis, and writing up findings. 5.4 Explain different methods of data collection. 5.5 Select and apply appropriate data collection methods. 5.6 Discuss the difficulties and obstacles in research.
6. Be able to present a piece of academic work to others.	6.1 Present key concepts and ideas in a logical and persuasive way. 6.2 Design and use effective visual aids. 6.3 Select appropriate information for a specific audience and purpose. 6.4 Deliver presentation at appropriate pace and volume. 6.5 Establish eye contact and engage the audience. 6.6 Make use of effective emphasis and summary.

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Getting Ready for Study	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Introduction to the unit • Study requirements in Higher Education • Conducting independent study • Managing time • Setting study priorities and setting SMART goals. ***Learning Outcome: 1***
2.	Learning and Skills Audit	1/12 Lectures: 6 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Optimising your own learning – Learning how to Learn • Conditions for effective learning • Learning from experience • Critical reflection • Study skills self-assessment • Identifying your current academic skills and development needs – activity • Keeping a learning diary ***Learning outcome: 1***
3.	Gathering Information – Sources and Reading	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Sources for gathering information – lectures, books, journals • Using the library and on-line sources • The Internet and 'appropriate' sources • Bibliographies and referencing • Reading books and articles • Developing 'speed reading' • Taking useful notes • Note-taking styles • Reviewing and using notes ***Learning outcomes: 1,2,3***
4.	Gathering Information – Lectures and Tutorials	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Getting the most from lectures • Making and using lecture notes - recognising key points • Engagement and active listening • Finding the meaning of unfamiliar content • Using tutorials and group discussions ***Learning outcomes: 1,2***

5.	Using Critical Thinking and Reasoning	1/12 Lectures: 10 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Key concepts of critical thinking and reasoning • The foundations: taking a critical and analytical approach • Critical questions • Critical thinking when reading • Identifying and evaluating arguments • Critical and analytical vs. descriptive writing. • Making good arguments • Critical analysis and data • Barriers to critical thinking ***Learning outcomes: 1,3***
6.	Planning for an assignment	1/12 Lectures: 6 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Types of academic work and their requirements. • Common steps in producing academic work. • Academic style - Conventions and Types • Assignment Planning - Understanding the task. • Assignment Planning - Getting started. • Assignment Planning - Using Marking and feedback. ***Learning outcome: 2,3,4***
7.	Academic Writing	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• A process for writing assignments • Essay planning and organising notes • Structuring your writing • Organising and linking information - including 'sufficient' detail • Plagiarism and paraphrasing • Referencing and bibliographies • Referencing – essentials, styles, citations, quotations, software • Drafting, editing, proofreading, and checking work against criteria • Academic integrity, academic misconduct (plagiarism, collusion, or cheating), *Turnitin* ***Learning outcome: 3,4***
8.	The Nature and Process of Research - 1	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Understanding research – types, benefits, approaches; 'good' research, 'messiness of research • Research requirements and using research criteria • Getting started: reviewing the literature • Planning a research project and formulating research questions • Ethics and politics in research ***Learning outcome: 4,5,***

9.	The Nature and Process of Research 2	1/12 Lectures: 9 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Research programme strategy • What is data collection and why use data? • Data collection approaches - quantitative and qualitative data • Data collection tools and techniques • The important of data accuracy and appropriate data collection • Common challenges in data collection • Features of a research report • Structuring the report • Integrating evidence into a report • Editing and proof reading ***Learning outcome: 5***
10.	Developing a Presentation	1/12 Lectures: 7 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• What makes a good presentation? • Define goals • Know your audience • Preparing the contents • Using visual aids • Presenting data visually • The presentation itself ***Learning outcome: 6***
11.	Examinations and Revision	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Preparing for exams • Time Management - Preparing a revision action plan • Writing summaries and reviewing notes • Managing stress and anxiety • During the exam ***Learning outcome: 1***
12.	Module Summary and Assignment	1/12 Lectures: 8 hrs Tutorials: 2 hrs Private study: 6.8 hrs	• Summary and assignment planning/guidance • Presentation practice and assessment • Using feedback ***Learning outcome: All***

Assessment Type
• 1,000-word research proposal assignment (75%) • 10-minute research presentation inclusive of 5-minute Q&A session (25%)
See also Section 3 above

5. Law for University Study

Title	Law for University Study
Unit reference number	A/651/0276
Credits	20
Level	3
Type	Elective

Guided Learning Hours	48 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Be able to recognise and discuss the primary concepts, terms, and processes in the practice of law in England and Wales and discuss the interpretation and application of legal rules, providing insight into key aspects of professional practice and law in the workplace	1.1 Recognise and evaluate the statements of the enormously varied and rich literature on nature of law, and why we need it. 1.2 Recognise the rule of law and the influence of the law upon our social behaviour. 1.3 Identify and discuss the need for clear and accessible law 1.4 Examine the law-making process, review court structure and the passage of an Act through Parliament 1.5 Identify key legal personnel including solicitors, barristers, legal executives and judges 1.6 Recognise and discuss the profile of the judiciary, types of judges and how judges are appointed 1.7 Identify the purposes and mechanism of judicial administration in England and Wales and its influence across the globe 1.8 Recognise and discuss judicial independence and impartiality 1.9 Recognise, identify, and discuss the roles of legal professionals in England and Wales, with a focus on the main three groupings – barristers, solicitors, and legal executives. 1.10 Identify and discuss how legal systems facilitate judicial law-making, including the cases that changed the law, the role of the common law system and the hierarchy of courts 1.11 Define, analyse, and discuss the law of juries, when juries are used, majority verdicts and when judges act as jurors.

2. Be able to recognise and analyse different types of law, what constitutes valid and enforceable laws and look at the obligations, rights, and terms, covering a range of concepts via legal reasoning, and analytical and critical evaluations.	2.1 Review the differences between criminal and civil law, discussing and noting the presentational style of cases and examining how the law is distilled from them 2.2 Recognise and discuss how precedents gain increased authority with time within the system of precedents 2.3 Examine the general principles of criminal law, including how liability is incurred through acts, omissions and intention. 2.4 Consider and discuss offences involving dishonesty and non-fatal offences and defences 2.5 Discuss and evaluate key doctrines and rules with analysis of statute and case law. 2.6 Examine how criminal cases operate within the criminal litigation system of England and Wales 2.7 Identify, describe and analyse the professional requirements and skills to run a criminal file in practice. 2.8 Identify and recognise the ways of making oral legal submissions 2.9 Discuss overruling in light of retrospect, certainty and predictability
3. Be able to recognise and discuss the skills needed for effective legal practice, including the proper use of language, legal reasoning, critical thinking, and decision making as well as the processes and procedures of professional conduct, with client care, interviews, and communications.	3.1 Recognise and discuss the reasons why law is closely associated with Latin 3.2 Appreciate, identify and discuss the importance of punctuation in law 3.3 Identify, discuss and list the words that occur frequently in textbooks and case reports in all branches of English law 3.4 Assess and discuss the law relating to proper names 3.5 Recognise and discuss the use of profane and concise language in law

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	The Role of Law in Society	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• The evolution of law • The rule of law • Law in England and Wales • Legal systems across the world • Law and Democracy • Law and social change across the globe ***Learning Outcome: 1***
2.	Law-Making	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• Law-making across the world • International Relations and Supra-national law • Law-making in Parliament • The rules of statutory interpretation • Interpreting legal language • Human Rights and UK law • Brexit and the changing relationship with the European Union ***Learning Outcome: 1, 3***
3.	Types of Law	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• The English Legal System • Common law and civil law • Common law and statute law • Public law and private law • Criminal law • Civil law ***Learning Outcome: 2, 3***
4.	Judges	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• Who are the judiciary? • Law made by Judges • Judges and the courts • Judges and the public • Judicial independence • Judicial impartiality • Removal of judges from office • Magistrates ***Learning Outcome: 1, 2***
5.	Lawyers	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• The legal profession • Lawyers and professional practice • Solicitors • The Chartered Institute of Legal Executives • Barristers • The courtroom • Legal claims against lawyers • The changing regulatory environment ***Learning Outcome: 1***

6.	Cases and the Courts	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• The common law system in England and Wales • The hierarchy of the courts • Human rights and international law • Cases that changed the law ***Learning Outcome: 1, 2, 3***
7.	The Jury	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• What is a jury? • When are juries used? • The law of juries • Majority verdicts • Judicial guidance • The role of juries (supported by example cases) • The verdict ***Learning Outcome: 1***
8.	Case Technique	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• The Law in Practice • Key Legal Language (e.g., Ratio decidendi, Obiter Dictum) • Judicial development of the law • Judicial precedent • Overruling • Distinguishing • Dissenting judgments • Legal reporting • Media reporting ***Learning Outcome: 1, 2, 3***
9.	Language and Law	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• Latin and the law • Legal definitions • Legal language • Punctuation • Profane language • Conciseness • Developing your legal language ***Learning Outcome: 1, 2, 3***
10.	Law and Justice in Popular Culture	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• Legal literary classics • Great lawyers • Trouble in the courtroom • Great legal films • Legal Failures • Remarkable pieces of evidence • Presenting the evidence • Remarkable passages of judicial prose ***Learning Outcome: 1, 2, 3***

11.	Criminal Law	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• The Foundational elements of a crime • Actus Reus and Mens Rea • Judging Mens Rea • Intention • Recklessness • Negligence ***Learning Outcome: 2***
12.	Legal Practice for your Assessment	1/12 Lectures: 3 hrs Tutorials: 1 hrs Private study: 12.67 hrs	• Using the law in your assessment • Presenting your work • Critical thinking in legal assessments ***Learning Outcome: 1, 2, 3***

Assessment Type
Two global assignments (100%): • 500-word case brief (25%). • 1,000-word essay (75%).
See also Section 3 above

6. Introductory Accounting

Title	Introductory Accounting
Unit reference number	T/651/0292
Credits	20
Level	3
Type	Elective

Guided Learning Hours	64 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Understand the purpose of management accounting and its importance to a business for sustainability and decision-making	1.1 Identify the purpose of a business and discuss the ways in which a business may be organised and managed. 1.2 Discuss the issues considered when setting the financial aims and objectives of a business. 1.3 Explain the role of management accounting within a business and describe the key qualities that management accounting information should possess. 1.4 Explain the changes that have occurred over time in both the role of the management accountant and the type of information provided by management accounting systems. 1.5 Define and distinguish between relevant costs, outlay costs and opportunity costs. 1.6 Identify and quantify the costs that are relevant to a particular decision. 1.7 Use relevant costs to make decisions. 1.8 Set out relevant cost analysis in a logical form so that the conclusion may be communicated to managers 1.9 Distinguish between fixed cost and variable cost and use this distinction to explain the relationship between cost, volume, and profit. 1.10 Prepare a break-even chart and deduce the break-even point for some activity. 1.11 Discuss the weaknesses of break-even analysis. 1.12 Demonstrate the way in which marginal analysis can be used when making short-term decisions. 1.13 Deduce the full (absorption) cost of a cost unit in both a single-product and multi-product environments. 1.14 Discuss the problems of deducing full (absorption) cost in practice. 1.15 Discuss the usefulness of full (absorption) cost information to managers.

	1.16 Describe the nature of the modern product costing and pricing environment. 1.17 Discuss the principles and practicalities of activity-based costing. 1.18 Explain how new developments such as total life-cycle costing and target costing can be used to manage product costs. 1.19 Explain the theoretical underpinning of pricing decisions and discuss the issues involved in reaching a pricing decision in real-world situations. 1.20 Define a budget and show how budgets, strategic objectives and strategic plans are related. 1.21 Explain the budgeting process and the interlinking of the various budgets within the business. 1.22 Identify the uses of budgeting and construct various budgets, including the cash budget, from relevant data. 1.23 Discuss the criticisms that are made of budgeting. 1.24 Discuss the role and limitations of budgets for performance evaluation and control. 1.25 Undertake variance analysis and discuss possible reasons for the variances calculated. 1.26 Discuss the issues that should be taken into account when designing an effective system of budgetary control. 1.27 Explain the nature, role and limitations of standard costing 1.28 Explain the nature and importance of investment decision making. 1.29 Identify the four main investment appraisal methods found in practice. 1.30 Discuss the strengths and weaknesses of various techniques for dealing with risk in investment appraisal. 1.31 Explain the methods used to monitor and control investment projects 1.32 Discuss the nature and role of strategic management accounting. 1.33 Explain how management accounting information can help a business gain a better understanding of its competitors and customers. 1.34 Describe the techniques available for gaining competitive advantage through cost leadership. 1.35 Explain how the balanced scorecard can help monitor and measure progress towards the achievement of strategic objectives. 1.36 Discuss the role of shareholder value analysis and economic value added in strategic decision making. 1.37 Discuss the potential advantages and disadvantages for a business of adopting a divisional structure.

	1.38 Identify the major methods of measuring the performance of operating divisions and divisional managers, and assess their usefulness. 1.39 Describe the problems of determining transfer prices between divisions, and outline the methods used in practice. 1.40 Explain the increasing importance of non-financial measures in managing a business and how they may be used for decision-making purposes. 1.41 Identify the main elements of working capital. 1.42 Discuss the purpose of working capital and the nature of the working capital cycle. 1.43 Explain the importance of establishing policies for the control of working capital. 1.44 Explain the factors that have to be taken into account when managing each element of working capital.
2. Analyse the financial health and performance of a business using information from financial statements and data	2.1 Define and explain financial accounting. 2.2 Explain what is meant by a conceptual framework. 2.3 Explain the distinguishing features of a sole trader, a partnership and a limited company. 2.4 List the main users of financial information and their particular needs and discuss the usefulness of financial statements to the main users. 2.5 Define and explain the accounting equation. 2.6 Define assets, apply the definition to examples of assets and explain and apply the rules for recognition of assets. 2.7 Define liabilities, apply the definition to examples of liabilities and explain and apply the rules for recognition of liabilities. 2.8 Define ownership interest and explain how the recognition of ownership interest depends on the recognition of assets and liabilities. 2.9 Use the accounting equation to show the effect of changes in the ownership interest. 2.10 Explain how users of financial statements can gain assurance about assets and liabilities 2.11 Explain the benefits and problems of producing annual financial statements. 2.12 Explain the purpose and structure of the statement of financial position (balance sheet). 2.13 Explain the purpose and structure of the income statement (profit and loss account). 2.14 Explain the purpose and structure of the statement of cash flows. 2.15 Comment on the usefulness to users of the financial statements prepared. 2.16 List and explain the qualitative characteristics desirable in financial statements.

	2.17 Explain the approach to measurement used in financial statements. 2.18 Explain why there is more than one view on the role of prudence in accounting. 2.19 Recognise and explain how and why financial reporting is regulated or influenced by external authorities. 2.20 Be aware of the process by which financial statements are reviewed by an investor. 2.21 Explain how the accounting equation is applied to transactions of a service and a trading business. 2.22 Analyse the transactions of a service, trading and manufacturing businesses during a specific period of time, using the accounting equation. 2.23 Prepare a spreadsheet analysing the transactions and show that the results of the spreadsheet are consistent with the financial statements provided by the organisation. 2.24 Explain the main aspects of the statement of cash flows, income statement (profit and loss account) and statement of financial position (balance sheet) of a service, trading and manufacturing business. 2.25 Explain the key international influences that affect accounting practice in the UK. 2.26 Explain the structure of company reporting as set out in the Framework and in UK guidance. 2.27 Explain the main contents of (a) the balance sheet, (b) the income statement (profit and loss account) and (c) the cash flow statement as presented by larger companies. 2.28 Define 'parent company' and 'subsidiary company' and explain how a group is structured. 2.29 Explain the main features of group financial statements. 2.30 Explain the nature of, and reason for, other forms of communication beyond the annual report.
3. Recognise, describe, and analyse the financial concepts in relation to non-current (fixed) assets, current assets, current liabilities and non-current (long-term) liabilities	3.1 Define a non-current (fixed) asset and apply the definition. 3.2 Explain the recognition conditions that are applied to tangible non-current (fixed) assets, intangible non-current (fixed) assets and non-current (fixed) asset investments. 3.3 Explain users' needs for information about non-current (fixed) assets. 3.4 Describe and explain the non-current (fixed) asset information provided in annual reports of companies. 3.5 Evaluate the usefulness of published information about non-current (fixed) assets.

	3.6 Explain the nature of depreciation, and calculate depreciation, record the effect on the accounting equation and report the result in financial statements. 3.7 Define a current asset and apply the definition. 3.8 Explain the operation of the working capital cycle. 3.9 Explain the factors affecting recognition of inventories (stocks), receivables (debtors) and investments. 3.10 Explain how the information presented in a company's statement of financial position (balance sheet) and notes, in relation to current assets, meets the needs of users. 3.11 Explain the different approaches to measurement of inventories (stocks) and cost of goods sold. 3.12 Analyse provisions for doubtful debts using a spreadsheet. 3.13 Analyse prepayments using a spreadsheet. 3.14 Explain the term 'revenue' and the application of principles of revenue recognition 3.15 Define a liability and explain the distinguishing feature of current liabilities. 3.16 Explain the conditions for recognition of liabilities. 3.17 Explain how the information presented in a company's statement of financial position (balance sheet) and notes, in relation to liabilities, meets the needs of users. 3.18 Explain the features of current liabilities and the approach to measurement and recording. 3.19 Explain the terms 'accruals' and 'matching concept' and show how they are applied to expenses of the period. 3.20 Explain how liabilities for taxation arise in companies. 3.21 Define a non-current (long-term) liability. 3.22 Explain the needs of users for information about non-current (long-term) liabilities. 3.23 Explain the different types of non-current (long-term) loan finance which may be found in the statements of financial position (balance sheets) of major companies. 3.24 Understand the purpose of provisions and explain how provisions are reported in financial statements. 3.25 Understand the nature of deferred income and explain how it is reported in financial statements. 3.26 Recognise the main types of loan finance and capital instruments used by companies and understand the principles of reporting information in the financial statements
4. Recognise and discuss the accounting principles related to ownership interest, and recall, define, interpret, and	4.1 Define ownership interest and explain and demonstrate how the ownership interest is presented in company accounts. 4.2 Understand the nature and purpose of the statement of changes in equity in the IASB system and also the UK ASB equivalents.

perform ratio analysis calculations	4.3 Explain the needs of users for information about the ownership interest in a company. 4.4 Read and interpret the information reported by companies in their annual reports, in respect of the ownership interest. 4.5 Explain the accounting treatment of dividends. 4.6 Understand the methods by which a company's shares may be issued when the company has a Stock Exchange listing. 4.7 Show that you understand the impact of transactions and events on ownership interest in company accounts 4.8 Define, calculate, and interpret ratios that help analyse and understand (a) performance for investors, (b) management performance, (c) liquidity and working capital and (d) gearing. 4.9 Explain investors' views of the balance of risk and return and the risks of investing in a geared company when profits are fluctuating. 4.10 Explain how the pyramid of ratios helps integrate interpretation. 4.11 Describe the uses and limitations of ratio analysis. 4.12 Carry out a practical exercise of calculating and interpreting ratios.
5. Recognise and discuss the principles of and issues around reporting corporate performance and reporting cash flows	5.1 Explain the importance of the operating and financial review as a component of the annual report of a company. 5.2 Describe and explain other useful information in the annual report that is relevant to analysis of corporate performance. 5.3 Relate the interpretation of ratios to the information in a statement of cash flows. 5.4 Explain how segmental information is useful to the analysis of corporate performance 5.5 Explain why statements of cash flows are regarded as providing useful information. 5.6 Explain the meaning of cash and cash equivalents. 5.7 Explain the direct and the indirect forms of presentation of a statement of cash flows. 5.8 Prepare a statement of cash flows using the direct and the indirect method

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
Part A: Management Accounting			
1.	Introduction to management accounting and the relevant costs for decision making	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• What is the purpose of a business? • How are businesses organised? • How are businesses managed? • The changing business landscape • Setting financial aims and objectives • What is management accounting? • How useful is management accounting Information? • Weighing up the costs and benefits

			• Management accounting as an information system • What information do managers need? • Reporting non-financial information • Influencing managers' behaviour • Reaping the benefits of IT • Reasons to be ethical • Management accounting and financial accounting • Not-for-profit organisations • What is meant by cost? • Relevant costs: opportunity and outlay costs • Sunk costs and committed costs • Qualitative factors of decisions ***Learning Outcome: 1***
2.	Cost-volume-profit analysis, Full costing and costing and pricing in a competitive environment	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Cost behaviour • Fixed cost • Variable cost • Semi-fixed (semi-variable) cost • Finding the break-even point • Achieving a target profit • Contribution and contribution margin ratio • Margin of safety • Operating gearing • Profit-volume charts • The economist's view of the break-even chart • Failing to break even • Weaknesses of break-even analysis • Using contribution to make decisions - marginal analysis • Why do managers want to know the full cost? • What is full costing? • Single- and Multi-product businesses • Direct and indirect costs • Job costing • Full (absorption) costing and the behaviour of cost • The problem of indirect cost • Overheads as service renderers • Job costing: a worked example • Selecting a basis for charging overheads • Segmenting the overheads • Dealing with overheads on a cost centre basis • Batch costing

			• Full (absorption) cost as the break-even price • The forward-looking nature of full (absorption) costing • Cost determination in the changed business environment • Costing and pricing products in the traditional way • Costing and pricing products in the new environment • Cost management systems • Activity-based costing (ABC) • An alternative approach to full costing • What drives the costs? • Attributing overheads benefits of ABC • ABC versus the traditional approach • ABC and service industries criticisms of ABC • Other approaches to cost management in the modern environment (total (or whole) life-cycle costing, target costing, costing quality control, Kaizen costing, benchmarking) • Pricing (economic theory, some practical considerations, full cost (cost-plus) pricing, pricing on the basis of relevant/marginal cost, target pricing, pricing strategies) ***Learning Outcome: 1***
3.	Budgeting and Accounting for control	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• What is a budget? What is budgeting? • How budgets link with strategic plans and objectives • Time horizon of plans and budgets • Limiting factors • Budgets and forecasts • Periodic and continual budgets • How budgets link to one another • How budgets help managers • The budget setting process • Using budgets in practice • Incremental and zero-base budgeting • Preparing the cash budget • Preparing other budgets • Activity-based budgeting • Non-financial measures in budgeting • Budgets and management behaviour • Who needs budgets? • Beyond conventional budgeting • Budgeting for control

			• Types of control • Variances from budget (flexing the budget, sales volume variance, sales price variance, materials variances, labour variances, fixed overhead variance) • Reasons for adverse variances • Variance analysis in service industries • Non-operating profit variance • Investigating variances • Compensating variances • Making budgetary control effective • Behavioural issues (the impact of management style, failing to meet the budget) • Standard quantities and costs • Setting standards (who sets the standards? how is information gathered? what kinds of standards should be used?) ***Learning Outcome: 1***
4.	Making capital investment decisions and Strategic management accounting	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• The nature of investment decisions • Investment appraisal methods • Accounting rate of return (ARR) (ARR and ROCE, problems with ARR) • Payback period (PP) and its problems • Net present value (NPV) (interest lost, risk, inflation, what will a logical investor do? using discount tables, the discount rate and the cost of capital, why NPV is better) • Internal rate of return (IRR) and its problems • Investment appraisal in practice • Investment appraisal and strategic planning • Dealing with risk (assessing and reacting to the level of risk) • The process of managing investment projects • What is strategic management accounting? • Facing outwards (competitor analysis, customer profitability analysis) • Competitive advantage through cost leadership (total life cycle costing, target costing, Kaizen costing, value chain analysis) • Translating strategy into action - the balanced scorecard • Measuring shareholder value (the quest for shareholder value, how can

			shareholder value be created? the need for new measures, net present value (NPV) analysis, shareholder value analysis (SVA), measuring free cash flows, business value and shareholder value) ***Learning Outcome: 1***
5.	Measuring performance and managing working capital	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Divisionalisation (why do businesses divisionalise? types of divisions, divisional structures, is divisionalisation a good idea?) • Measuring divisional profit (contribution, controllable profit, divisional profit before common expenses, divisional profit for the period) • Divisional performance measures (return on investment (ROI), residual income (RI), looking to the longer term, comparing performance) • Transfer pricing (the objectives of transfer pricing, transfer pricing and tax mitigation, transfer pricing policies, market prices, variable cost, full cost, negotiated prices, divisions with mixed sales, differential transfer prices, transfer pricing and service industries) • Non-financial measures of performance (what is measured? choosing non-financial measures, who should report?) • What is working capital? • Managing working capital • The scale of working capital • Managing inventories (budgeting future demand, financial ratios, recording and reordering system, levels of control) • Inventories' management models (economic order quantity (EOQ), materials requirement planning systems, just-in-time inventories management) • Managing receivables (which customers should receive credit and how much credit should they be offered? length of credit period, cash discounts) • Debt factoring and invoice discounting • Collection policies and reducing the risk of non-payment • Managing cash (why hold cash? how much cash should be held? controlling the cash balance, cash budgets and managing cash, the operating cash cycle, cash transmission, bank overdrafts)

			• Managing trade payables (taking advantage of cash discounts, controlling trade payables) ***Learning Outcome: 1***
Part B: Financial Accounting and Reporting			
6.	Who needs financial accounting?	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Introduction • The development of a conceptual framework • Framework for the preparation and presentation of financial statements • Types of business entity • Users and their information needs • General purpose or specific purpose financial statements? • Stewards and agents • Who needs financial statements? ***Learning Outcome: 2***
7.	A systematic approach to financial reporting: the accounting equation, and the financial statements from the accounting equation	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Introduction • The accounting equation • Defining assets • Examples of assets • Recognition of assets • Defining liabilities • Examples of liabilities • Recognition of liabilities • Defining the ownership interest • Recognition • Changes in the ownership interest • Assurance for users of financial statements • Introduction • Who is in charge of the accounting system? • The accounting period • The statement of financial position (balance sheet) • The income statement (profit and loss account) • The statement of cash flows • Usefulness of financial statements ***Learning Outcome: 2***
8.	Published financial statements and ensuring the quality of financial statements	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Introduction • Qualitative characteristics of financial statements • Measurement in financial statements • Views on prudence • Regulation of financial reporting

			• Reviewing published financial statements • International influences • Accounting framework • Statement of financial position (balance sheet) • Income statement (profit and loss account) • Statement of cash flows • Group structure of companies • Group financial statements • Small and medium-sized entities (SMEs) • Beyond the annual report ***Learning Outcome: 2***
9.	Accounting information for service, trading, and manufacturing businesses	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Introduction • Analysing transactions using the accounting equation • Illustration of accounting for a service business • A process for summarising the transactions: a spreadsheet • Financial statements as a means of communication • Introduction • Goods purchased for resale • Manufacturing goods for resale • Illustration of accounting for a trading business • A process for summarising the transactions: a spreadsheet • Example of financial statements of a wholesaler ***Learning Outcome: 2***
10.	Non-current (fixed) assets, Current assets, Current liabilities and Provisions and non-current (long-term) liabilities	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Introduction • Definitions • Recognition • Users' needs for information • Information provided in the financial statements • Usefulness of published information • Depreciation: an explanation of its nature • Reporting non-current (fixed) assets and depreciation in financial statements • The working capital cycle • Recognition • Users' needs for information • Information provided in the financial statements • Measurement and recording

			• Inventories (stocks) of raw materials and finished goods • Receivables (debtors) • Prepayments • Revenue recognition • Users' needs for information • Information provided in the financial statements • Measurement and recording • Accruals and the matching concept • Liabilities for taxation • Information provided in the financial statements • Provisions • Deferred income • Non-current (long-term) liabilities ***Learning Outcome: 3***
11.	Ownership interest and Ratio analysis	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Introduction • Definition and recognition • Presentation of ownership interest • Statement of changes in equity • Users' needs for information • Information provided in the financial statements • Dividends • Issue of further shares on the Stock Exchange • A note on terminology • Systematic approach to ration analysis • Investors' views on risk and return • Pyramid of ratios • Use and limitations of ratio analysis • Worked example of ratio analysis • Linking ratios to the statement of cash flows ***Learning Outcome: 4***
12.	Reporting cash flows and corporate performance	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Introduction • Cash and cash equivalents • The direct method and the indirect method • Preparing a statement of cash flows: the indirect method • Preparing a statement of cash flows: the direct method • Interpretation of cash flow information • Illustration • Operating and financial review (OFR) and business review • Other guidance in analysis

			• Segmental information • Off-balance-sheet finance • Corporate social responsibility • Corporate governance • Developing issues: 'present fairly' and 'true and fair view' • Measurement of value • Developing issues: how valid is the stakeholder model? ***Learning Outcome: 5***

Assessment Type
Two 2-hour closed-book, supervised, paper-based global exams (100%): • Exam 1; covers Topics 1-6 (40%) • Exam 2; covers Topics 7-12 (60%)
See also Section 3 above

7. Introductory Economics

Title	Introductory Economics
Unit reference number	Y/651/0293
Credits	20
Level	3
Type	Elective

Guided Learning Hours	96 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Acquire a firm grounding in introductory Microeconomic Theory and supply and demand, and recognise the key theoretical explanations of individual, firm, and industry behaviour.	1.1 Define the key terms in economics. 1.2 Explain and illustrate the basic economic problems. 1.3 Explain and illustrate how resource allocation is made in an economic by using the Production Possibility Frontier. 1.4 Understand how the allocation of scarce resources is made in different economic systems. 1.5 Explain and illustrate how consumers and firms maximise their objectives. 1.6 Recognise that microeconomics is the study of the allocation of scare sources. 1.7 Assess the different economic systems that are used to allocate scarce resources, considering the strengths and weaknesses of these systems. 1.8 Discuss the three key trade-offs the society faces: which goods and services to produce, how to produce them and who gets them. 1.9 Appreciate that economists use models to make testable predictions. 1.10 Recognise that individuals, governments and firms use microeconomic models and predictions in decision making. 1.11 Define, analyse and discuss demand, supply, market equilibrium and elasticities. 1.12 Explain what is meant by shocking the equilibrium. 1.13 Discuss the effects of sales taxes. 1.14 Identify and explain when the quantity supplied may not need to equal the quantity demanded. 1.15 Recognise when to use the Supply-and-Demand model. 1.16 Use the consumer theory to derive demand curves. 1.17 Describe and analyse the effects of an increase in income and price. 1.18 Describe how the substitution and income effect impacts on consumer preferences to maximise utility.

	1.19 Recognise how changes in price levels lead to inflation. 1.20 Recognise the indices used in the UK to measure inflation. 1.21 Recognise how consumer revealed preferences lead to strong and weak axiom. 1.22 Analyse the importance of elasticity within the market drawing on the concept of time. 1.23 Use the demand and supply model to analyse markets for a range of commodities such as primary products, foodstuffs, transport and foreign currency. 1.24 Examine the factors of production, their rewards and the advantages and disadvantages of specialisation in the use of resources.
2. Evaluate and critically analyse microeconomic arguments, theories, and policies regarding the price system	2.1 Examine the motivation and behaviour of individual consumers and firms in markets. 2.2 Recognise how the properties of consumer preferences influence the utility. 2.3 Recognise how the indifference curve helps to identify the substitution between goods. 2.4 Recognise the budget constraints and how consumers have constrained choices. 2.5 Recognise how behavioural economics test transitivity, the endowment effect and salience. 2.6 Explain how ownership and management differ within private, public and not –for profit organisations. 2.7 Explain how economists measure firm's cost of production. 2.8 Explain the relationship between a firm's labour and output in the short run. 2.9 Explain the relationship between a firm's labour and output in the long run. 2.10 Explain how the long run average cost curve is derived. 2.11 Analyse how firms use ISO cost and isoquant curves to minimise costs. 2.12 Explain how specialisation and minimising production costs lead to learning by doing. 2.13 Explain what a perfect competition market is and what its characteristics are. 2.14 Explain the process of deriving the demand curve. 2.15 Explain the ways in which firms can increase their profits. 2.16 Explain how firms encounter competition in the short run. 2.17 Explain what a residual supply curve is. 2.18 Explain how firms operate and face competition in the long run. 2.19 Explain how firms reach long run equilibrium. 2.20 Analyse and appraise perfectly competitive and imperfect market structures. 2.21 Examine how markets and the price mechanism determine the allocation of resources, with particular emphasis on scarcity, choice, equilibrium and disequilibrium. 2.22 Explain how competitive firms reach market equilibrium

	with zero profits in the long run. 2.23 Recognise how producers can either benefit or suffer from a shift in the equilibrium. 2.24 Recognise how competition plays a crucial role in maximising the welfare of a society by increasing both consumer and producer surplus. 2.25 Recognise how government policies can shift supply and demand curves in a perfect competition, leading to harm for consumers and welfare. 2.26 Recognise how the different government policies such as taxes, price floors, and tariffs create a wedge between the demand and supply curve reducing the equilibrium quantity while increasing the equilibrium price. 2.27 Explain how trade policies lead to different welfare effects. 2.28 Explain how a shift in the government policy or a shock affects the general equilibrium. 2.29 Explain when two parties are unable to produce certain goods or services, they can benefit from mutually agreeable trades. 2.30 Define what Pareto-efficient allocation is. 2.31 Explain how competition can lead to a Pareto-Efficient allocation with appropriate income distribution. 2.32 State the benefits of trade and why it is important to consider how production is affected. 2.33 Explain how society should allocate resources among individuals while maintaining equity if Pareto efficient allocation is possible. 2.34 Detail market forces and the price mechanism. 2.35 Consider the efficiency of markets and their participants, and the market failures that can arise from their activities. 2.36 Recognise the significance of consumer surplus and producer surplus, drawing on the concepts of the concepts of efficiency and inefficiency. 2.37 Describe the characteristics of a monopoly and market power. 2.38 Describe the ways in which firms maximise market power using barriers to entry. 2.39 Use monopoly market analysis to determine the equilibrium level of output and price for a monopoly. 2.40 Describe the different forms of price discrimination. 2.41 Describe the different approaches to regulating a natural monopoly. 2.42 Describe the characteristics of a monopsony and market power. 2.43 Give examples of benefits and costs of monopsonies to firms. 2.44 Define and identify oligopoly. 2.45 Use game theory to analyse oligopolies. 2.46 Define and identify monopolistic competition. 2.47 Explain how a firm in monopolistic competition determines its price and output in the short run and the long run.

3. Develop a solid grasp of macroeconomic theory and analyse and use analytical models for applications.	3.1 Recognise the importance of key measurements of economic performance and understand the main instruments of economic policy in both global and UK context. 3.2 Be familiar with the current economic events and policies. 3.3 Understand macroeconomic government intervention, measurement of employment and inflation causes and consequences. 3.4 Understand the business cycle and identify its four phases. 3.5 Identify and discuss the different types of workers in the labour force. 3.6 Define unemployment and understand its calculation. 3.7 Define Inflation and understand its calculation. 3.8 Use the Consumer Price Index to compare nominal values over time. 3.9 Define Gross Domestic Product (GDP). 3.10 Explain how GDP is related to a nation's total income and spending. 3.11 Assess the components of GDP. 3.12 Evaluate how GDP is corrected for inflation 3.13 Relate GDP as a measure for society's well-being 3.14 Explain what economic growth is and its importance for nations. 3.15 Analyse growth rates.

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Introduction to economics and the basic tools of economic analysis	1/12 Lectures: 4 hrs Seminars: 1 hr Tutorials: 1 hr Private study: 8.67 hrs	• Nature of Economics as a subject • Micro and Macroeconomics Explained • Positive and Normative Economics Statements • The Economic Problems: Scarcity, Choice, and Opportunity Cost • Factors of Production • Production Possibility Frontier • Resource allocation in different Economic Systems • Rational decision making: • Consumers aim to maximise utility • Firms aim to maximise profits ***Learning Outcome: 1***
2.	Demand and supply	1/12 Lectures: 8 hrs Seminars: 1 hr Tutorials: 1 hr Private study: 8.67 hrs	• Demand • Supply • Market Equilibrium • Shocking the Equilibrium: Comparative Static • Elasticities • Effects of Sales Tax

			• Quantity Supplied Need Not Equal Quantity Demanded • When to Use the Supply-and-Demand Model ***Learning Outcome: 1***
3.	Consumer's constrained choice	1/12 Lectures: 4 hrs Seminars: 1 hr Tutorials: 1 hr Private study: 8.67 hrs	• Preferences • Utility • Budget constraint • Constrained Consumer Choice • Behavioural Economics ***Learning Outcome: 2***
4.	Demand	1/12 Lectures: 4 hrs Seminars: 1 hr Tutorials: 1 hr Private study: 8.67 hrs	• Deriving Demand Curves • Effects of an Increase in Income • Effects of a price increase • Cost of Living adjustment • Revealed Preference ***Learning Outcome: 1***
5.	Firms, production, and costs	1/12 Lectures: 4 hrs Seminars: 1 hr Tutorials: 1 hr Private study: 8.67 hrs	• The Ownership and Management of Firms • Production • Short-Run Production: One Variable and One Fixed Input • Long-Run Production: Two Variable Inputs • Returns to Scale • Productivity and Technical Change • Measuring Costs • Short-Run Costs • Long-Run Costs • Lower Costs in the Long Run • Cost of Producing Multiple Goods ***Learning Outcome: 2***
6.	Competitive firms and markets	1/12 Lectures: 4 hrs Seminars: 1 hr Tutorials: 1 hr Private study: 8.67 hrs	• Perfect Competition • Profit Maximisation • Competition in the Short Run • Competition in the Long Run ***Learning Outcome: 2***
7.	Properties and applications of the competitive model	1/12 Lectures: 4 hrs Seminars: 1 hr Tutorials: 1 hr Private study: 8.67 hrs	• Zero Profit for Competitive Firms in the Long Run • Producer Surplus • Competition Maximises Welfare • Policies That Shift Supply Curves • Policies That Create a Wedge Between Supply and Demand Curves • Comparing Both Types of Policies: Trade ***Learning Outcome: 2***

8.	General equilibrium and welfare	1/12 Lectures: 4 hrs Seminars: 1 hr Tutorials: 1 hr Private study: 8.67 hrs	• General Equilibrium • Trading Between Two People • Competitive Exchange • Production and Trading • Efficiency and Equity ***Learning Outcome: 2***
9.	Monopoly and monopsony	1/12 Lectures: 6 hrs Seminars: 2 hrs Tutorials: 2 hrs Private study: 8.67 hrs	• Market power • Monopoly Market Characteristics • Profit Maximisation Under Monopoly • Discriminating Monopoly • Monopoly Regulation • Antitrust Policy • Governmental Strategy in Monopoly Markets • Monopsonies ***Learning Outcome: 2***
10.	Business cycles, inflation and unemployment	1/12 Lectures: 6 hrs Seminars: 2 hrs Tutorials: 2 hrs Private study: 8.67 hrs	• Macroeconomic objectives • Business cycle • Labour force • Unemployment • Inflation • Consumer Price Index (CPI) • Nominal and Real Income ***Learning Outcome: 3***
11.	Oligopoly and Monopolistic Competition	1/12 Lectures: 6 hrs Seminars: 2 hrs Tutorials: 2 hrs Private study: 8.67 hrs	• Market spectrum • Imperfect competitive markets • Oligopoly • Game theory • Collusions • Monopolistic Competition • Prices in short and long run ***Learning Outcome: 2***
12.	Gross Domestic Product (GDP) and Economic Growth	1/12 Lectures: 6 hrs Seminars: 2 hrs Tutorials: 2 hrs Private study: 8.67 hrs	• Income and Expenditure • Circular flow diagram • Measuring nations' Production - GDP • GDP vs. nations' total income and spending • The components of GDP • GDP vs. Inflation [Real vs. Nominal prices] • GDP as a measure for society's well-being • Economic growth • Growth rates ***Learning Outcome: 3***

Assessment Type
Two 2-hour closed-book, supervised, paper-based global exams (100%): • Exam 1; covers Topics 1-6 (50%) • Exam 2; covers Topics 7-12 (50%)
See also Section 3 above

8. Introduction to Programming with Python

Title	Introduction to Programming with Python
Unit reference number	A/651/0294
Credits	20
Level	3
Type	Elective

Guided Learning Hours	60 hours	**Total Qualification Time**	200 hours

Learning Outcomes; The Learner will:	**Assessment Criteria;** The Learner can:
1. Describe and apply a systematic approach to the design of programs.	1.1 Describe the Software Development Life Cycle 1.2 Describe and apply techniques for creating high quality software. 1.3 Write pseudocode to solve a well-defined problem. 1.4 Describe and create a test plan for a program.
2. Write small procedural programs to perform well-defined tasks, following well-defined requirements	2.1 Use an appropriate software development environment 2.2 Implement a simple algorithm written in pseudocode. 2.3 Describe and apply the fundamental concepts of procedural programming including sequence, selection, and iteration. 2.4 Write code which uses input and output, including simple files. 2.5 Store data in memory in standard built-in types.
3. Test and document program code following the principles of software engineering	3.1 Develop programs incrementally, using simple tests to check each increment 3.2 Write documentation to explain the design and implementation of their own code, or example code which is supplied to them. 3.3 Describe and apply different testing techniques. 3.4 Identify and correct bugs which prevent the program from functioning as intended.
4. Describe and apply the benefits of modular software design.	4.1 Describe and use functions. 4.2 Describe and use libraries and python modules. 4.3 Describe the basic concepts of Object-Oriented programming

	4.4 Write a simple Object-Oriented program using a class and objects.

Syllabus Content			
Topic No	**Topic Title**	**Proportion**	**Course Coverage**
1.	Introduction	1/12 2 hours of lectures 2 hours of tutorials	• Digital Computers: giving instructions • Computer Languages: Low level, High level; types of languages; why Python? • Software Development Lifecycle • Developing quality software: Software Engineering Principles • Designing programs: Algorithms, Pseudocode, sequence, selection, iteration. • Test Plans ***Learning Outcome: 1***
2.	Getting started with Python	1/12 2 hours of lectures 2 hours of tutorials	• Installing and using the IDE • Installing Python • Interacting with Python • Command line • GUI • Help ***Learning Outcome: 2***
3.	Introduction to data types and sequential programming	1/12 2 hours of lectures 2 hours of tutorials	• Introduction to variables • Assignment statements • Introduction to data types • Arithmetic operations • Dates and Times • Comments • Writing a program using sequential statements. ***Learning Outcome: 2***
4.	Making decisions: selection statements	1/12 2 hours of lectures 2 hours of tutorials	• Pseudocode • Making decisions with the if statement • Comparison operators • If-else • Nested decisions • Multiple decisions • Writing a program using selection. ***Learning Outcome: 2***

5.	Performing repetitive tasks: Loops	1/12 2 hours of lectures 2 hours of tutorials	• Pseudocode • Bounded and unbounded loops • For loop • While loop • Controlling execution with break, continue, pass, else. • Writing a program using repetition. ***Learning Outcome:2***
6.	Dealing with Errors	1/12 2 hours of lectures 2 hours of tutorials	• Sources of errors • Testing • Debugging • Error types. • Input validation • Catching exceptions • Raising exceptions • Writing a program using exception processing ***Learning Outcome: 3***
7.	Programming with Strings	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Characters and Strings • String processing • String concatenation • Selecting individual Characters • Formatting strings. • Escape characters • Writing a program with strings ***Learning Outcome: 2***
8.	Lists	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Defining Lists • Creating Lists • Accessing and modifying lists • Looping through lists • Searching and sorting • The counter object • Writing a program with lists ***Learning Outcome: 2***
9.	Modularity	1/12 2 hours of lectures 2 hours of tutorials	• Software engineering principles in practice: planning, design, modularity, reuse, cohesion, coupling, defensive programming, testing. • Functions: Arguments, returning values, defaults, local variables • Python modules: import and use ***Learning Outcome: 4***

10.	Object Oriented Programming	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Object oriented concepts: introduction to encapsulation, abstraction, inheritance, (and polymorphism.) • Classes, objects, methods, attributes • Writing and using a simple class ***Learning Outcome: 4***
11.	Storing Data in files	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Permanent storage • Creating a file • Reading a file • Updating a file • Deleting a file ***Learning Outcome: 2***
12.	Summary and Assignment Preparation	1/12 2 hours of lectures 2 hours of tutorials	• Summary of key points • Assignment guidance and preparation

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:**

Assessments
• 70% Global Assignment • 30% Local Exam (MCQ)

9. International Business

Title	International Business
Unit reference number	D/651/0295
Credits	20
Level	3
Type	Elective

Guided Learning Hours	62 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Recognise and appreciate the nature and scope of international business, the role of business in society, internationally and within each candidate's own country as well as the importance of enterprise, business's objectives, structure, size, and stakeholders, including all types of businesses especially multinationals.	1.1 Discuss and explain the nature of business activity, the role of the entrepreneur and social enterprise. 1.2 Discuss business structure – economic sectors and legal structures: 1.3 Recognise and discuss the measurements of business size, the significance of small businesses and internal growth: 1.4 Discuss business objectives and decisions in the private sector: 1.5 Discuss business stakeholders and the importance and influence of stakeholders on business activities (including internal, connected, and external stakeholders) 1.6 Discuss Local, national, and multinational businesses: 1.7 Discuss privatisation and external growth: 1.8 External influences on business activity – political, legal, economic constraints and enablers, social, technological (including the internet), other businesses, demographic and environmental/sustainability 1.9 Discuss the basics of international competition, trends impacting international management and developments in regions internationally.
2. Develop critical and contemporary understanding and application of the concepts of people and culture in international organisations, with analysis and evaluation of the related present-	2.1 Discuss the growing importance of remote and hybrid working and their impact on how organisations are structured, and individual employees are managed. 2.2 Discuss management, managers, leadership, and the choice of leadership style: 2.3 Discuss emotional intelligence/ emotional quotient (EQ) and Motivation as a tool of management and leadership: 2.4 Discuss Human needs, Motivation theories and Motivation methods in practice – financial motivators, non-financial

day problems as well as the various management, leadership, and motivation theories.	motivators: 2.5 Discuss Purpose and roles of HRM, Recruitment and selection, Job descriptions, person specifications, job Advertisements, Employment contracts, Redundancy, and dismissal: 2.6 Discuss Staff morale, welfare and training: 2.7 Discuss Approaches to HRM: 2.8 Discuss labour legislation and the cooperation between management and workforce: 2.9 Discuss Workforce planning and reasons for and role of a workforce plan 2.10 Discuss Role of trade unions in HRM and the benefits to employers and employees of trade union involvement in the workplace including their role in collective bargaining 2.11 Discuss the relationship between business objectives, people, and organisational structure as well as the various Types of structure – functional, hierarchical (flat and narrow), matrix: 2.12 Discuss Formal and informal organisations and features of a formal structure: levels of hierarchy, chain of command, span of control, responsibility, authority, delegation/accountability, centralised/decentralised 2.13 Discuss delegation, accountability, control, authority, trust, centralisation, line, and staff: 2.14 Recognise and analyse the impact of culture on international management and explain the basic cultural dimensions and their implications for managing people globally. 2.15 Examine how culture can affect employees' perceptions of their work environment, their jobs and the people around them, how cultural differences can impede communication and the ways to circumvent that in terms of verbal, nonverbal and written communication. 2.16 Discuss the purposes of, methods of, channels of and barriers to communications across cultures: 2.17 Discuss the role of management in facilitating communication: 2.18 Appreciate and explain the role of senior management and line managers in showing visible commitment towards cultural diversity
3. Develop knowledge and apply it to business situations with analysis and evaluation of (international) marketing problems, including emphasis on the process of finding and satisfying customers and how marketing objectives can be met by understanding, applying, and adapting the	3.1 Recognise and discuss Role of (international) marketing and its relationship with other business activities: 3.2 Discuss Supply and demand: 3.3 Discuss the Features of markets: location, size, share, competitors, growth, and stage of market evolution: 3.4 Discuss Industrial and consumer markets: 3.5 Recognise and discuss niche versus mass marketing and Market segmentation: 3.6 Discuss Primary and secondary research, Methods of information gathering and sampling methods: 3.7 Discuss Market research results and its cost effectiveness: 3.8 Discuss The elements of the marketing mix (the 4Ps) and

marketing mix.	the role of the customer (the 4Cs): 3.9 Discuss Product and Product Life Cycle: 3.10 Discuss the types of pricing strategies and Price elasticity of demand: 3.11 Discuss Promotion methods: 3.12 Discuss Channels of distribution and Using the Internet for the 4Ps/4Cs: 3.13 Discuss Consistency in the marketing mix, market planning, elasticity, and product development: 3.14 Discuss Forecasting and Coordinated marketing mix: 3.15 Discuss Globalisation and the Strategies for international marketing: 3.16 Recognise, analyse, and discuss the increased role of business (or data) analytics and big data as well as the dominance of online and social media-based marketing.
4. Recognise, discuss, and apply the concepts of international operations management, with analysis and evaluation of related problems, including the emphasis on the way international organisations use inputs and manage business processes efficiently.	4.1 Discuss Inputs, outputs and the transformation process (including the ITO – Input Output Transformational model) and discuss the 3Es model of Effectiveness, Efficiency, Economy and productivity and Value addition: 4.2 Discuss Capital versus labour intensity and the benefits and limitations of capital and labour intensive processes 4.3 Discuss Operations and international operations decisions: 4.4 Discuss Flexibility and Innovation: 4.5 Discuss Operations methods: job, batch, flow, mass customisation: 4.6 Discuss Location and Scale of operation: 4.7 Discuss Purpose, costs, and benefits of inventory as well as some of the ways of Managing inventory: 4.8 Discuss Enterprise resource planning (ERP): 4.9 Discuss Measurement and significance of capacity, Increasing capacity utilisation and outsourcing: 4.10 Discuss Lean production, Kaizen and Just in Time (JIT): 4.11 Discuss Quality control and assurance, Total Quality Management (TQM) and benchmarking: 4.12 Appreciate and explain that the competitive advantage of MNCs stems in part from their ability to replicate effective operating routines elsewhere in the corporation, and in part from their ability to access, manage and recombine new knowledge
5. Recognise the concepts of finance, cash flow, the sources of finance and published accounts, and apply these to practical situations, with analysis, evaluation, and development of quantitative, problem-solving, decision-making and communication skills.	5.1 Discuss Start-up capital, capital for expansion and Working capital: 5.2 Discuss the relationship between the legal structure of a business and its sources of finance 5.3 Distinguish between the short- and long-term sources of finance 5.4 Discuss Internal, External, and international sources of finance, the Factors influencing these sources and how to select the source of finance: 5.5 Define what Cost information is and discuss the Uses of cost information: 5.6 Discuss Break-even analysis:

	5.7 Define and discuss Income statement and the Statement of financial position (and previous titles of Profit and Loss Account and Balance Sheet respectively) 5.8 Define, explain, and analyse Liquidity and profitability ratios, and Discuss the Practical uses of ratio analysis: 5.9 Discuss the Main users of accounts: 5.10 Discuss the Limitations of published accounts: 5.11 Discuss the Purposes of cash flow forecasts, how Cash flow forecasts actually are in practice and the Methods of improving cash flow: 5.12 Discuss Approaches to costing: full, contribution as well as the Solutions to costing problems: 5.13 Discuss The purposes of budgets: 5.14 Discuss Variances: adverse, favourable and the meaning, calculation, and interpretation of variances (e.g., price/ volume variances 5.15 Define the concept of investment appraisal, recognise the need for it and appreciate the significance of risk in investment decisions 5.16 Define the meaning and perform the calculation and application of the Basic methods – payback, accounting rate of return (ARR): 5.17 Define the meaning, and perform the calculation and application of the Discounted cash flow methods – discounted payback, net present value (NPV), internal rate of return (IRR) 5.18 Recognise the Qualitative factors in investment appraisal that might influence an investment decision in a given situation, and compare the investment appraisal methods, including their limitations 5.19 Construct simple decision trees from information given, calculate the expected monetary values from decision trees and use the results to assist in selecting the most appropriate strategy 5.20 Describe the usefulness of decision trees including an assessment of the accuracy of the data they contain
6. Identify, analyse, and discuss the international cultural, political, economic, social, technological, legal, environmental, and ethical issues associated with international business activity and how they guide the formulation and application of the international business strategy.	6.1 Undertake and interpret SWOT (strengths, weaknesses, opportunities, threats) analysis in a given situation, and develop the outcome of the analysis into a strategic objective 6.2 Undertake and interpret PESTLE (political, economic, social, technological, legal, environmental) analysis in a given situation 6.3 Evaluate the role of business vision/mission statements and objectives in strategic analysis 6.4 Undertake and interpret the Boston Consultancy Group (BCG) Matrix analysis on the product portfolio of a business 6.5 Use Porter's Five Forces analysis as a framework for business strategy 6.6 Use Prahalad and Hamel's Core Competencies analysis as a framework for business strategy 6.7 Describe the structure of the Ansoff Matrix, how it

	analyses the link between business strategy and risk and use the Ansoff Matrix to analyse and evaluate different business strategies in a given situation 6.8 use simple Force Field Analysis to make strategic choices in a given situation 6.9 Understand cultural differences in how business is conducted globally

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Understanding Business and International Business Activity	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Business activity • Business structure and size • Classification of businesses • Enterprise, business growth • Types of business organisations • Business Objectives, stakeholders in business and stakeholder objectives • External influences on business activity (government economic objectives and policies, environmental and ethical issues, business, and the international economy) • External economic influences on business behaviour • Political, economic, and legal systems • Remote- and hybrid-working and their effect on the business's structure and activity • The essential foundations for successful international management • Case study ***Learning Outcome: 1, 6***
2.	People in International Businesses (or Organisations)	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Motivating workers • Organisation management and leadership • Leadership styles • Emotional intelligence/ emotional quotient (EQ) • Human Resource Management (HRM) and its approaches • Recruitment, selection, and training of workers • Staff morale, welfare • Internal and external business communication • Remote- and hybrid-working and their effect on how employees are managed • Trade unions

			• Delegation, accountability, control, authority, trust, centralisation, line and staff • Purposes, methods, and channels of as well as barriers to communications across cultures • Case study ***Learning Outcome: 2***
3.	Marketing and International Marketing	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• What is marketing and international marketing? • Marketing, competition, and the customer • Supply and demand • Markets – location, size, share, competitors, growth • Market research and its cost effectiveness • The marketing mix: product • The marketing mix: price • The marketing mix: promotion and technology in marketing • The marketing mix: place • The 4Cs: Customer, Cost, Communication and Convenience • Marketing forecasting, planning and strategy • Globalisation and international marketing • The increased role of big data and the dominance of online and social media-based marketing. • Case study ***Learning Outcome: 3***
4.	Operations Management and International Operations Management	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• The nature of operations • Operations planning • Inventory management • Capacity utilisation • Production of goods and services • Costs, scale of production and breakeven analysis • Lean production, Kaizen and JIT • Achieving quality production and quality management • Quality control, assurance, and TQM • Location decisions • Project management • Case study ***Learning Outcome: 4***

5.	Financial Information and Financial Decisions	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Business finance: needs and sources • Accounting fundamentals • Cash flow forecasting and working capital • Income statements • Balance sheets • Contents and analysis of published accounts • Budget • Investment appraisal • The payback and ARR methods • The DCF, NPV and IRR methods • Decision trees • Case study ***Learning Outcome: 5***
6.	Culture and Cultural Diversity in International Business	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Cultures and International business, languages, religion, and ethics • Definition and artefacts of culture • Three ways to understand cultural differences: • Languages: how do language competencies shape intercultural interactions? Definition of corporate language, what is 'Lingua franca'? • Religions: How do religions shape cultures? Definition of 'Holy', 'Taboo' and 'Secular society' • Ethics: Definition and importance of Ethics; definition of Code of conduct; Managing ethics overseas: definition of 'ethical relativism', 'ethical imperialism', 'corruption' • Debates: (a) units of culture: social groups that share culture, (b) cultural convergence versus divergence, (c) in-groups versus out-groups in collectivist societies. Limits of collectivism. • Potential benefits of cultural diversity: widening one's knowledge, transfer of knowledge & expertise, interplay of different perspectives, accessing international markets, globalisation, Corporate Social Responsibility (CSR), compensation for shortage of skilled labour ***Learning Outcome: 2***

7.	Communicating Effectively Across Cultures	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Communication - General guidelines • Cultural differences that might lead to misunderstandings: (1) communication of thoughts and suggestions, (2) discussions, (3) Decision making, (4) completing tasks, (5) teamwork, (6) relationship to colleagues/work-life-balance, (7) leadership/hierarchical structures, (8) criticism, (9) rules and regulations, (10) dealing with problems or conflict, (11) showing emotions, (12) food, (13) taking initiative/acting independently, (14) dressing, (15) space, (16) time, (18) volume of speech, (19) gender equality, and (20) religion. • Training for the existing workforce • Spoken and written communication: languages of the world, language fluency, communicating in foreign language, • Compliments, criticism, embarrassment, • Nonverbal communication: interpersonal space and gestures, emotions and touch, vocal qualities (speed and loudness of speech), context, ***Learning Outcome: 2***
8.	Understanding Globalisation	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Why do nations trade? (resource-based and institution-based views) • What are the theories of International Trade? (classical and modern theories) • Appreciate how economic and political institutions influence internal trade • European and global business • Redefining and re-explaining the concepts of international business (IB) and global business; definitions of Multinational enterprise (MNE), Foreign direct investment (FDI), emerging economies/markets, Gross domestic product (GDP), Purchasing power parity (PPP), expatriate assignments, Gross national product (GNP), Gross national income (GNI), • Views on globalisation; definition of globalisation • Trends of globalisation; liberalisation, waves of globalisation • The global economic pyramid: Top tier, Second tier and base of the pyramid • Risk management • Regional economic integration, multilateral trade and monetary systems

			• Examples of regional integration: Europe, Americas and Asia Pacific ***Learning Outcome: 2, 3***
9.	Going International: Resources, Institutions, and Internationalisation	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Global Business Models (the different business models to exploit the advantages of a globally operating firm) • Small- and medium-sized enterprises (SMEs), entrepreneurs, entrepreneurial teams, • The different options for firms to start engaging in International Business • How firms develop resources for international business • How institutions influence exporting behaviour • International trade structures: the international division, geographic area, global product division, and global matrix structures • Fitting strategy, structure, and organisation architecture ***Learning Outcome: 1, 2, 3***
10.	Competitive Advantages of The Global Firm	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Strategic objectives of establishing foreign subsidiaries, Where When and How to Enter? • Foreign subsidiaries, entry strategy (HRM, Logistics, Location, Timing, Marketing, Ownership, Greenfield/Acquisition) • Why MNEs establish subsidiaries abroad (Why to enter) • Relevant location-specific advantages that attract foreign investors (where to enter): • Compare and contrast first- and late-mover advantages (When to enter) • Compare and contrast alternative modes of entry (How to enter) • The strategic advantages of globally operating firms ***Learning Outcome: 1, 2, 3***

11.	Managing Knowledge and IT Infrastructure and Architecture in Global Firms	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• The relationship between multinational strategy and structure • The four organisational structures in MNEs: (1) international division, (2) geographic area, (3) global product division, (4) global matrix • Challenges associated with learning, innovation and knowledge management • Offshoring global services and production, Deciding on location attractiveness • Managing global enterprise IT architecture, Global IT sourcing decision and risks • Enterprise IT architecture for 'multinational' (localisation), 'international', 'transnational' and 'global' (global standardisation) approaches ***Learning Outcome: 1, 4***
12.	Global Human Resource Management	1/12 Lectures: 3 hrs Tutorials: 2 hrs Private study: 11.5 hrs	• Managing people and expatriates abroad • Distinguishing ethnocentric, polycentric, and geocentric management practices • How expatriates are managed in MNEs • How MNEs manage their employees in subsidiaries abroad • Issues of staffing policies, expatriate issues and the role of recruitment and selection, • Expatriate training and development, performance appraisal, compensation, and labour relations ***Learning Outcome: 1, 2, 4***

Assessment Type
• 2-hour, closed-book, paper-based invigilated exam (40%) • 2,000-word assignment (60%)
See also Section 3 above

10. Further Mathematics for University Study

Title	Further Mathematics for University Study
Unit reference number	H/615/2415
Credits	20
Level	3
Type	Elective

Guided Learning Hours	74 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Recognise and employ principles of algebra and how it is an essential tool that supports and expresses mathematical reasoning and provides a means to generalise across a number of contexts	1.1 Understand the meaning of $\|x\|$, sketch the graph of $y = \|ax + b\|$ and use relations such as $\|a\| = \|b\| \Leftrightarrow a^2 = b^2$ and $\|x - a\| < b \Leftrightarrow a - b < x < a + b$ when solving equations and inequalities 1.2 Divide a polynomial, of degree not exceeding 4, by a linear or quadratic polynomial, and identify the quotient and remainder (which may be zero) 1.3 Use the factor theorem and the remainder theorem. 1.4 Recall an appropriate form for expressing rational functions in partial fractions, and carry out the decomposition, in cases where the denominator is no more complicated than: • $(ax + b)(cx + d)(ex + f)$, • $(ax + b)(cx + d)^2$ or • $(ax + b)(cx^2 + d)$ and where the degree of the numerator does not exceed that of the denominator 1.5 Use the expansion of $(1 + x)^n$, where n is a rational number and $\|x\| < 1$
2. Recognise and work with coordinate geometry and identify how algebraic representations also describe a spatial relationship, which gives us a new way to understand a situation.	2.1 Find the equation of a straight line given sufficient information 2.2 Interpret and use any of the forms $y = mx + c, y - y_1 = m(x - x_1), ax + by + c = 0$ in solving problems 2.3 Understand that the equation $(x - a)^2 + (y - b)^2 = r^2$ represents the circle with centre (a, b) and radius r 2.4 Use algebraic methods to solve problems involving lines and circles 2.5 Understand the relationship between a graph and its associated algebraic equation, and use the relationship between points of intersection of graphs and solutions of equations.

3. Recognise, employ principles of and work effectively with sequence and series	3.1 Use the expansion of $(a + b)^n$, where n is a positive integer 3.2 Recognise arithmetic and geometric progressions 3.3 Use the formulae for the n^{th} term and for the sum of the first n terms to solve problems involving arithmetic or geometric progressions 3.4 Use the condition for the convergence of a geometric progression, and the formula for the sum to infinity of a convergent geometric progression.
4. Recognise, identify, and work with the different types of equations and functions including trigonometric, logarithmic and exponential functions	4.1 Understand the terms function, domain, range, one-one function, inverse function and composition of functions 4.2 Identify the range of a given function in simple cases, and find the composition of two given functions 4.3 Determine whether or not a given function is one-one, and find the inverse of a one-one function in simple cases 4.4 Illustrate in graphical terms the relation between a one-one function and its inverse 4.5 Understand and use the transformations of the graph of $y = f(x)$ given by: • $y = f(x) + a$, • $y = f(x + a)$, • $y = af(x)$, or • $y = f(ax)$ and simple combinations of the above. 4.6 Understand the definitions of the hyperbolic functions $\sinh x$, $\cosh x$, $\tanh x$, $\operatorname{sech} x$, $\operatorname{cosech} x$ and $\coth x$ in terms of the exponential function 4.7 Sketch the graphs of hyperbolic functions 4.8 Use identities involving hyperbolic functions (e.g. $\cosh^2 x - \sinh^2 x = 1$, $\sinh 2x = 2\sinh x \cosh x$ and similar results corresponding to the standard trigonometric identities 4.9 Understand and use the definitions of the inverse hyperbolic functions and use the logarithmic forms 4.10 Understand the relationship between logarithms and indices, and use the laws of logarithms (excluding change of base) 4.11 Understand the definition and properties of e^x and $ln\ x$, including their relationship as inverse functions and their graphs 4.12 Use logarithms to solve equations and inequalities in which the unknown appears in indices 4.13 Use logarithms to transform a given relationship to linear form, and hence determine unknown constants by considering the gradient and/or intercept. 4.14 Sketch and use graphs of the sine, cosine and tangent functions (for angles of any size, and using either degrees or radians) 4.15 Use the exact values of the sine, cosine and tangent of 30°, 45°, 60°, and related angles 4.16 Use the notations $sin^{-1}x$, $cos^{-1}x$, $tan^{-1}x$ to denote the principal values of the inverse trigonometric relations 4.17 Use the identities $\frac{sin\theta}{cos\theta} \equiv tan\theta$ and $sin^2\theta + cos^2\theta \equiv 1$

	4.18 Find all the solutions of simple trigonometrical equations lying in a specified interval (general forms of solution are not included). 4.19 Understand the relationship of the secant, cosecant and cotangent functions to cosine, sine and tangent, and use properties and graphs of all six trigonometric functions for angles of any magnitude 4.20 Use trigonometrical identities for the simplification and exact evaluation of expressions, and in the course of solving equations, and select an identity or identities appropriate to the context, showing familiarity in particular with the use of: (a) $sec^2\theta \equiv 1 + tan^2\theta$ and $cosec^2\theta \equiv 1 + cot^2\theta$, (b) the expansions of $\sin(A \pm B)$, $\cos(A \pm B)$ and $\tan(A \pm B)$, (c) the formulae for $sin2A$, $cos2A$ and $tan2A$, and (d) the expression of $asin\theta + bcos\theta$ in the forms $R\sin(\theta \pm \alpha)$ and $R\cos(\theta \pm \alpha)$
5. Identify, interpret, and use the techniques in calculus to perform differentiation and integration on individual and combinations of different types of functions and how to use these techniques to solve problems involving functions given parametrically	5.1 Understand the gradient of a curve at a point as the limit of the gradients of a suitable sequence of chords, and use the notations $f'(x)$, $f''(x)$, $\frac{dy}{dx}$, and $\frac{d^2y}{dx^2}$ for first and second derivatives 5.2 Use the derivative of x^n (for any rational n), together with constant multiples, sums and differences of functions, and of composite functions using the chain rule 5.3 Apply differentiation to gradients, tangents and normals, increasing and decreasing functions and rates of change 5.4 Locate stationary points and determine their nature, and use information about stationary points in sketching graphs. 5.5 Understand integration as the reverse process of differentiation, and integrate $(ax + b)^n$ (for any rational n except -1), together with constant multiples, sums and differences 5.6 Solve problems involving the evaluation of a constant of integration 5.7 Evaluate definite integrals 5.8 Use definite integration to find: (a) the area of a region bounded by a curve and lines parallel to the axes, or between a curve and a line or between two curves, and (b) a volume of revolution about one of the axes 5.9 Extend the idea of 'reverse differentiation' to include the integration of: • e^{ax+b}, • $\frac{1}{ax+b}$, • $sin(ax + b)$, • $cos(ax + b)$, and • $sec^2(ax + b)$ 5.10 Use trigonometrical relationships in carrying out Integration 5.11 Understand and use the trapezium rule to estimate the

	value of a definite integral.
6. Recognise and work effectively with vectors and matrices	6.1 Use standard notations for vectors 6.2 Carry out addition and subtraction of vectors and multiplication of a vector by a scalar, and interpret these operations in geometrical terms 6.3 Calculate the magnitude of a vector, and use unit vectors, displacement vectors and position vectors 6.4 Understand the significance of all the symbols used when the equation of a straight line is expressed in the form $\mathbf{r} = \mathbf{a} + t\mathbf{b}$, and find the equation of a line, given sufficient information 6.5 Determine whether two lines are parallel, intersect or are skew, and find the point of intersection of two lines when it exists 6.6 Use formulae to calculate the scalar product of two vectors, and use scalar products in problems involving lines and points. 6.7 Carry out operations of matrix addition, subtraction and multiplication, and recognise the terms zero matrix and identity (or unit) matrix 6.8 Recall the meaning of the terms 'singular' and 'non-singular' as applied to square matrices and, for 2×2 and 3×3 matrices, evaluate determinants and find inverses of non-singular matrices 6.9 Understand and use the result, for non-singular matrices, $(\mathbf{AB})^{-1} = \mathbf{B}^{-1}\mathbf{A}^{-1}$ 6.10 Understand the use of 2×2 matrices to represent certain geometric transformations in the x-y plane 6.11 Understand the meaning of 'invariant' as applied to points and lines in the context of transformations represented by matrices and solve simple problems involving invariant points and invariant lines. 6.12 Formulate a problem involving the solution of 3 linear simultaneous equations in 3 unknowns as a problem involving the solution of a matrix equation, or vice versa 6.13 Understand the cases that may arise concerning the consistency or inconsistency of 3 linear simultaneous equations, relate them to the singularity or otherwise of the corresponding matrix, solve consistent systems, and interpret geometrically in terms of lines and planes
7. Recognise how to solve equations numerically	7.1 Locate approximately a root of an equation, by means of graphical considerations and/or searching for a sign change 7.2 Understand the idea of, and use the notation for, a sequence of approximations which converges to a root of an equation 7.3 Understand how a given simple iterative formula of the form $x_{n+1} = F(x_n)$ relates to the equation being solved, and use a given iteration, or an iteration based on a given rearrangement of an equation, to determine a root to a prescribed degree of accuracy.

8. Recognise, employ the principles of and work effectively with differential equations	8.1 Formulate a simple statement involving a rate of change as a differential equation 8.2 Find by integration a general form of solution for a first order differential equation in which the variables are separable 8.3 Use an initial condition to find a particular solution 8.4 Interpret the solution of a differential equation in the context of a problem being modelled by the equation. 8.5 Find an integrating factor for a first order linear differential equation, and use an integrating factor to find the general solution 8.6 Solve differential equations of form $y'' + ay' + by = f(x)$, where a and b are constants, by solving the homogeneous case and adding a particular integral to the complementary function (in cases where $f(x)$, is a polynomial, exponential or trigonometric function). 8.7 Recall the meaning of the terms 'complementary function' and 'particular integral' in the context of linear differential equations, and recall that the general solution is the sum of the complementary function and a particular integral 8.8 Find the complementary function for a first or second order linear differential equation with constant coefficients 8.9 Recall the form of, and find, a particular integral for a first or second order linear differential equation in the cases where a polynomial or αe^{bx} or $a\cos px + b\sin px$ is a suitable form, and in other simple cases find the appropriate coefficient(s) given a suitable form of particular integral 8.10 Use a given substitution to reduce a differential equation to a first or second order linear equation with constant coefficients or to a first order equation with separable variables 8.11 Use initial conditions to find a particular solution to a differential equation and interpret a solution in terms of a problem modelled by a differential equation.
9. Be able to effectively work with complex numbers, perform arithmetic calculations using complex numbers, solve higher order polynomials with complex roots and sketch regions in the complex plane	9.1 Understand the idea of a complex number, recall the meaning of the terms real part, imaginary part, modulus, argument, conjugate, and use the fact that two complex numbers are equal if and only if both real and imaginary parts are equal 9.2 Carry out operations of addition, subtraction, multiplication and division of two complex numbers expressed in cartesian form $x + iy$ 9.3 Use the result that, for a polynomial equation with real coefficients, any non-real roots occur in conjugate pairs 9.4 Represent complex numbers geometrically by means of an argand diagram 9.5 Carry out operations of multiplication and division of two complex numbers expressed in polar form $r(\cos\theta + i\sin\theta) \equiv re^{i\theta}$ 9.6 Find the two square roots of a complex number 9.7 Understand in simple terms the geometrical effects of conjugating a complex number and of adding, subtracting, multiplying and dividing two complex numbers

	9.8 Illustrate simple equations and inequalities involving complex numbers by means of loci in an argand diagram

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Algebra	1/12 Lectures: 6 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Background algebra • Factors and bracket expansion • Changing the subject of a formula • Linear equations • Quadratic equations • Solving quadratic equations • Quadratic factorisation • The quadratic formula • The graphs of quadratic functions • Simultaneous equations • Inequalities • Operations with polynomials • Solution of polynomial equations • The modulus function • The remainder theorem • The factor theorem • The general binomial expansion • Review of algebraic fractions • Partial fractions • Using partial fractions with the binomial expansion ***Learning Outcome: 1***
2.	Coordinate geometry	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Coordinates • Plotting, sketching and drawing • The gradient of a line • The distance between two points • The mid-point of a line joining two points • The equation of a straight line • Finding the equation of a line • The intersection of two lines • Drawing curves • The intersection of a line and a curve ***Learning Outcome: 2***

3.	Sequence and series	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Sequences • Finite and infinite series • Definitions and notation • Arithmetic progressions • Geometric progressions • Binomial expansions ***Learning Outcome: 3***
4.	Functions	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 10.5 hrs	• The language of functions • Composite functions • Inverse functions • hyperbolic functions $\sinh\theta$, $\cosh\theta$, $\tanh\theta$, $\operatorname{sech}\theta$, $\operatorname{cosech}\theta$, $\coth\theta$ • Inverse hyperbolic functions • Logarithmic forms of the inverse hyperbolic functions. ***Learning Outcome: 4***
5.	Logarithms and exponentials	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Logarithms • Exponential functions • Modelling curves • The natural logarithm function • The exponential function ***Learning Outcome: 4***
6.	Trigonometry	1/12 Lectures: 6 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Trigonometry background • Trigonometrical functions • Trigonometrical functions for angles of any size • The sine and cosine graphs • The tangent graph • Solving equations using graphs of trigonometrical functions • Circular measure • The length of an arc of a circle • The area of a sector of a circle • Other trigonometrical functions • Reciprocal trigonometrical functions • Compound-angle formulae • Double-angle formulae • The forms $rcos(\theta \pm a)$, $rsin(\theta \pm a)$ • The general solutions of trigonometrical equations • ***Learning Outcome: 4***

7.	Differentiation and integration	1/12 Lectures: 8 hrs Tutorials: 1 hr Private study: 10.5 hrs	Differentiation: • The gradient of a curve • Finding the gradient of a curve • Finding the gradient from first principles • Differentiating by using standard results • Using differentiation • Tangents and normals • Maximum and minimum points • Increasing and decreasing functions • Points of inflection • The second derivative • Applications • The chain rule • The product rule • The quotient rule • Differentiating natural logarithms and exponentials • Differentiating trigonometrical functions • Differentiation of hyperbolic functions • Differentiating functions defined implicitly • Parametric equations • Parametric differentiation Integration: • Reversing differentiation • Finding the area under a curve • Area as the limit of a sum • Areas below the x-axis • The area between two curves • The area between a curve and the y-axis • The reverse chain rule • Improper integrals • Finding volumes by integration • Integrals involving the exponential function • Integrals involving the natural logarithm function • Integrals involving trigonometrical functions • Numerical integration • Deriving formulae for and calculating volumes of revolution. • Evaluating the mean value of a function • Integration by substitution • Integrals involving exponentials and natural logarithm • Integrals involving trigonometrical functions

			• Integration of hyperbolic functions • The use of partial fractions in integration • Integration by parts • General integration ***Learning Outcome: 5***
8.	Differential equations	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Integrating factor to solve differential equations • General and perpendicular solutions of differential equations. • Differential equations in modelling kinematics and in other contexts. • The relationship between the cases when the discriminant of the auxiliary equation is positive, zero and negative and the form of solution of the differential equation. • Forming differential equations from rates of change • Solving differential equations ***Learning Outcome: 8***
9.	Numerical solution of equations	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Interval estimation – change of-sign method • Fixed-point iteration ***Learning Outcome: 7***
10.	Vectors	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Vectors in two dimensions • Vectors in three dimensions • Vector calculations • The angle between two vectors • The vector equation of a line • The intersection of two lines • The angle between two lines • The perpendicular distance from a point to a line • The vector equation of a plane • The intersection of a line and a plane • The distance of a point from a plane • The angle between a line and a plane • The intersection of two planes ***Learning Outcome: 6***

11.	Matrices	1/12 Lectures: 6 hrs Tutorials: 1 hr Private study: 10.5 hrs	• Adding, subtracting and multiplying conformable matrices; multiplying a matrix by a scalar • Zero and identity matrices • Use of matrices to represent linear transformations in 2D; successive transformations; single transformations in 3D • Invariant points and lines for a linear transformation. • Determinants of 2 × 2 and 3 × 3 matrices and interpreting as scale factors, including the effect on orientation. • Singular and non-singular matrices; properties of inverse matrices. • Inverse of non-singular 2 × 2 matrices and 3 × 3 matrices • Solving three linear simultaneous equations in three variables by use of the inverse matrix. • Geometric interpretation of the solution and failure of solution of three simultaneous linear equations. • Factorisation of determinants using row and column operations. ***Learning Outcome: 6***
12.	Complex numbers	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 10.5 hrs	• The growth of the number system • Working with complex numbers • Representing complex numbers geometrically • Sets of points in an Argand diagram • The modulus-argument form of complex numbers • Sets of points using the polar form • Working with complex numbers in polar form • Complex exponents • Complex numbers and equations • Solve any quadratic equation with real coefficients; solve cubic or quartic equations with real coefficients • Add, subtract, multiply and divide complex numbers in the form $x + iy$ with x and y real; use the terms 'real part' and 'imaginary part'. • Complex conjugate; know that non-real roots of polynomial equations with real coefficients occur in conjugate pairs.

			• Conversion between the Cartesian form and the modulus-argument form of a complex number • Multiplication and division of complex numbers in modulus-argument form ***Learning Outcome: 9***

Assessment Type
Two 2-hour closed-book, supervised, paper-based global exams (100%): • Exam 1; covers Topics 1-6 (40%) • Exam 2; covers Topics 7-12 (60%)
See also Section 3 above

11. Physics for University Study

Title	Physics for University Study
Unit reference number	K/615/2416
Credits	20
Level	3
Type	Core

Guided Learning Hours	73 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Recognise, describe, analyse, and work with kinematics and solve equations of motion	1.1 Define and use distance, displacement, speed, velocity and acceleration 1.2 Use graphical methods to represent distance, displacement, speed, velocity and acceleration 1.3 Determine displacement from the area under a velocity–time graph 1.4 Determine velocity using the gradient of a displacement–time graph 1.5 Determine acceleration using the gradient of a velocity–time graph 1.6 Derive, from the definitions of velocity and acceleration, equations that represent uniformly accelerated motion in a straight line 1.7 Solve problems using equations that represent uniformly accelerated motion in a straight line, including the motion of bodies falling in a uniform gravitational field without air resistance 1.8 Describe an experiment to determine the acceleration of free fall using a falling object 1.9 Describe and explain motion due to a uniform velocity in one direction and a uniform acceleration in a perpendicular direction 1.10 Define the radian and express angular displacement in radians 1.11 Understand and use the concept of angular speed 1.12 Recall and use $\omega = 2\pi / T$ and $v = r\omega$
2. Recognise and employ the principles of dynamics, momentum and its conservation, Newton's laws of motion and the related notions of forces, work, energy,	2.1 Define, describe and discuss momentum and Newton's laws of motion 2.2 Define, describe and discuss non-uniform motion 2.3 Define, describe and discuss linear momentum and its conservation 2.4 Define, describe and discuss the turning effects of forces 2.5 Define, describe and discuss equilibrium of forces

and power	2.6 Define, describe and discuss density and pressure 2.7 Define, describe and discuss energy conservation 2.8 Define, describe and discuss gravitational potential energy and kinetic energy
3. Recognise, identify, and describe the principles of electricity and its related concepts (i.e., electric current, electric forces and fields, potential difference and power, resistance and resistivity, circuits, Kirchhoff's laws and capacitors) as well as magnetic fields and electromagnetism	3.1 Define, describe and discuss electric current 3.2 Define, describe and discuss potential difference and power 3.3 Define, describe and discuss resistance and resistivity 3.4 Define, describe and discuss practical circuits 3.5 Define, describe and discuss Kirchhoff's laws 3.6 Define, describe and discuss potential dividers 3.7 Define, describe and discuss electric fields and field lines 3.8 Define, describe and discuss uniform electric fields 3.9 Define, describe and discuss the electric force between point charges 3.10 Define, describe and discuss electric field of a point charge and recall and use E = Q / (4πε0r2) for the electric field strength due to a point charge in free space 3.11 Define, describe and discuss electric potential 3.12 Define, describe and discuss capacitors and capacitance 3.13 Define, describe and discuss energy stored in a capacitor 3.14 Define, describe and discuss discharging a capacitor 3.15 Define, describe and discuss the concept of a magnetic field 3.16 Define, describe and discuss the force on a current-carrying conductor 3.17 Define, describe and discuss the force on a moving charge 3.18 Define, describe and discuss magnetic fields due to currents 3.19 Define, describe, and discuss electromagnetic induction
4. Recognise, identify, analyse, and describe the different types of waves	4.1 Define, describe, and discuss progressive waves 4.2 Define, describe, and discuss transverse and longitudinal waves 4.3 Define, describe, and discuss Doppler effect for sound waves 4.4 Define, describe, and discuss electromagnetic spectrum 4.5 Define, describe, and discuss polarisation
5. Recognise, define, and describe atomic structure and nuclear physics	5.1 Define, describe, and discuss atoms, nuclei and radiation 5.2 Define, describe, and discuss fundamental particles 5.3 Define, describe, and discuss mass defect and nuclear binding energy 5.4 Define, describe, and discuss radioactive decay

6. Identify, analyse, and discuss the principles and equations of simple harmonic, and damped and forced oscillations	6.1 Define, describe, and discuss simple harmonic oscillations 6.2 Define, describe, and discuss energy in simple harmonic motion 6.3 Define, describe, and discuss damped and forced oscillations, resonance
7. Recognise, describe, and analyse the principles of thermal physics, ideal gases, and quantum physics	7.1 Define, describe, and discuss thermal equilibrium 7.2 Define, describe, and discuss temperature scales 7.3 Define, describe, and discuss specific heat capacity and specific latent heat 7.4 Define, describe, and discuss the mole 7.5 Define, describe, and discuss the equation of state 7.6 Define, describe, and discuss kinetic theory of gases 7.7 Define, describe, and discuss the energy and momentum of a photon 7.8 Define, describe, and discuss the photoelectric effect 7.9 Define, describe, and discuss wave-particle duality 7.10 Define, describe, and discuss energy levels in atoms and line spectra

Syllabus Content			
No.	**Topic title**	**Proportion**	**Course coverage**
1.	Kinematics, and accelerated and circular motions	1/10 Lectures: 5 hrs Tutorials: 1 hr Private study: 12.7 hrs	• Understanding SI units • Scalars and Vectors • Components of vectors • Adding and subtracting vectors • Distance and displacement • Speed and velocity • Displacement-time graphs • Combining displacements • Combining velocities • The meaning of acceleration • Calculating acceleration • Unit of acceleration • Determining the displacement, velocity and acceleration • The equations of motion and their derivation • Uniform and non-uniform acceleration • Acceleration caused by gravity and determining g • Motion in two dimensions: projectiles • Understanding projectiles • Describing circular motion • Angles in radians • Steady speed, changing velocity • Angular speed • Centripetal forces • Calculating acceleration and force

			• The origins of centripetal forces ***Learning Outcome: 1***
2.	Dynamics (Forces, Work, Energy, Power and Momentum), matter and materials	1/10 Lectures: 6 hrs Tutorials: 1 hr Private study: 12.7 hrs	• Mass and inertia • Force, mass and acceleration • Identifying forces • Weight, Normal reaction, Friction, Tension force in wires and Resultant force. • Newton's third law of motion • Combining forces and applications • Components of vectors • Gravitational fields (representing a gravitational field, gravitational field strength g, energy in a gravitational field, gravitational potential, orbiting under gravity, the orbital period, orbiting the Earth) • Gravitational potential energy • Centre of gravity • Kinetic energy • Gravitational potential to kinetic energy transformation • Doing work, transferring energy • Energy changes and transfers • Mechanical Power • The idea of momentum • Modelling collisions • Understanding collisions • Explosions and crash-landings • Collisions in two dimensions • Momentum and Newton's laws • The turning effect of a force. • Moment of force. • The torque generated by a couple of forces • Motion through fluids • Archimedes' principle • Density • Pressure • Compressive and tensile forces • Stretching materials • Elastic potential energy ***Learning Outcome: 2***

3.	Thermal physics and ideal gases	1/10 Lectures: 4 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12.7 hrs	• Modelling gases: the kinetic model • Temperature and molecular kinetic energy • Changes of state • The meaning of temperature • Thermometers • Particles of a gas • Explaining pressure • Combined law of gases • Changing temperature • Ideal gas equation • Calculating energy changes • Heat and Internal energy • First law of Thermodynamics ***Learning Outcome: 7***
4.	Oscillations	1/10 Lectures: 4 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12.7 hrs	• Free and forced oscillations • Observing oscillations • Describing oscillations • Simple harmonic motion (SHM) • Representing SHM graphically • Frequency and angular frequency • Equations of SHM • Energy changes in SHM • Damped oscillations • Resonance ***Learning Outcome: 6***
5.	Electricity (Electric current, Kirchhoff's laws, Resistance and resistivity, Practical circuits and electric fields)	1/10 Lectures: 4 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12.7 hrs	• Circuit symbols and diagrams • Uniform electric fields (attraction and repulsion, the concept of an electric field, electric field strength, force on a charge) • Coulomb's law (electric fields, Coulomb's law, electric field strength for a radial field, electric potential, gravitational and electric fields) • Capacitance (capacitors in use, energy stored in a capacitor, capacitors in parallel, capacitors in series, capacitor networks, charge and discharge of capacitors) • Electric current • The meaning of voltage • Ohm's law • Electrical resistance • Internal resistance • The I-V characteristic for a metallic conductor • Resistance and temperature • Resistivity • Combinations of resistors and capacitors

			• Potential dividers • Electrical power • Kirchhoff's first law • Kirchhoff's second law • Applying Kirchhoff's laws • Sensors • Potentiometer circuits • Alternating currents (Sinusoidal current, alternating voltages, power and alternating current, rectification) ***Learning Outcome: 3***
6.	Magnetic fields, electromagnetism and motion of charged particles	1/10 Lectures: 4 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12.7 hrs	• Producing and representing magnetic fields • Magnetic force • Magnetic flux density • Measuring magnetic flux density • Currents crossing fields • Forces between currents • Relating SI units • Comparing forces in magnetic, electric and gravitational fields • Observing the force • Orbiting charged particles • Electric and magnetic fields • The Hall effect • Discovering the electron • Electromagnetic induction (observing induction, explaining electromagnetic induction, Faraday's law of electromagnetic induction, Lenz's law, everyday examples of electromagnetic induction) ***Learning Outcome: 3***
7.	Waves and Optics	1/10 Lectures: 4 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12.7 hrs	• Describing waves • Longitudinal and transverse waves • Wave energy • Wave speed • The Doppler effect for sound waves • Electromagnetic waves • Electromagnetic radiation • Orders of magnitude • The nature of electromagnetic waves • Polarisation • The principle of superposition of waves • Diffraction of waves • Interference • The Young double-slit experiment • Diffraction gratings • Geometric optics

			• From moving to stationary • Nodes and antinodes • Formation of stationary waves • Determining the wavelength and speed of sound ***Learning Outcome: 4***
8.	Atomic structure	1/10 Lectures: 4 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12.7 hrs	• Looking inside the atom • Alpha-particle scattering and the nucleus • A simple model of the atom • Nucleons and electrons • Forces in the nucleus • Discovering radioactivity • Radiation from radioactive substances • Energies in α and β decay • Equations of radioactive decay • Fundamental particles • Families of particles ***Learning Outcome: 5***
9.	Nuclear physics	1/10 Lectures: 4 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12.7 hrs	• Balanced equations • Mass and energy • Energy released in radioactive decay • Binding energy and stability • Randomness and radioactive decay • The mathematics of radioactive decay • Decay graphs and equations • Decay constant λ and half-life t ***Learning Outcome: 5***
10.	Quantum physics	1/10 Lectures: 4 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12.7 hrs	• Modelling with particles and waves • Understand the dual nature of light • The photoelectric effect • Threshold frequency and wavelength • Photons and their momentum • Line spectra and the explanation of their origin • Photon energies • The nature of light: waves or particles? • Electron waves ***Learning Outcome: 7***

Assessment Type
Two 2-hour closed-book, supervised, paper-based global exams (100%): • Exam 1; covers Topics 1-4 (50%) • Exam 2; covers Topics 5-10 (50%)
See also Section 3 above

12. Chemistry for University Study

Title	Chemistry for University Study
Unit reference number	R/616/8688
Credits	20
Level	3
Type	Elective

Guided Learning Hours	68 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Be able to define, analyse and discuss the atom and its particles as well as isotopes, electrons, energy levels, atomic orbitals, and ionisation energy.	1.1 Define and discuss particles in the atom and atomic radius 1.2 Define and discuss isotopes 1.3 Define and discuss electrons, energy levels and atomic orbitals 1.4 Define and discuss ionisation energy
2. Be able to define, analyse and discuss atoms, molecules, stoichiometry, and chemical bonding	2.1 Define and discuss relative masses of atoms and molecules 2.2 Define and discuss the mole and the Avogadro constant and define and use the term mole in terms of the Avogadro constant 2.3 Recognise and use the relevant formulae 2.4 Define and discuss reacting masses and volumes (of solutions and gases) and perform calculations including the use of the mole concept 2.5 Define and discuss electronegativity and bonding 2.6 Define and discuss ionic bonding 2.7 Define and discuss metallic bonding as the electrostatic attraction between positive metal ions and delocalised electrons 2.8 Define and discuss covalent bonding and coordinate (dative covalent) bonding 2.9 Define, analyse and discuss shapes of molecules 2.10 Define, analyse and discuss intermolecular forces, electronegativity and bond properties 2.11 Define, analyse and discuss dot-and-cross diagrams and use them to illustrate ionic, covalent and coordinate bonding

3. Be able to define, analyse and discuss states of matter, energy changes in chemistry as well as electrochemistry and chemical equilibria	3.1 Define and discuss the 3 states of matter and explain how substances can change from one state to another. 3.2 Define and discuss the gaseous state: ideal and real gases and pV = nRT 3.3 Define and discuss bonding and structure 3.4 Define and discuss enthalpy change ΔH 3.5 Define and discuss Hess's law 3.6 Define and discuss redox processes: electron transfer and changes in oxidation number (oxidation state) 3.7 Define and discuss chemical equilibria: reversible reactions, dynamic equilibrium 3.8 Define and discuss Brønsted–Lowry theory of acids and bases
4. Be able to define, analyse and discuss the kinetics of reactions	4.1 Define and discuss rates of reaction 4.2 Define and discuss the effect of temperature on reaction rates and the concept of activation energy 4.3 Define and discuss homogeneous and heterogeneous catalysts
5. Be able to recognise, analyse and discuss the Periodic Table and chemical periodicity with focus on Group 2 and Group 17 elements	5.1 Define, evaluate and discuss the periodicity of physical properties of the elements in Period 3 5.2 Define, evaluate and discuss the periodicity of chemical properties of the elements in Period 3 5.3 Define, evaluate and discuss chemical periodicity of other elements 5.4 Define, evaluate and discuss the similarities and trends in the properties of the Group 2 metals, magnesium to barium, and their compounds 5.5 Define, evaluate and discuss the physical properties of the Group 17 elements 5.6 Define, evaluate and discuss the chemical properties of the halogen elements and the hydrogen halides 5.7 Define, evaluate and discuss the reactions of the halide ions 5.8 Define, evaluate and discuss the reactions of chlorine
6. Be able to recognise, analyse and discuss hydrocarbons, compounds (halogen, Hydroxy, carbonyl), esters, carboxylic acids, and their derivatives	6.1 Define, analyse and discuss the formulae, functional groups and the naming of organic compounds 6.2 Define, analyse and discuss the characteristic organic reactions 6.3 Define, analyse and discuss the shapes of organic molecules; σ and π bonds 6.4 Define, analyse and discuss isomerism: structural isomerism and stereoisomerism 6.5 Define, analyse and discuss hydrocarbons: Alkanes, Alkenes 6.6 Define, analyse and discuss halogen compounds: Halogenoalkanes 6.7 Define, analyse and discuss hydroxy compounds: Alcohols 6.8 Define, analyse and discuss carbonyl compounds: Aldehydes and ketones 6.9 Define, analyse and discuss carboxylic acids and derivatives

	6.10 Define, analyse and discuss esters
7. Be able to recognise, analyse and discuss nitrogen compounds, polymerisation, organic synthesis, and analytical techniques	7.1 Define and discuss primary amines and recall the reactions by which amines can be produced: e.g., reaction of a halogenoalkane with NH3 in ethanol heated under pressure 7.2 Define and discuss nitriles and hydroxynitriles 7.3 Define and discuss addition polymerisation 7.4 Define and discuss organic synthesis 7.5 Define and discuss infrared spectroscopy and analyse an infrared spectrum of a simple molecule to identify functional groups (see the Data section for the functional groups required) 7.6 Define and discuss mass spectrometry

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Physical chemistry: Introduction and the atomic structure	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Introduction and classifying matter • Intensive and extensive properties • The sizes and masses of atoms and molecules • The mole • Atomic symbols and formulae • Moles and compounds • Empirical and molecular formulae • Equations • Using the mole in mass calculations • Moles of gases • Moles and concentrations • Calculations using a combination of methods • Particles in the atom and atomic radius • Isotopes • Electrons, energy levels and atomic orbitals • Ionisation energy ***Learning Outcome: 1***
2.	Physical chemistry: Atoms, molecules, and stoichiometry	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Relative masses of atoms and molecules • The mole and the Avogadro constant • Formulae • Reacting masses and volumes (of solutions and gases) ***Learning Outcome: 2***

3.	Physical chemistry: Chemical bonding in simple molecules	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Electronegativity and bonding • Ionic bonding • Metallic bonding • Covalent bonding and coordinate (dative covalent) bonding • Shapes of molecules • Intermolecular forces, electronegativity and bond properties • Dot-and-cross diagrams ***Learning Outcome: 2***
4.	Physical chemistry: States of matter – solids, liquids, and gases	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• The gaseous state: ideal and real gases and pV = nRT • Bonding and structure ***Learning Outcome: 3***
5.	Physical chemistry: Chemical energetics	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Enthalpy change • Hess's law ***Learning Outcome: 3***
6.	Physical chemistry: Electrochemistry	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Redox processes: electron transfer and changes in oxidation number (oxidation state) ***Learning Outcome: 3***
7.	Physical chemistry: Equilibria	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Chemical equilibria: reversible reactions, dynamic equilibrium • Brønsted–Lowry theory of acids and bases ***Learning Outcome: 3***
8.	Physical chemistry: Reaction kinetics	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Rates of reaction • Effect of temperature on reaction rates and the concept of activation energy • Homogeneous and heterogeneous catalysts ***Learning Outcome: 4***
9.	Inorganic chemistry: The Periodic Table - chemical periodicity	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Periodicity of physical properties of the elements in Period 3 • Periodicity of chemical properties of the elements in Period 3 • Chemical periodicity of other elements ***Learning Outcome: 5***

10.	Inorganic chemistry: Group 2 and Group 17 elements	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs Private study: 11 hrs	• Similarities and trends in the properties of the Group 2 metals, magnesium to barium, and their compounds • Physical properties of the Group 17 elements • The chemical properties of the halogen elements and the hydrogen halides • Reactions of the halide ions • The reactions of chlorine ***Learning Outcome: 5***
11.	Organic chemistry: Introduction, Hydrocarbons, Halogen compounds, Hydroxy compounds, Carbonyl compounds, Esters, Carboxylic acids and derivatives	1/12 Lectures: 8 hrs Tutorials: 1 hr Private study: 11 hrs	• Formulae, functional groups and the naming of organic compounds • Characteristic organic reactions • Shapes of organic molecules; σ and π bonds • Isomerism: structural isomerism and stereoisomerism • Hydrocarbons: Alkanes, Alkenes • Halogen compounds: Halogenoalkanes • Hydroxy compounds: Alcohols • Carbonyl compounds: Aldehydes and ketones • Carboxylic acids and derivatives • Esters ***Learning Outcome: 6***
12.	Organic chemistry: Nitrogen compounds, Polymerisation, Organic synthesis and Analytical techniques	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11 hrs	• Primary amines • Nitriles and hydroxynitriles • Addition polymerisation • Organic synthesis • Infrared spectroscopy • Mass spectrometry ***Learning Outcome: 7***

Assessment Type
Two 2-hour closed-book, supervised, paper-based global exams (100%): • Exam 1; covers Topics 1-7 (50%) • Exam 2; covers Topics 8-12 (50%)
See also Section 3 above

13. Biology for University Study

Title	Biology for University Study
Unit reference number	Y/616/8689
Credits	20
Level	3
Type	Elective

Guided Learning Hours	64 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Define and discuss cell structure, biological molecules, and enzymes	**Cell structure:** 1.1 Recognise organelles and other cell structures found in eukaryotic cells and outline their structures and functions 1.2 Describe and interpret photomicrographs, electron micrographs and drawings of typical plant and animal cells, including introduction to the electron microscope, types of electron microscope (TEMs and SEMs) and units of measurements in cell studies. 1.3 Compare the structure of typical plant and animal cells 1.4 Outline key structural features of a prokaryotic cell as found in a typical bacterium, 1.5 Compare the structure of a prokaryotic cell as found in a typical bacterium with the structures of typical eukaryotic cells in plants and animals 1.6 State that all viruses are non-cellular structures with a nucleic acid core (either DNA or RNA) and a capsid made of protein, and that some viruses have an outer envelope made of phospholipids 1.7 Tissues and Organs **Biological molecules - Carbohydrates and lipids:** 1.8 Describe and draw the ring forms of α-glucose and β-glucose 1.9 Define the terms monomer, polymer, macromolecule, monosaccharide, disaccharide and polysaccharide 1.10 State the role of covalent bonds in joining smaller molecules together to form polymers 1.11 Compare glucose, fructose, and maltose (reducing sugars) and that sucrose (a non-reducing sugar) 1.12 Describe the formation of a glycosidic bond by condensation, with reference to disaccharides, including sucrose, and polysaccharides 1.13 Describe the breakage of a glycosidic bond in polysaccharides and disaccharides by hydrolysis, with

	reference to the non-reducing sugar test 1.14 Describe the molecular structure of the polysaccharides starch (amylose and amylopectin) and glycogen and relate their structures to their functions in living organisms 1.15 Describe the molecular structure of the polysaccharide cellulose and outline how the arrangement of cellulose molecules contributes to the function of plant cell walls 1.16 Recognise that triglycerides are non-polar hydrophobic molecules and describe the molecular structure of triglycerides with reference to fatty acids (saturated and unsaturated), glycerol and the formation of ester bonds 1.17 Relate the molecular structure of triglycerides to their functions in living organisms 1.18 Describe the molecular structure of phospholipids with reference to their hydrophilic (polar) phosphate heads and hydrophobic (non-polar) fatty acid tails **Biological molecules - Proteins:** 1.19 Describe and draw the general structure of an amino acid and the formation and breakage of a peptide bond 1.20 Explain the meaning of the terms primary structure, secondary structure, tertiary structure and quaternary structure of proteins 1.21 Describe the types of interaction that hold protein molecules in shape (hydrophobic interactions, hydrogen bonding, ionic bonding and covalent bonding) 1.22 Recognise that globular proteins are generally soluble and have physiological roles and fibrous proteins are generally insoluble and have structural roles 1.23 Describe the structure of a molecule of haemoglobin as an example of a globular protein 1.24 Relate the structure of haemoglobin to its function, including the importance of iron in the haem group 1.25 Describe the structure of a molecule of collagen as an example of a fibrous protein, and the arrangement of collagen molecules to form collagen fibres 1.26 Relate the structures of collagen molecules and collagen fibres to their function **Biological molecules - Water:** 1.27 Explain how hydrogen bonding occurs between water molecules and relate the properties of water to its roles in living organisms, limited to solvent action, high specific heat capacity and latent heat of vaporisation **Enzymes:** 1.28 Recognise that enzymes are globular proteins that catalyse reactions inside cells (intracellular enzymes) or are secreted to catalyse reactions outside cells (extracellular enzymes) 1.29 Explain the mode of action of enzymes in terms of an active site, enzyme-substrate complex, lowering of activation energy and enzyme specificity, including the

	lock-and-key hypothesis and the induced-fit hypothesis 1.30 Investigate the progress of enzyme-catalysed reactions by measuring rates of formation of products using catalase and rates of disappearance of substrate using amylase 1.31 Outline the use of a colorimeter for measuring the progress of enzyme-catalysed reactions that involve colour changes 1.32 Investigate and explain the effects of the following factors on the rate of enzyme-catalysed reactions (temperature, pH (using buffer solutions) and concentration (enzyme, substrate and inhibitor) 1.33 Explain that the maximum rate of reaction (Vmax) is used to derive the Michaelis-Menten constant (Km), which is used to compare the affinity of different enzymes for their substrates 1.34 Explain the effects of reversible inhibitors, both competitive and non-competitive, on enzyme activity 1.35 State the difference in activity between an enzyme immobilised in alginate and the same enzyme free in solution, and state the advantages of using immobilised enzymes
2. Recognise, describe, and discuss the process of reproduction	**Replication and division of nuclei and cells:** 2.1 Describe the structure of a chromosome (DNA, histone proteins, sister chromatids, centromere, telomeres) 2.2 Explain the importance of mitosis in the production of genetically identical daughter cells during (growth of multicellular organisms, replacement of damaged or dead cells, repair of tissues by cell replacement, asexual reproduction) 2.3 Outline the mitotic cell cycle (interphase, mitosis, cytokinesis) 2.4 Outline the role of telomeres in preventing the loss of genes from the ends of chromosomes during DNA replication 2.5 Outline the role of stem cells in cell replacement and tissue repair by mitosis 2.6 Explain how uncontrolled cell division can result in the formation of a tumour **Chromosome behaviour in mitosis:** 2.7 Describe the behaviour of chromosomes in plant and animal cells during the mitotic cell cycle and the associated behaviour of the nuclear envelope, the cell surface membrane, and the spindle (names of the main stages of mitosis are expected: prophase, metaphase, anaphase and telophase) 2.8 Interpret photomicrographs, diagrams and microscope slides of cells in different stages of the mitotic cell cycle and identify the main stages of mitosis **Structure of nucleic acids and replication of DNA:** 2.9 Describe the structure of nucleotides, including the phosphorylated nucleotide ATP (structural formulae are not expected)

	2.10 Recognise that the bases adenine and guanine are purines with a double ring structure, and that the bases cytosine, thymine and uracil are pyrimidines with a single ring structure (structural formulae for bases are not expected) 2.11 Describe the structure of a DNA molecule as a double helix 2.12 Describe the semi-conservative replication of DNA during the S phase of the cell cycle, 2.13 Describe the structure of an RNA molecule, using the example of messenger RNA (mRNA) **Protein synthesis:** 2.14 State that a polypeptide is coded for by a gene and that a gene is a sequence of nucleotides that forms part of a DNA molecule 2.15 Describe the principle of the universal genetic code in which different triplets of DNA bases either code for specific amino acids or correspond to start and stop codons 2.16 Describe how the information in DNA is used during transcription and translation to construct polypeptides, including the roles of RNA polymerase, messenger RNA (mRNA), codons, transfer RNA (tRNA), anticodons, ribosomes 2.17 State that the strand of a DNA molecule that is used in transcription is called the transcribed or template strand and that the other strand is called the non-transcribed strand 2.18 Explain that, in eukaryotes, the RNA molecule formed following transcription (primary transcript) is modified by the removal of non-coding sequences (introns) and the joining together of coding sequences (exons) to form mRNA 2.19 State that a gene mutation is a change in the sequence of base pairs in a DNA molecule that may result in an altered polypeptide 2.20 Explain that a gene mutation is a result of substitution or deletion or insertion of nucleotides in DNA and outline how each of these types of mutation may affect the polypeptide produced **Passage of information from parents to offspring:** 2.21 Explain the meanings of the terms haploid (n) and diploid (2n) 2.22 Explain what is meant by homologous pairs of chromosomes 2.23 Explain the need for a reduction division during meiosis in the production of gametes 2.24 Describe the behaviour of chromosomes in plant and animal cells during meiosis and the associated behaviour of the nuclear envelope, the cell surface membrane and the spindle (names of the main stages of meiosis, but not the sub-divisions of prophase I, are

	expected: prophase I, metaphase I, anaphase I, telophase I, prophase II, metaphase II, anaphase II and telophase II) 2.25 Interpret photomicrographs and diagrams of cells in different stages of meiosis and identify the main stages of meiosis 2.26 Explain that crossing over and random orientation (independent assortment) of pairs of homologous chromosomes and sister chromatids during meiosis produces genetically different gametes 2.27 Explain that the random fusion of gametes at fertilisation produces genetically different individuals **The roles of genes in determining the phenotype:** 2.28 Explain the terms gene, locus, allele, dominant, recessive, codominant, linkage, test cross, F1, F2, phenotype, genotype, homozygous and heterozygous 2.29 Interpret and construct genetic diagrams, including Punnett squares, to explain and predict the results of monohybrid crosses and dihybrid crosses that involve dominance, codominance, multiple alleles and sex linkage 2.30 Interpret and construct genetic diagrams, including Punnett squares, to explain and predict the results of dihybrid crosses that involve autosomal linkage and epistasis 2.31 Interpret and construct genetic diagrams, including Punnett squares, to explain and predict the results of test crosses 2.32 Explain the relationship between genes, proteins and phenotype with respect to the ○ TYR gene, tyrosinase and albinism, ○ HBB gene, haemoglobin and sickle cell anaemia, ○ F8 gene, factor VIII and haemophilia, and ○ HTT gene, huntingtin and Huntington's disease 2.33 Explain the role of gibberellin in stem elongation including the role of the dominant allele, Le, that codes for a functional enzyme in the gibberellin synthesis pathway, and the recessive allele, le, that codes for a non-functional enzyme **Gene control:** 2.34 Describe the differences between structural genes and regulatory genes and the differences between repressible enzymes and inducible enzymes 2.35 Explain genetic control of protein production in a prokaryote using the lac operon (knowledge of the role of cAMP is not expected) 2.36 Recognise that transcription factors are proteins that bind to DNA and are involved in the control of gene expression in eukaryotes by decreasing or increasing the rate of transcription 2.37 Explain how gibberellin activates genes by causing the breakdown of DELLA protein repressors, which normally

	inhibit factors that promote transcription
3. Define and discuss cell membranes, and the mammalian transport and cardiovascular systems	**Fluid mosaic membranes:** 3.1 Describe the fluid mosaic model of membrane structure with reference to the hydrophobic and hydrophilic interactions that account for the formation of the phospholipid bilayer and the arrangement of proteins 3.2 Describe the arrangement of cholesterol, glycolipids and glycoproteins in cell surface membranes 3.3 Describe the roles of phospholipids, cholesterol, glycolipids, proteins and glycoproteins in cell surface membranes, with reference to stability, fluidity, permeability, transport (carrier proteins and channel proteins), cell signalling (cell surface receptors) and cell recognition 3.4 Outline the main stages in the process of cell signalling leading to specific responses: ○ (secretion of specific chemicals (ligands) from cells ○ transport of ligands to target cells, ○ binding of ligands to cell surface receptors on target cells) **Movement into and out of cells:** 3.5 Describe and explain the processes of simple diffusion, facilitated diffusion, osmosis, active transport, endocytosis and exocytosis 3.6 Investigate simple diffusion and osmosis using plant tissue and non-living materials, including dialysis (Visking) tubing and agar 3.7 Illustrate the principle that surface area to volume ratios decrease with increasing size by calculating surface areas and volumes of simple 3-D shapes 3.8 Investigate the effect of changing surface area to volume ratio on diffusion using agar blocks of different sizes 3.9 Investigate the effects of immersing plant tissues in solutions of different water potentials, using the results to estimate the water potential of the tissues 3.10 Explain the movement of water between cells and solutions in terms of water potential and explain the different effects of the movement of water on plant cells and animal cells **The circulatory system:** 3.11 state that the mammalian circulatory system is a closed double circulation consisting of a heart, blood and blood vessels including arteries, arterioles, capillaries, venules and veins 3.12 describe the functions of the main blood vessels of the pulmonary and systemic circulations, limited to pulmonary artery, pulmonary vein, aorta and vena cava 3.13 recognise arteries, veins and capillaries from microscope slides, photomicrographs and electron micrographs and make plan diagrams showing the structure of arteries and veins in transverse section (TS) and longitudinal section (LS)

	3.14 explain how the structure of muscular arteries, elastic arteries, veins and capillaries are each related to their functions 3.15 recognise and draw red blood cells, monocytes, neutrophils and lymphocytes from microscope slides, photomicrographs and electron micrographs 3.16 state that water is the main component of blood and tissue fluid and relate the properties of water to its role in transport in mammals, limited to solvent action and high specific heat capacity 3.17 state the functions of tissue fluid and describe the formation of tissue fluid in a capillary network 3.18 Cardiovascular diseases 3.19 Prevention and cure of coronary heart disease. **Transport of oxygen and carbon dioxide:** 3.20 Describe the role of red blood cells in transporting oxygen and carbon dioxide with reference to the roles of: ○ haemoglobin, ○ carbonic anhydrase, ○ the formation of haemoglobinic acid, and ○ the formation of carbaminohaemoglobin 3.21 Describe the chloride shift and explain the importance of the chloride shift 3.22 Describe the role of plasma in the transport of carbon dioxide 3.23 Describe and explain the oxygen dissociation curve of adult haemoglobin 3.24 Explain the importance of the oxygen dissociation curve at partial pressures of oxygen in the lungs and in respiring tissues 3.25 Describe the Bohr shift and explain the importance of the Bohr shift 3.26 Issues with Oxygen transport. **The heart:** 3.27 Describe the external and internal structure of the mammalian heart 3.28 Explain the differences in the thickness of the walls of the atria and left and right ventricles 3.29 Describe the cardiac cycle, with reference to the relationship between blood pressure changes during systole and diastole and the opening and closing of valves 3.30 Explain the roles of the sinoatrial node, the atrioventricular node and the Purkyne tissue in the cardiac cycle

4. Define and discuss gas exchange and the human respiratory and energy release systems	**The gas exchange system:** 4.1 Describe the structure of the human gas exchange system, including the lungs, trachea, bronchi, bronchioles, alveoli and capillary network 4.2 Describe the distribution in the gas exchange system of cartilage, ciliated epithelium, goblet cells, squamous epithelium of alveoli, smooth muscle and capillaries 4.3 Recognise cartilage, ciliated epithelium, goblet cells, squamous epithelium of alveoli, smooth muscle and capillaries in microscope slides, photomicrographs and electron micrographs 4.4 Recognise trachea, bronchi, bronchioles and alveoli in microscope slides, photomicrographs and electron micrographs and make plan diagrams of transverse sections of the walls of the trachea and bronchus 4.5 Describe the functions of ciliated epithelial cells, goblet cells and mucous glands in maintaining the health of the gas exchange system 4.6 Describe the functions in the gas exchange system of cartilage, smooth muscle, elastic fibres and squamous epithelium 4.7 Describe gas exchange between air in the alveoli and blood in the capillaries 4.8 Link between smoking and lung diseases **Energy:** 4.9 State that cells use ATP from respiration for energy-requiring processes 4.10 Outline the need for energy in living organisms, as illustrated by active transport, movement and anabolic reactions, such as those occurring in DNA replication and protein synthesis 4.11 Describe the features of ATP that make it suitable as the universal energy currency 4.12 State that ATP is synthesised by: ○ transfer of phosphate in substrate-linked reactions, and ○ chemiosmosis in membranes of mitochondria and chloroplasts 4.13 Explain the relative energy values of carbohydrates, lipids and proteins as respiratory substrates 4.14 State that the respiratory quotient (RQ) is the ratio of the number of molecules of carbon dioxide produced to the number of molecules of oxygen taken in, as a result of respiration 4.15 Calculate RQ values of different respiratory substrates from equations for respiration 4.16 Describe and carry out investigations, using simple respirometers, to determine the RQ of germinating seeds or small invertebrates (e.g., blowfly larvae) **Respiration:** 4.17 State where each of the four stages in aerobic respiration occurs in eukaryotic cells:

	○ glycolysis in the cytoplasm, ○ link reaction in the mitochondrial matrix, ○ Krebs cycle in the mitochondrial matrix and ○ oxidative phosphorylation on the inner membrane of mitochondria 4.18 Outline glycolysis as phosphorylation of glucose and the subsequent splitting of fructose 1,6-bisphosphate (6C) into two triose phosphate molecules (3C), which are then further oxidised to pyruvate (3C), with the production of ATP and reduced NAD 4.19 Explain that, when oxygen is available, pyruvate enters mitochondria to take part in the link reaction 4.20 Describe the link reaction, including the role of coenzyme A in the transfer of acetyl (2C) groups 4.21 Outline the Krebs cycle, explaining that oxaloacetate (4C) acts as an acceptor of the 2C fragment from acetyl coenzyme A to form citrate (6C), which is converted back to oxaloacetate in a series of small steps 4.22 Explain that reactions in the Krebs cycle involve decarboxylation and dehydrogenation and the reduction of the coenzymes NAD and FAD 4.23 Describe the role of NAD and FAD in transferring hydrogen to carriers in the inner mitochondrial membrane 4.24 Explain what happens during oxidative phosphorylation 4.25 Describe the relationship between the structure and function of mitochondria using diagrams and electron micrographs 4.26 Outline respiration in anaerobic conditions in mammals (lactate fermentation) and in yeast cells (ethanol fermentation) 4.27 Explain why the energy yield from respiration in aerobic conditions is much greater than the energy yield from respiration in anaerobic conditions 4.28 Explain how rice is adapted to grow with its roots submerged in water, limited to the development of aerenchyma in roots, ethanol fermentation in roots and faster growth of stems 4.29 Describe and carry out investigations using redox indicators, including DCPIP and methylene blue, to determine the effects of temperature and substrate concentration on the rate of respiration of yeast 4.30 Describe and carry out investigations using simple respirometers to determine the effect of temperature on the rate of respiration

5. Recognise, define, and discuss diseases and infections, and the human body's immune system as a means of defences against them.	**Infectious diseases:** 5.1 Recognise that infectious diseases are caused by pathogens and are transmissible 5.2 State the name and type of pathogen that causes a) cholera, b) malaria, c) tuberculosis (TB) and d) HIV/AIDS 5.3 Explain how cholera, malaria, TB and HIV are transmitted 5.4 Discuss the biological, social and economic factors that need to be considered in the prevention and control of cholera, malaria, TB and HIV 5.5 Covid, SARS, Bird flu, and Measles **Antibiotics:** 5.6 Outline how penicillin acts on bacteria and why antibiotics do not affect viruses 5.7 Discuss the consequences of antibiotic resistance and the steps that can be taken to reduce its impact **The immune system:** 5.8 Describe the mode of action of phagocytes (macrophages and neutrophils) 5.9 Explain what is meant by an antigen and state the difference between self-antigens and non-self-antigens 5.10 Describe the sequence of events that occurs during a primary immune response with reference to the roles of: o macrophages, o B-lymphocytes, o T-lymphocytes 5.11 Explain the role of memory cells in the secondary immune response and in long-term immunity **Antibodies and vaccination:** 5.12 Relate the molecular structure of antibodies to their functions 5.13 Outline the hybridoma method for the production of monoclonal antibodies 5.14 Outline the principles of using monoclonal antibodies in the diagnosis of disease and in the treatment of disease 5.15 Describe the differences between active immunity and passive immunity and between natural immunity and artificial immunity 5.16 Explain that vaccines contain antigens that stimulate immune responses to provide long-term immunity 5.17 Explain how vaccination programmes can help to control the spread of infectious diseases 5.18 Problems with vaccines 5.19 The eradication of smallpox

6. Recognise, define, and discuss the systems involved in the regulation, coordination and control of the human body and in plants	**Homeostasis in mammals:** 6.1 Explain what is meant by homeostasis and the importance of homeostasis in mammals 6.2 Explain the principles of homeostasis in terms of internal and external stimuli, receptors, coordination systems (nervous system and endocrine system), effectors (muscles and glands) and negative feedback 6.3 State that urea is produced in the liver from the deamination of excess amino acids 6.4 Describe the structure of the human kidney, including fibrous capsule, cortex, medulla, renal pelvis, ureter and branches of the renal artery and renal vein 6.5 Identify, in diagrams, photomicrographs and electron micrographs, the parts of a nephron and its associated blood vessels and structures, including glomerulus, Bowman's capsule, proximal convoluted tubule, loop of Henle, distal convoluted tubule and collecting duct 6.6 Describe and explain the formation of urine in the nephron 6.7 Relate the detailed structure of the Bowman's capsule and proximal convoluted tubule to their functions in the formation of urine 6.8 Describe the roles of the hypothalamus, posterior pituitary gland, antidiuretic hormone (ADH), aquaporins and collecting ducts in osmoregulation 6.9 Describe the principles of cell signalling using the example of the control of blood glucose concentration by glucagon 6.10 Explain how negative feedback control mechanisms regulate blood glucose concentration, with reference to the effects of insulin on muscle cells and liver cells and the effect of glucagon on liver cells 6.11 Explain the principles of operation of test strips and biosensors for measuring the concentration of glucose in blood and urine, with reference to glucose oxidase and peroxidase enzymes **Homeostasis in plants:** 6.12 Explain that stomata respond to changes in environmental conditions by opening and closing and that regulation of stomatal aperture balances the need for carbon dioxide uptake by diffusion with the need to minimise water loss by transpiration 6.13 Explain that stomata have daily rhythms of opening and closing 6.14 Describe the structure and function of guard cells and explain the mechanism by which they open and close stomata 6.15 Describe what plant growth regulators are and the role of abscisic acid in the closure of stomata during times of water stress, including the role of calcium ions as a second messenger **Control and coordination in Mammals:** 6.16 Structure and function of the central nervous system (CNS) and the peripheral nervous system (PNS)

	6.17 Describe the features of the endocrine system with reference to the hormones ADH, glucagon and insulin 6.18 Compare the features of the nervous system and the endocrine system 6.19 Describe the structure and function of a sensory neurone and a motor neurone and state that intermediate neurones connect sensory neurones and motor neurones 6.20 Outline the role of sensory receptor cells in detecting stimuli and stimulating the transmission of impulses in sensory neurones 6.21 Describe the sequence of events that results in an action potential in a sensory neurone, using a chemoreceptor cell in a human taste bud as an example 6.22 Describe and explain changes to the membrane potential of neurones, including: o how the resting potential is maintained, o the events that occur during an action potential, o how the resting potential is restored during the refractory period 6.23 Describe and explain the rapid transmission of an impulse in a myelinated neurone with reference to saltatory conduction 6.24 Explain the importance of the refractory period in determining the frequency of impulses 6.25 Describe the structure of a cholinergic synapse and explain how it functions, including the role of calcium ions 6.26 Describe the roles of neuromuscular junctions, the T-tubule system and sarcoplasmic reticulum in stimulating contraction in striated muscle 6.27 Describe the ultrastructure of striated muscle with reference to sarcomere structure using electron micrographs and diagrams 6.28 Explain the sliding filament model of muscular contraction including the roles of troponin, tropomyosin, calcium ions and ATP 6.29 The structure and function of the eyes (in relation to sight), ears (in relation to hearing), nose (in relation so smell), mouth (in relation to taste) and the skin (in relation to sensory perception). 6.30 Explain the roles of hormones in controlling the human menstrual cycle and outline the biological basis of contraceptive pills 6.31 Explain the roles of the eight hormones: o insulin, o leptin, o triiodothyronine, o cortisol, o ghrelin, o progesterone, o testosterone, and o oestrogen in regulating and controlling a proper metabolism functioning in the human body.

	Control and coordination in plants: 6.32 Describe the rapid response of the Venus fly trap to stimulation of hairs on the lobes of modified leaves and explain how the closure of the trap is achieved 6.33 Explain the role of auxin in elongation growth by stimulating proton pumping to acidify cell walls 6.34 Describe the role of gibberellin in the germination of barley
7. Define, explain, and discuss photosynthesis and transport in multicellular plants	**Structure of transport tissues:** 7.1 The need for transport systems in multicellular organisms 7.2 Draw plan diagrams of transverse sections of stems, roots and leaves of herbaceous dicotyledonous plants from microscope slides and photomicrographs 7.3 Describe the distribution of xylem and phloem in transverse sections of stems, roots and leaves of herbaceous dicotyledonous plants 7.4 Draw and label xylem vessel elements, phloem sieve tube elements and companion cells from microscope slides, photomicrographs and electron micrographs 7.5 Relate the structure of xylem vessel elements, phloem sieve tube elements and companion cells to their functions **Transport mechanisms:** 7.6 Recognise that some mineral ions and organic compounds can be transported within plants dissolved in water 7.7 Describe the transport of water from the soil to the xylem through the apoplast and symplast pathways 7.8 Explain that transpiration involves the evaporation of water from the internal surfaces of leaves followed by diffusion of water vapour to the atmosphere 7.9 Explain how hydrogen bonding of water molecules is involved with movement of water in the xylem by cohesion-tension in transpiration pull and by adhesion to cellulose in cell walls 7.10 Make annotated drawings of transverse sections of leaves from xerophytic plants to explain how they are adapted to reduce water loss by transpiration 7.11 State that assimilates dissolved in water, such as sucrose and amino acids, move from sources to sinks in phloem sieve tubes 7.12 Explain how companion cells transfer assimilates to phloem sieve tubes, with reference to proton pumps and cotransporter proteins 7.13 Explain mass flow in phloem sieve tubes down a hydrostatic pressure gradient from source to sink **Photosynthesis as an energy transfer process:** 7.14 Describe the relationship between the structure of chloroplasts, as shown in diagrams and electron micrographs, and their function 7.15 Explain that energy transferred as ATP and reduced NADP from the light-dependent stage is used during the light-independent stage (Calvin cycle) of photosynthesis to produce complex organic molecules

	7.16 State that within a chloroplast, the thylakoids (thylakoid membranes and thylakoid spaces), which occur in stacks called grana, are the site of the light-dependent stage and the stroma is the site of the light-independent stage 7.17 Describe the role of chloroplast pigments (chlorophyll a, chlorophyll b, carotene and xanthophyll) in light absorption in thylakoids 7.18 Interpret absorption spectra of chloroplast pigments and action spectra for photosynthesis 7.19 Describe and use chromatography to separate and identify chloroplast pigments (reference should be made to Rf values in identification of chloroplast pigments) 7.20 State that cyclic photophosphorylation and non-cyclic photophosphorylation occur during the light-dependent stage of photosynthesis 7.21 Explain what happens in cyclic and non- cyclic photophosphorylation 7.22 Outline the three main stages of the Calvin cycle 7.23 Recognise that Calvin cycle intermediates are used to produce other molecules, limited to GP to produce some amino acids and TP to produce carbohydrates, lipids and amino acids **Investigation of limiting factors:** 7.24 State that light intensity, carbon dioxide concentration and temperature are examples of limiting factors of photosynthesis 7.25 Explain the effects of changes in light intensity, carbon dioxide concentration and temperature on the rate of photosynthesis 7.26 Describe the investigations carried out using redox indicators, including DCPIP and methylene blue, and the suspension of chloroplasts to determine the effects of light intensity and light wavelength on the rate of photosynthesis 7.27 Describe and the investigations carried out using whole plants, including aquatic plants, to determine the effects of light intensity, carbon dioxide concentration and temperature on the rate of photosynthesis

8. Define and discuss selection, evolution, classification, biodiversity, and conservation	**Variation:** 8.1 Explain, with examples, that phenotypic variation is due to genetic factors or environmental factors or a combination of genetic and environmental factors 8.2 Explain what is meant by discontinuous variation and continuous variation 8.3 Explain the genetic basis of discontinuous variation and continuous variation **Natural and artificial selection:** 8.4 Explain that natural selection occurs because populations have the capacity to produce many offspring that compete for resources; in the 'struggle for existence', individuals that are best adapted are most likely to survive to reproduce and pass on their alleles to the next generation 8.5 Explain how environmental factors can act as stabilising, disruptive and directional forces of natural selection 8.6 Explain how selection, the founder effect and genetic drift, including the bottleneck effect, may affect allele frequencies in populations 8.7 Outline how bacteria become resistant to antibiotics as an example of natural selection 8.8 Use the Hardy-Weinberg principle to calculate allele and genotype frequencies in populations and state the conditions when this principle can be applied 8.9 Describe the principles of selective breeding (artificial selection) 8.10 Outline the following examples of selective breeding: ○ the introduction of disease resistance to varieties of wheat and rice, ○ inbreeding and hybridisation to produce vigorous, uniform varieties of maize, and ○ improving the milk yield of dairy cattle **Evolution:** 8.11 The Darwin-Wallace theory of evolution by natural selection, outlining the theory of evolution as a process leading to the formation of new species from pre-existing species over time, as a result of changes to gene pools from generation to generation 8.12 Discuss how DNA sequence data can show evolutionary relationships between species 8.13 Explain how speciation may occur as a result of genetic isolation by: ○ geographical separation (allopatric speciation) and ○ ecological and behavioural separation (sympatric speciation) **Classification:** 8.14 Discuss the meaning of the term species, limited to the biological species concept, morphological species concept and ecological species concept 8.15 Describe the classification of organisms into three domains: Archaea, Bacteria and Eukarya

	8.16 State that Archaea and Bacteria are prokaryotes and that there are differences between them, limited to differences in membrane lipids, ribosomal RNA and composition of cell walls 8.17 Describe the classification of organisms in the Eukarya domain into the taxonomic hierarchy of kingdom, phylum, class, order, family, genus and species 8.18 Outline the characteristic features of the kingdoms Protoctista, Fungi, Plantae and Animalia 8.19 Outline how viruses are classified, limited to the type of nucleic acid (RNA or DNA) and whether this is single stranded or double stranded **Biodiversity:** 8.20 Define the terms ecosystem and niche 8.21 Explain that biodiversity can be assessed at different levels, including: o the number and range of different ecosystems and habitats, o the number of species and their relative abundance, o the genetic variation within each species 8.22 Explain the importance of random sampling in determining the biodiversity of an area 8.23 Describe and use suitable methods to assess the distribution and abundance of organisms in an area, limited to frame quadrats, line transects, belt transects and mark-release-recapture using the Lincoln index 8.24 Use Spearman's rank correlation and Pearson's linear correlation to analyse the relationships between two variables, including how biotic and abiotic factors affect the distribution and abundance of species (formulae provided) 8.25 Use Simpson's index of diversity (D) to calculate the biodiversity of an area, and state the significance of different values of D (formulae provided) **Conservation:** 8.26 Explain why populations and species can become extinct as a result of climate change, competition, hunting by humans, degradation and loss of habitats 8.27 Outline reasons for the need to maintain biodiversity 8.28 Outline the roles of zoos, botanic gardens, conserved areas (including national parks and marine parks), 'frozen zoos' and seed banks, in the conservation of endangered species 8.29 Describe methods of assisted reproduction used in the conservation of endangered mammals, including IVF, embryo transfer and surrogacy 8.30 Explain reasons for controlling invasive alien species 8.31 Outline the role in conservation of the International Union for the Conservation of Nature (IUCN) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

9. Recognise, define, and discuss genetic technology and its principles and advancements	**Principles of genetic technology:** 9.1 Define the term recombinant DNA 9.2 Explain that genetic engineering is the deliberate manipulation of genetic material to modify specific characteristics of an organism and that this may involve transferring a gene into an organism so that the gene is expressed 9.3 Explain that genes to be transferred into an organism may be: (a) extracted from the DNA of a donor organism, (b) synthesised from the mRNA of a donor organism, (c) synthesised chemically from nucleotides 9.4 Explain the roles of restriction endonucleases, DNA ligase, plasmids, DNA polymerase and reverse transcriptase in the transfer of a gene into an organism 9.5 Explain why a promoter may have to be transferred into an organism as well as the desired gene 9.6 Explain how gene expression may be confirmed by the use of marker genes coding for fluorescent products 9.7 Explain that gene editing is a form of genetic engineering involving the insertion, deletion or replacement of DNA at specific sites in the genome 9.8 Describe and explain the steps involved in the polymerase chain reaction (PCR) to clone and amplify DNA, including the role of Taq polymerase 9.9 Describe and explain how gel electrophoresis is used to separate DNA fragments of different lengths 9.10 Outline how microarrays are used in the analysis of genomes and in detecting mRNA in studies of gene expression 9.11 Mining with microorganisms 9.12 Large scale production techniques 9.13 Advantages of batch and continuous culture 9.14 Outline the benefits of using databases that provide information about nucleotide sequences of genes and genomes, and amino acid sequences of proteins and protein structures **Genetic technology applied to medicine:** 9.15 Explain the advantages of using recombinant human proteins to treat disease, using the examples insulin, factor VIII and adenosine deaminase 9.16 Outline the advantages of genetic screening, using the examples of breast cancer (BRCA1 and BRCA2), Huntington's disease and cystic fibrosis 9.17 Outline how genetic diseases can be treated with gene therapy, using the examples severe combined immunodeficiency (SCID) and inherited eye diseases 9.18 Discuss the social and ethical considerations of using genetic screening and gene therapy in medicine **Genetically modified organisms in agriculture:** 9.19 Explain that genetic engineering may help to solve the global demand for food by improving the quality and productivity of farmed animals and crop plants, using the

	examples of GM salmon, herbicide resistance in soybean and insect resistance in cotton 9.20 Discuss the ethical and social implications of using genetically modified organisms (GMOs) in food production

Syllabus Content			
Topic No.	**Topic title**	**Proportion**	**Course coverage**
1.	Cell structure, biological molecules, and enzymes	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	**Cell structure:** • Cells • Cell biology and microscopy • Similarities and differences between animal and plant cells • Units of measurement in cell studies • Electron microscopes • Ultrastructure of animal cells • Structure and functions of organelles • Ultra structure of plant cells • Two fundamentally different types of cells • Tissues and organs **Biological molecules:** • The building blocks of life • Monomers, polymers, and macromolecules • Carbohydrates • Lipids • Proteins • Water **Enzymes:** • How enzymes reduce activation energy • The course of a reaction • Enzyme inhibitors ***Learning Outcome: 1***
2.	Cell, nuclear division, and genetic control	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	**The mitotic cell cycle:** • The nucleus contains chromosomes • The structure of chromosomes • Types of nuclear division • Mitosis in an animal cell • Cancer **Nucleic acids and protein synthesis:** • The structure of DNA and RNA • DNA replication • Genes and mutations • DNA, RNA, and protein synthesis ***Learning Outcome: 2***

3.	Cell membranes, the mammalian transport system and mammalian heart	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	**Cell membranes:** • Phospholipids • Structure of membranes • Transport across the cell surface membrane **The mammalian transport system:** • The mammalian cardiovascular system • Blood plasma and tissue fluid • Lymph • Blood • Haemoglobin • Issues with oxygen transport **The mammalian heart:** • The cardiac cycle • Cardiovascular diseases • Prevention and cure of coronary heart disease • Control of the heartbeat ***Learning Outcome: 3***
4.	Gas exchange and lungs	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Lungs • Trachea, bronchi, and bronchioles • Alveoli • Smoking • Lung diseases • Proving the link between smoking and lung diseases ***Learning Outcome: 4***

5.	Infectious diseases and immunity	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	**Infectious diseases:** • Worldwide importance of infectious diseases • Cholera • Malaria • Acquired immune deficiency syndrome (AIDS) • Tuberculosis (TB) • Antibiotics • Covid, SARS, bird flu, etc. **Immunity:** • Defence against diseases • Cells of the immune system • Active and passive immunity • Vaccination • Problems with vaccines • The eradication of smallpox • Measles ***Learning Outcome: 5***
6.	The human respiratory and energy release systems	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• The need for energy in living organisms • Work • ATP • Respiration • Anaerobic respiration • Respiratory substrates ***Learning Outcome: 4***
7.	Photosynthesis and transport in multicellular plants	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	**Transport in multicellular plants:** • The need for transport systems in multicellular organisms • Transport of water • Transport in multicellular plants • Translocation • Differences between sieve tubes and xylem vessels **Photosynthesis:** • An energy transfer process • The light-dependent and independent reactions of photosynthesis • Leaf structure and function • Chloroplast structure and function • Factors necessary for photosynthesis • Trapping light energy ***Learning Outcome: 7***

8.	Homeostasis and Regulation	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	**Homeostasis in mammals:** • What is homeostasis and what is its importance? • Principles of homeostasis • The structure and function of the human kidney and the formation of urine. • Osmoregulation and the roles of hypothalamus, posterior pituitary gland and antidiuretic hormone. • Principles and operation of testing the concentration of glucose in blood and urine. **Homeostasis in plants:** • Stomatal response to changes in environmental conditions • Structure and function of guard cells • Describing what plant growth regulators are and the role of abscisic acid in stomatal closure. ***Learning Outcome: 6***
9.	Control and Coordination	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Structures and functions of the central nervous system (CNS) and peripheral nervous system (PNS) • The transmission of impulses across synapses • The endocrine system • Feedback loops • Hormones and controlling metabolism • Hormones and controlling menstrual cycle and during pregnancy • The structure and function of the eyes (in relation to sight), ears (in relation to hearing), nose (in relation to smell), mouth (in relation to taste) and the skin (in relation to sensory perception). • Excretion • Control of water content • Nervous communication • Hormonal communication • Plant growth regulators • Electrical communication in plants ***Learning Outcome: 6***

10.	Inherited change and Inheritance	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Meiosis • Genetics • Genotype affects phenotype • Inheriting genes • Multiple alleles • Sex inheritance • Sex linkage • Dihybrid crosses • Mutations • Environment and phenotype ***Learning Outcome: 2***
11.	Selection, evolution, biodiversity, and conservation	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Natural selection • Evolution • The Darwin-Wallace theory of evolution by natural selection • Species and speciation • Artificial selection • The five-kingdom classification • Maintaining biodiversity • Endangered species ***Learning Outcome: 8***
12.	Gene technology and biotechnology	1/12 Lectures: 4 hrs Tutorials: 1 hr Private study: 11.33 hrs	• Gene technology • Benefits of gene technology • Potential hazards of gene technology • Social and ethical implication of genetic engineering • Electrophoresis • Cystic fibrosis • Genetic counselling • Genetic screening • Mining with microorganisms • Large-scale production techniques • Advantages of batch and continuous culture • How penicillin works • Immobilising enzymes • Monoclonal antibodies ***Learning Outcome: 9***

Assessment Type
Two 2-hour closed-book, supervised, paper-based global exams (100%): • Exam 1; covers Topics 1-6 (50%) • Exam 2; covers Topics 7-12 (50%)
See also Section 3 above

14. Introduction to Computer Science

Title	Introduction to Computer Science
Unit reference number	F/504/0727
Credits	10
Level	3
Type	Elective

Guided Learning Hours	52 hours	**Total Qualification Time**	100 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Understand fundamental concepts relating to computer systems	1.1 Describe the purpose of a computer system 1.2 Identify types of computers for different functions 1.3 Describe an 'embedded system' and be able to recognise and provide examples of where this type of computing is used 1.4 Describe the purpose of the main hardware components found in a typical desktop PC including motherboard, buses, ports, CPU, optical drives, hard disk store, cooling fan, ram sticks, power supply and graphics card 1.5 Define the term 'hardware' and peripheral' and identify methods of connecting peripherals to a computer system 1.6 Describe a range of input and output peripheral devices and justify the use of a type of device for a particular purpose 1.7 Describe the purpose of a CPU, its components and their functions 1.8 Describe the stages and components involved in the Fetch Decode Execute Cycle 1.9 Describe the role of primary memory (RAM, ROM, registers and cache memory) 1.10 Describe a range of factors that affect the CPU performance
2. Understand the characteristics of secondary storage	2.1 Describe a range of secondary storage media and justify the use of a type of storage media for a particular purpose 2.2 Identify and convert between units of secondary storage

	2.3 Describe how data is stored on magnetic storage devices (hard disk drives, magnetic tape), optical storage devices (CD, DVD, Blu Ray) and solid state storage (solid state drives, USB pens, SD cards) 2.4 Explain the criteria for consideration when selecting secondary storage including cost, capacity, speed of access, portability, durability and reliability 2.5 Describe cloud storage and explain the advantages and drawbacks of using this type of storage 2.6 Calculate data capacity
3. Understand application and system software	3.1 Define the term 'application software' 3.2 Describe a range of application software and justify the use of a type of software for a particular purpose including spreadsheets, databases, word processors, web-browsers, desk-top publishers, graphic design software and e-mail software 3.3 Identify features of application software that make them suitable for a specific purpose 3.4 Describe software licenses and why they are needed 3.5 Describe piracy and the law that protects software developers 3.6 Describe the purpose and functions of an operating system 3.7 Define the term 'user interface' and describe a range of types of interface including graphical user interface, mobile user interface and a command line interface 3.8 Describe the features of types of interfaces 3.9 Describe how the operating system manages memory, peripherals, users and files including the use of paging, device drivers, access levels and auditing 3.10 Describe a range of utility software and their role in maintaining computer systems including defragmentation, backups, encryption and compression

4. Understand how computers store data	4.1 Describe how data is represented by the binary number system 4.2 Demonstrate the addition of binary numbers 4.3 Demonstrate the use of two's compliment to represent negative binary numbers 4.4 Describe how keyboard characters are stored using binary including character sets ASCII & Unicode 4.5 Describe the hexadecimal number system and explain why colours are often represented by hexadecimal 4.6 Demonstrate conversion between hexadecimal and decimal and binary number systems 4.7 Describe how images are represented in a computer system including colour depth, resolution and image size 4.8 Describe how sound is represented in a computer system including sample rate and bit depth 4.9 Calculate the size of an image and sound file and identify file formats of images and sound files 4.10 Describe how lossy and lossless compression can facilitate the storage and transmission of data
5. Understand logic gates	5.1 Describe a computer in terms of logic gates and circuits 5.2 Demonstrate the effects of the AND, OR, NAND, NOR, XOR and NOT gates 5.3 Calculate the outputs of a combination of logic gates 5.4 Draw logic gates circuit diagrams to represent logic sequences 5.5 Describe the use of truth tables and create tables to record logic inputs and outputs
6. Understand the fundamental concepts of computer networks and threats to network security	6.1 Explain the advantages and disadvantages of computer networks vs standalone computer systems 6.2 Describe types of computer network and explain the criteria for selecting a particular type of network including LANs, WANS, peer-to-peer networks and client-server networks 6.3 Describe the hardware used in connecting devices to a network including hubs, switches, WAP's and routers 6.4 Describe and contrast the transmission media used in a computer network including twisted copper wire and fibre optic cable 6.5 Describe how wireless networks work 6.6 Describe the range of factors that affect the performance of a wired and wireless network 6.7 Describe and contrast star and mesh network topologies

	6.8 Describe a range of threats against a computer network 6.9 Describe the Internet and World Wide Web 6.10 Define the terms 'social engineering', 'phishing', 'pharming' and 'shoulder-surfing' 6.11 Describe a range of network security methods to prevent threats including firewalls, encryption, anti-malware software, mac address filtering, user access levels and the use of penetration testing 6.12 Describe methods of user authentication
7. Understand Ethical, Environmental and Cultural issues in Computing	7.1 Explain a range of ethical concerns with a range of technological developments including social media, virtual and augmented reality, cloud technology and music streaming 7.2 Define the term 'artificial intelligence' and explain why AI presents ethical concerns for a range of sectors 7.3 Describe a range of cultural issues involving technological advances including remote working and the 'digital divide' 7.4 Describe a range of environmental issues

Syllabus Content			
Topic No	**Topic Title**		**Course Coverage**
1.	Introduction to Computer Systems and Hardware	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• Definition of computer system • Functions of a computer system: Input, Process and Output • Types of computer systems • Embedded Systems • Definition of hardware • Hardware components: • Motherboard, chips, central processing unit (CPU), clock, memory, chipset, expansion slots and cards, power supply, fan, buses, connectors • Input and Output Peripherals ***Learning Outcome: 1***

2.	The CPU and Primary Memory	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• The purpose of a computer processor • Components of a CPU • The functions of a CPU • How components of a CPU communicate with each other • The fetch-execute-decode cycle • Primary Memory: RAM and ROM • Primary Memory: Cache and Registers • The CPU performance ***Learning Outcome: 1***
3.	Secondary Storage	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• Types of Secondary Storage • Units of Storage • Magnetic Storage • Optical Storage • Solid State Storage • Criteria for • Cloud Storage • Calculating Capacity of files ***Learning Outcomes: 2***
4.	Application Software	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• Categories of software • Types, features and uses of application software • Criteria to consider when selecting application software • Software distribution • Proprietary Software • Open Source Software • Software licences • Software piracy and the Copyright Law ***Learning Outcome: 3***
5.	System Software	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• System software • Operating systems • User Interfaces • Features of interfaces • Memory Management • User Management • File Management • Device Management • Utility Software • Defragmentation • Encryption • Compression ***Learning Outcome: 3***

6.	Data Representation: Numbers & Text	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• Binary representation of data • Number systems • Conversion between binary and decimal • Addition of binary numbers • Two's complement • ASCII representation of data • Unicode representation of data ***Learning Outcome: 4***
7.	Data Representation- Images & Sound	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• Hexadecimal number system • Converting decimal, binary and hexadecimal numbers • Image representation • Sound representation • Lossy compression • Lossless compression • Compression of data • Compression of images • File formats and sizes ***Learning Outcome: 4***
8.	Logic Gates	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• Digital logic • Truth Tables • Logic gates • - AND • - OR • - NOT • - NAND • - NOR • - XOR ***Learning Outcome: 5***
9.	Computer Networks	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• Networks vs standalone machines • Types of network • Criteria for selecting a network • Network connecting hardware • Network transmission media • Wireless networks • Network performance issues • Network topologies – star & mesh ***Learning Outcome: 6***

10.	Network Security	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes of private study 1 hour laboratory session	• Network threats • Social Engineering • Security Methods ***Learning Outcome: 6***
11.	Computer Ethics	2 hours of lectures 2 hours of tutorials 3 hours 50 minutes private study 1 hour laboratory session	• Definition of Ethics • Social Media and Privacy • Artificial Intelligence • Automation • Cultural Issues • The Digital Divide • Environmental Issues ***Learning Outcome: 7***
12.	Summary and Exam Preparation	2 hours of lectures 2 hours of tutorials 2 hours 50 minutes of private study	• Summary of key points • Exam preparation ***Learning Outcome: All***

Related National Occupational Standards (NOS)

Sector Subject Area: IT Users

Related NOS: ESKITU080, ESKIDMS1 P1-5, Enter, edit and organise structured information in a database

ESKIDB1 P6-7 Use database software tools to extract information and produce reports

ESKIDB2 P8-11 Use database software tools to run queries and produce reports

ESKIDB3 P1-4 Plan, create and modify relational database tables to meet requirements

ESKIDMS2 P1-5 Enter, edit and maintain data records in a data management system

ESKIDMS1 P6-7 Retrieve and display data records to meet requirements

ESKIDMS1 P1-5 Enter, edit and maintain data records in a data management system

Sector Subject Area: IT and Telecoms

Related NOS: ESKITP4062 P5-7 Document specified information relating to human interaction and interface (HCI) design

Assessments
• 100% Global Exam (includes 70% Structured Questions and 30% MCQ)

15. Digital World

This unit explores how the world of the 21st century is underpinned by computing technology and how it works, together with the impacts on society and the importance of cyber security.

Title	Digital World
Unit reference number	M/651/0326
Credits	10
Level	3
Type	Elective

Guided Learning Hours	60 hours	**Total Qualification Time**	100 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Discuss the development of the Digital Computer and its characteristics	1.1 Describe the origins of digital computer 1.2 Describe the trends in development of computer hardware and software 1.3 Explain how the advancement of computer hardware and software have enabled new application areas. 1.4 Define and discuss digital convergence.
2. Explain the key characteristics of a range of major digital technology innovations	2.1 Describe the basic theory and principles of operation of a range of digital technology developments. 2.2 Analyse how a range of digital technological innovations has contributed to new opportunities.
3. Appraise the impact on society of a range of major digital technology innovations	3.1 Analyse the consequences of a range of digital technological innovations on different sections of society

4. Explain security threats posed by major digital technology innovations and possible control measures	4.1 Explain security terminology: threat, vulnerability, risk, impact, likelihood, control with examples 4.2 Explain how threats can arise for a range of digital technological innovations and any potential controls
5. Understand cultural, ethical, environmental and legal issues relating to computing	5.1 Explain current individual (moral), social (ethical), legal, environmental and cultural opportunities and risks of computing. 5.2 Explain how cultural and ethical issues can be addressed 5.3 Identify laws and guidelines that relate to computing 5.4 Discuss the challenges facing legislators in the digital age

Syllabus Content			
Topic No	**Topic Title**	**Proportion**	**Course Coverage**
1.	Introduction	1/12 2 hours of lectures 2 hours of tutorials	• A Brief history of the development of the digital computer. Digital and Analogue technology. • What is Computing and Theory of Computation? • Computational thinking: abstraction, modelling, decomposition, algorithms, separation of concerns. • Computing and innovation: range of application areas & technologies, Automation • Skills and knowledge needed – associated disciplines ***Learning Outcome: 1***
2.	Data Processing	1/12 2 hours of lectures 2 hours of tutorials	• Data and Information • Automation, development of large scale data processing, relational databases. • Software crisis and software engineering: methodologies for producing reliable secure efficient systems • Issues of data privacy, accuracy. • Case study ***Learning Outcome: 1***

3.	Data Communication, Networking and the Internet	1/12 2 hours of lectures 2 hours of tutorials	• Sharing data over distance: the Internet • Bandwidth: constraints and enablement • The World Wide Web: Technology and applications • Web services • Digital convergence: Telecoms and Computing • Cloud computing – remote service provision (storage, software, and processing). Advantages and disadvantages of cloud computing. • IoT – Internet of Things platform and sensors. Scenarios. • The dark web • Case study ***Learning Outcome: 2***
4.	Big Data and Data Analytics	1/12 2 hours of lectures 2 hours of tutorials	• Definition of Big Data (3V model) • Fact based and graph schema models for representation • Issues involved in processing big data • Data analytics of Big data • Case study of big data processing and use ***Learning Outcome: 2***
5.	Social Media, Social Networking, Virtual Reality and Cyberspace	1/12 2 hours of lectures 2 hours of tutorials	• Development of Social media – history • Types of Social media • Trends • Impact of algorithms and AI and deliberate/ unforeseen consequences • Case studies ***Learning Outcome: 3***
6.	Artificial Intelligence	1/12 2 hours of lectures 2 hours of tutorials	• Definitions: AI – does AI really mean anything? • Origins and development of AI theory and practice. • Types of AI system • Knowledge representation • Reasoning with uncertainty • The impact of Artificial Intelligence on society • Case studies: Machine Learning, NLP, Expert systems, Intelligent Agents, Neural nets ***Learning Outcome: 2***

7.	E-commerce	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Definition of Ecommerce • Types of Ecommerce B2C, B2B, C2B Mobile • Underpinning technology and standards • Trends • Regulation • Global trends and challenges • Disruption, Growth, and impact ***Learning Outcome: 2, 3***
8.	Security	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Definitions: Security (CIA model), Threat, vulnerability, Risk, Impact, Likelihood • Types, range and origins of threats and vulnerabilities • Risk calculation • Risk mitigation and control • Case studies • Personal security ***Learning Outcome: 4***
9.	Cyber Warfare	1/12 2 hours of lectures 2 hours of tutorials	• Defining cyber warfare, cyber terrorism • Types of cyber warfare: espionage, Sabotage, Propaganda, DDoS • Motivation, • Case studies and trends ***Learning Outcome: 4***
10.	The Impact of Digital Technology on Society	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Ways of evaluation, who judges? How is it evaluated? Economic, power, technical, ethical, • see United Nations https://www.un.org/en/un75/impact-digital-technologies • Benefits: E.g.: communications, education, automation, reduced unnecessary travel, remote monitoring etc – • Disbenefits: E.g.: Digital divide, social engineering, monitoring behaviour, amassing and analysis of personal information, distribution, publication, communication, and dissemination of personal information. deep fakes, identity theft, ***Learning Outcome: 4/5***

11.	Cultural, Ethical, Environmental, and Legal Issues Relating to Computing	1/12 2 hours of lectures 2 hours of tutorials 3 hours of laboratory sessions	• Impacts of digital technology on wider society • Ethical issues – definition, addressing public safety and the security of data • Cultural issues – definition, digital divide and the changing nature of employment • Environmental Issues – definition and addressing the impact of technology on the environment • Data Protection, Privacy, Intellectual Property, Freedom of Speech ***Learning Outcome: 5***
12.	Summary and Assignment	1/12 2 hours of lectures 2 hours of tutorials	• Summary of key elements of the unit • Assignment guidance and preparation ***Learning Outcome: All***

Related National Occupational Standards (NOS)
Sector Subject Area: IT and Telecoms **Related NOS:**

Assessments
• 70% Global Assignment • 30% Local Exam (MCQ)

16. Art and Design (General)

Title	Art and Design (General)
Unit reference number	Y/651/2797
Credits	20
Level	3
Type	Elective

Guided Learning Hours	64 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Discuss how materials and methods are used in Art and Design	1.1 Define a range of formal elements in Art and Design 1.2 Describe a range of materials and methods in 2D and 3D Art and Design 1.3 Present examples of contextual Art and Design practices
2. Use materials and methods for a specified Art and Design project	2.1 Apply a range of 2D and 3D materials and methods in Art and Design 2.2 Present a range of experiments using selected materials and methods in Art and Design 2.3 Refine the use of materials and methods for a specified Art and Design project 2.4 Produce outcomes that realise personal intention for a specified Art and Design project
3. Develop and refine ideas to realise a specified Art and Design project	3.1 Use a range of primary and secondary research methods to develop a specified project 3.2 Gather and reflect on feedback to support the development of a specified Art and Design project. 3.3 Refine and clarify ideas for a specified Art and Design project
4. Evaluate Art and Design work for a specified project	4.1 Assess the use of the materials and methods in own Art and Design work 4.2 Evaluate final outcomes in relation to a specified Art and Design project

Syllabus Content			
Topic No	**Topic Title**	**Proportion**	**Course Coverage**
1.	Introduction to Art and Design	1/12	This topic introduces learners to the formal elements and the concept of visual language within Art and Design. It covers formal elements of Art and Design such as line, shape, form,

		Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	colour, texture and space, explaining how these elements are used to create visual compositions and communicate ideas. An overview of materials and methods will be introduced in Topic 1 to be later explored in more depth through workshops in Topics 2 Drawing, Topics 3 Painting, Topic 4 Collage and Topic 5 Sculpture. A brief introduction into contextual awareness will take place through exploring different Artists and Designers within the content in Topic 1. ***Learning Outcome: 1***
2.	Drawing	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	This topic introduces learners to the materials and methods used for two-dimensional (2D) Art and Design. The topic specifically focuses on Drawing as a method within Art and Design and explores materials such as pencil, charcoal, and ink. Learners will have allocated time in Lectures and Private Study blocks to practise a range of materials and methods whilst reflecting on the qualities of each. A continuation of contextual research into Artists and Designers who specialise in Drawing as a method within Art and Design. ***Learning Outcome: 1, 2, 3, 4***
3.	Painting	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	This topic introduces learners to the materials and methods used for two-dimensional (2D) Art and Design. The topic specifically focuses on Painting as a method within Art and Design and explores materials such as Watercolour, and Acrylics. Learners will have allocated time in Lectures and Private Study blocks to practise a range of materials and methods whilst reflecting on the qualities of each. A continuation of contextual research into Artists and Designers who

			specialise in Painting as a method within Art and Design. ***Learning Outcome: 1, 2, 3, 4***
4.	Collage and Mixed Medium	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	This topic introduces learners to the materials and methods used for two-dimensional (2D) Art and Design. The topic specifically focuses on Collage and Mixed Medium as a method within Art and Design and explores materials such as paper and found objects. Learners will have allocated time in Lectures and Private Study blocks to practise a range of these materials and methods whilst reflecting on the qualities of each. A continuation of contextual research into Artists and Designers who specialise in Painting as a method within Art and Design. ***Learning Outcome: 1, 2, 3, 4***
5.	Sculpture and Installation	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	This topic introduces learners to the materials and methods used for three-dimensional (3D) Art and Design. The topic specifically focuses on Sculpture and Installation as a method within Art and Design and explores materials such as Clay and found objects. Learners will have allocated time in Lectures and Private Study blocks to practise a range of these materials and methods whilst reflecting on the qualities of each. A continuation of contextual research into Artists and Designers who specialise in Sculpture and Installation as a method within Art and Design. ***Learning Outcome: 1, 2, 3, 4***
6.	Idea Generation and Design Cycles	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours	This topic introduces learners to the process of designing and refining Art and Design projects. It covers various methods of developing creative ideas such as mind mapping, mood boarding, and researching, helping learners generate a wide range of ideas for a personal project. Alongside idea generation the topic explores design cycles to support a personal creative project.

		Private Study and Activities - 11 hours Tutorials - 2 hours	In this topic, learners will continue to enhance and develop their practical skills across a range of selected materials and methods within Art and Design. ***Learning Outcome: 2, 3, 4***
7.	Contextual Studies	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	This topic enhances learners' knowledge and skills in Contextual Studies within Art and Design. Learners will explore Primary Research methods such as direct observation and data collection, and Secondary Research methods such as studying existing works for historical, cultural, and contemporary context. In this topic, learners will continue to enhance and develop their practical skills across a range of selected materials and methods within Art and Design. ***Learning Outcome: 1, 3, 4***
8.	Evaluation and Curation of Art and Design	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	This topic introduces learners to assessing and critiquing their own artworks, materials, and methods. It develops skills in evaluating their own works, articulating strengths and areas for improvement, and reflecting on the effectiveness of materials and methods used in their projects. This topic also introduces learners to various presentation methods in Art and Design portfolio and explores 2D and 3D work display methods. In this topic, learners will continue to enhance and develop their practical skills across a range of selected materials and methods within Art and Design. ***Learning Outcome: 1, 2, 3, 4***
9.	Global Assignment – Part 1	1/12 Total Topic Time – 16.7 hours	Global Assignment – Part 1 This topic allows learners to refine ideas through their conducted research, personal critique and by gathering feedback. Learners will have time in Lectures and Private Study

		Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	blocks to produce primary and secondary research on their proposed ideas and explore examples across selected Artists and Designers to further develop their contextual understanding and personal project. An emphasis of this topic will be on Research and Idea Generation as learners explore their personal project through the design cycle. ***Learning Outcome: 1, 2, 3, 4***
10.	Global Assignment – Part 2	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	Global Assignment – Part 2 This topic allows learners to refine ideas through exploration and experimentation of materials and methods. Learners will have time in Lectures and in Private Study blocks to produce experiments within a range of materials and methods for the next stage of the design cycle. Personal critique and gathered feedback will support in developing the idea and personal project. An emphasis of this topic will be on materiality and experimentation of art and design materials and methods. ***Learning Outcome: 1, 2, 3, 4***
11.	Global Assignment – Part 3	1/12 Total Topic Time – 16.7 hours Lecture Content – 3.7 hours Private Study and Activities - 11 hours Tutorials - 2 hours	Global Assignment – Part 3 This topic allows learners to refine ideas whilst working towards outcomes for their personal creative project. Learners will have time in Lectures and in Private Study to produce final outcomes for their personal project following the design cycle. An emphasis of this topic will be on realisation of outcomes drawn from analyses of strengths and development points within the creative works. ***Learning Outcome: 1, 2, 3, 4***
12.	Global Assignment – Preparation for Submission	1/12 Total Topic Time – 16.4 hours	Global Assignment Week – Submission Week This topic provides learners with a 10-hour period to curate their digital

		Lecture Content – 1.4 hours Private Study and Activities - 15 hours	portfolio for assessment and complete their final evaluation. Learners will curate a digital portfolio of a maximum of 20 slides, covering the entire creative journey from initial ideas to outcomes produced in Tasks 1, 2, and 3. The portfolio should include visuals, annotations, and a clear narrative of the process throughout the project. Within this topic, students will also present the final portfolio and evaluation verbally, with a time limit of 10 to 20 minutes. Additionally, learners will write an evaluation (250-750 words) of the project, reflecting on the development process, final outcomes, and personal learning. All assessment criteria will be submitted within this topic, ensuring a comprehensive evaluation of the creative journey and final outcomes. ***Learning Outcome: 1, 2, 3, 4***

Related National Occupational Standards (NOS)
Sector Subject Area: Arts, Media and Publishing 9.2 **Related NOS:** N/A

Assessments
• 100% Global Assignment
See also Section 3 above

17. Fine Art

Title	Fine Art
Unit reference number	A/651/2798
Credits	20
Level	3
Type	Elective

Guided Learning Hours	60 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Define and interpret fundamental approaches and key terms related to the study of fine art and art history in context.	1.1 Define, describe, and analyse some key critical ideas associated with fine art practice and art history. 1.2 Develop and define a glossary of key terms and vocabulary associated with the study of fine art and art history. 1.3 Explain and appraise both historical and contemporary perspectives and techniques in fine art and art history. 1.4 Discuss and analyse how and why key conceptual ideas in fine art and art history align to key artists and art movements in both a non-chronological and cross-cultural context.
2. Develop, analyse, and focus on the key techniques, processes and materials used in fine art and align to key theories and critical approaches in art history.	2.1 Define, practise, and summarise fine art terms, techniques, processes, and materials and how they link to the subject-matter of art works. 2.2 Discuss and analyse how a theoretical knowledge of cultural, social, and political context defines our comprehension and interpretation of fine art works, fine art practice and art history. 2.3 Demonstrate and illustrate how visual representations connect to fundamental theoretical ideas and terminology in fine art practice and art history.
3. Recognise, examine, and evaluate the impact on society and culture that fine art, artists, and movements have made.	3.1 Examine and analyse a range of key terms that allow us to compare how key artists and art movements align to key critical ideas in fine art practice. 3.2 Recognise and analyse a range of socio-cultural contexts and events that influence and inform how fine art practices and art historical ideas have developed and changed over different cultures and eras. 3.3 Describe, evaluate, and apply the broader impact

	that fine art, artists, and movements have had on individual modes of experience in context. 3.4 Compare and contrast how cultural identity (for example, race, class, gender, sexuality, nationality) have been constructed and deconstructed in fine art and art history.

Syllabus Content			
Topic No	**Topic Title**	**Proportion**	**Course Coverage**
1.	Introduction - Fine Art and Art History	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 8 hrs	• An overview and summary of the module content and assessment briefs • Identifying a vocabulary of fine art and art history • Recognising art historical thinking • Describing and listing some key contexts and concepts in fine art and art history ***Learning Outcomes: 1***
2.	Form and Function	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Identifying and interpreting 'Form' in the Arts • Identifying and interpreting 'Form' and 'Function' • Critical reading, evaluation, and consolidation of study - part 1 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio ***Learning Outcomes: 1, 2***
3.	Style and Aesthetics	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Identifying and defining Aesthetics and Abstraction • Identifying Knowledge and Philosophy in Fine Art • Critical reading, evaluation, and consolidation of study - part 2 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio ***Learning Outcomes: 1, 2***
4.	Techniques and Materials	1/12	• Interpreting artistic production and fine art practice – key ideas

		Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Materiality in Fine Art • Critical reading, evaluation, and consolidation of study - part 3 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio ***Learning Outcomes: 2, 3***
5.	Art and Arts Patronage	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Identifying and interpreting the 'art market' • Defining the artist's persona • Critical reading, evaluation, and consolidation of study - part 4 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio ***Learning Outcomes: 2, 3***
6.	Iconography and Iconology	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Defining Visual Culture - key ideas • Examining and interpreting Iconology • Examining and interpreting Iconography • Critical reading, evaluation, and consolidation of study - part 5 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio ***Learning Outcomes: 1, 2, 3***
7.	Historical, Visual and Cultural Contexts I	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Recognising and discussing 'Ideology' in fine art. • Analysing the work of John Berger – Ways of Seeing • Critical reading, evaluation, and consolidation of study - part 6 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio • Assignment Task 2 guidance and preparation ***Learning Outcomes: 1, 2, 3***
8.	Historical, Visual and Cultural Contexts II	1/12 Lectures: 2 hrs	• Recognising and discussing theories of 'Deconstruction' in fine art.

		Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Critical reading, evaluation, and consolidation of study - part 7 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio • Assignment Task 2 guidance and preparation ***Learning Outcomes: 1, 2, 3***
9.	Fine Art in Focus - Global Contexts	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Recognising and responding to Western art and art history • Defining 'Globalisation' and cross-cultural connections in fine art. • Critical reading, evaluation, and consolidation of study - part 8 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio • Assignment Task 2 guidance and preparation ***Learning Outcomes: 1, 3***
10.	Fine Art in Focus - The Gendered Subject	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Recognising and responding to gender politics in art and art history • Defining 'Feminism' in fine art. • Critical reading, evaluation, and consolidation of study - part 9 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio • Assignment Task 2 guidance and preparation ***Learning Outcomes: 1, 3***
11.	Fine Art in Focus – The 'Aura'	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Recognising and responding to ideas of 'repetition and value' in fine art. • Identifying and illustrating the concept of 'aura' in fine art. • Critical reading, evaluation, and consolidation of study - part 10 • Defining and developing Assignment Task 1 - Critical and Reflective Portfolio • Assignment Task 2 guidance and preparation ***Learning Outcomes: 1, 3***

12.	Summary and Assignment	1/12 Lectures: 2 hrs Tutorials: 1 hr Seminars: 2 hrs Private study: 12 hrs	• Consolidation, evaluation, and summary of the key elements of the module • Final consolidation and submission of Critical and Reflective Portfolio (75%) • In week 12 students will present an individual 10–15-minute presentation (Assignment Task 2 - 25%) ***Learning Outcomes: 1, 2, 3***

Related National Occupational Standards (NOS)
Sector Subject Area: Arts, Media and Publishing 9.2 **Related NOS:** N/A

Assessments
• 100% Global Assignment
See also Section 3 above

18. Digital Art

Title	Digital Art
Unit reference number	D/651/2799
Credits	20
Level	3
Type	Elective

Guided Learning Hours	97 hours	**Total Qualification Time**	200 hours

Learning Outcomes: The Learner will:	**Assessment Criteria:** The Learner can:
1. Be able to identify and discuss the technical requirements and aesthetic approaches involved in the production of various Digital Artefacts.	1.1 Demonstrate an understanding of the theories behind Photography, Videography, Design, Audio, and 3D Modelling and Animation, and apply this knowledge to plan and produce various Digital Assets. 1.2 Research, plan, and execute creative projects in response to specific briefs, showcasing technical proficiency and artistic intention in the production of Digital Artefacts. 1.3 Understand and explain the requirements and processes involved in Planning, Production, and Post-Production, including the technical and artistic approaches necessary to meet the criteria of provided briefs.
2. Be able to select and employ appropriate technologies, tools and techniques to realise and produce creative objectives.	2.1 Understand and apply camera settings to achieve desired effects in photographs and video recordings. 2.2 Demonstrate knowledge of composition, framing, depth of field, lighting, staging, and pacing in digital artefacts. 2.3 Optimise and enhance digital photographs and videos using professional image manipulation software. 2.4 Create and edit short video and audio sequences, employing seamless transitions, effects, and narrative development. 2.5 Apply key 2D principles to create aesthetically pleasing designs for various media, effectively manipulating text and typography. 2.6 Apply key 3D principles and industry-standard tools to construct 3D models and animations.
3. Employ effective and appropriate communication to discuss, describe and document aims and	3.1 Clearly describe the goals and intended outcomes for creating various digital artefacts, such as photography, videography, design, audio, and 3D

objectives, the developmental approaches, and the decision making processes involved in the production of various Digital Artefacts.	modelling and animation. This includes understanding the purpose, target audience, and desired impact of each artefact. 3.2 Engage in contextual research and critically evaluate various approaches and techniques found in historic and contemporary digital artefacts, and applying these insights to the development and refinement of their own digital projects. 3.3 Demonstrate a thorough evaluation and selection process for the techniques and tools needed to produce high-quality digital artefacts. This involves assessing different methods for photography, videography, design, audio production, and 3D modelling and animation, and choosing the most effective ones based on the project requirements. 3.4 Communicate the steps taken to meet the criteria for producing compelling digital artefacts. This includes outlining the workflow, from initial concept to final output, explaining how each step aligns with the defined aims and objectives and ensuring that the process is clear.
4. Be able to critically reflect and evaluate their approach to learning, the work produced and their progress and learning.	4.1 Critically evaluate the successes and failures of the Digital Artefacts produced against both assessment criteria and self-defined aims and objectives. 4.2 Discuss their approach to the management and completion of the task, including the approach selected, and evaluate their performance. 4.3 Reflect upon the learning experience and how this might inform future undertakings.

Syllabus Content			
Topic No	**Topic Title**	**Proportion**	**Course Coverage**
1.	Introduction to photography, cameras and image editing.	1/12 Lectures: 5 hrs Seminar: 5 hrs Private study: 6 hrs	This topic provides a general introduction to the area of study and the areas of Digital Arts that are covered within the Unit • An introduction to the area of Photography in general. • Leaners will be exposed to the general practices of photography, and the key terminology. • An Introduction to Camera Technology, Camera Operations, Settings and Controls. • The Exposure Triangle • An introduction to Adobe Photoshop Interface and Tools

			• An Introduction to Photographic Techniques in respect of Image Adjustment and Enhancement Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study ***Learning Outcome: 1,2,4***
2.	Photographic techniques: composition, aesthetic approaches, image manipulation and processing	1/12 Lectures: 5 hrs Seminar: 5 hrs Private study: 6 hrs	This topic introduces learners to the requirements and considerations of composing an image. Learners will be exposed to the different approaches to a variety of photography types / subjects, and how to communicate a theme, message or narrative. The Topic will build up on the Adjustment and Enhancement of images and continue this through the introduction of further processes of photographic enhancement. Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study ***Learning Outcome: 1,2,4***
3.	Introduction to video and video pre-production	1/12 Lectures: 5 hrs Seminar: 5 hrs Private study: 6 hrs	This topic introduces learners to the practices involved in Video Production and their relationship to Video Production. Leaners will be exposed to the general practices and terminology of working in Video. Learners will be exposed to theory and practical approaches to Video development including shot types. The topic will introduce the practices of Video Pre-Production and planning including areas such as risk assessment, recces and storyboarding.

			Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study ***Learning Outcome: 1,2,4***
4.	Video production and post-production	1/12 Lectures: 3 hrs Seminar: 4 hrs Private study: 7 hrs	This topic introduces learners to the practices involved in Video Production and Pre-Production. Learners will be exposed to theory and practical approaches to Video Production, Camera Techniques, the software interface, and techniques for developing video sequences. Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study. ***Learning Outcome: 1,2,4***
5.	Introduction to audio and audio editing	1/12 Lectures: 5 hrs Seminar: 3 hrs Private study: 10 hrs	This topic introduces learners to the theory and practical aspects of audio development, including key terminology, and the selection and employment of different types of audio and the editing of audio. Learners will be exposed to the Application interface and tools required to edit audio. Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study. ***Learning Outcome: 1,2,4***
6.	Processing, mixing, and creating narrative through sound design.	1/12 Lectures: 4 hrs Seminar: 2 hrs Private study: 9 hrs	This topic introduces learners to the theory and practical aspects of audio processing and mixing. Learners will develop and understanding of the processes and approaches required to develop well designed audio sequences that

			communicate a theme or narrative. Leaners will be exposed to the tools and techniques required to construct audio sequences. Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study. ***Learning Outcome: 1,2,4***
7.	Introduction to digital design and development	1/12 Lectures: 5 hrs Seminar: 3 hrs Private study: 10 hrs	This topic introduces learners to the theory and practical aspects of vector based design. Learners will gain an understanding of the application interface and tools employed to work with Vector Shapes, transform and edit artwork, work with colour, pen tools and brushes, and text. Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study. ***Learning Outcome: 1,2,4***
8.	Design techniques and applications of design	1/12 Lectures: 5 hrs Seminar: 3 hrs Private study: 10 hrs	This topic introduces learners to design techniques, approaches to design, and the applications of these designs. Students will consolidate previous techniques and Explore the development of Aesthetically pleasing Logo and Poster Design. Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study. ***Learning Outcome: 1,2,4***
9.	Introduction to 3D modelling and animation	1/12 Lectures: 3 hrs	This topic will introduce learners to the key concepts and principles of 3D.

		Seminar: 4 hrs Private study: 9 hrs	Leaners will be exposed to the general practices of working in 3D, Key concepts and terminology and introduced to the software interface. The topic will introduce the tools, techniques and methods used for 3D Art and Design and the tools and techniques requires to produce basic 3D models. Rendering, the output stage, will also be addressed within this session. Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study ***Learning Outcome: 1,2,4***
10.	Textures, shaders, lighting and animation.	1/12 Lectures: 4 hrs Seminar: 3 hrs Private study: 10 hrs	This topic introduces learners to the implementation of textures, shaders and lighting, their importance to the realisation of 3D models. Learners will also be introduced to the Principles of Animation, and the tools, techniques and methods for realising simple animations. Rendering, the output stage, will also be addressed within this session. Delivery will consist of lectures and seminars with exercises providing opportunity for practice and experimentation with reflection, with further practice and experimentation expected in private study ***Learning Outcome: 1,2,4***
11.	Assessment development	1/12 Seminar: 8 hrs Private study: 10 hrs	Within this session students are provided the opportunity to continue the development of the materials that will constitute their submission for assessment. Students may engage with their academics in classroom environment to discuss their practical work and receive formative feedback/feed forward and advice, and request assistance.

			Learning Outcome: 1,2,3,4
12.	Portfolio consolidation	1/12 Seminar: 8 hrs Private study: 10 hrs	Within this session students are provided the opportunity to continue the development of the materials that will constitute their submission for assessment. Students may engage with their academics in classroom environment to discuss their practical work and receive formative feedback/feed forward and advice, and request assistance. ***Learning Outcome: 1,2,3,4***

Related National Occupational Standards (NOS)
Sector Subject Area: Arts, Media and Publishing 9.2 **Related NOS:** N/A

Assessments
• 100% Global Assignment
See also Section 3 above

6. Results & Certificates

The grade descriptors Pass, Merit and Distinction are awarded by unit to successful candidates. A Pass is awarded for an overall unit mark of between 40 and 59. A Merit is awarded for an overall unit mark of between 60 and 69 and a Distinction is awarded for an overall unit mark of 70 and above. Candidates who obtain an overall unit mark of below 40 are classed as a fail in the unit and may resit.

A final qualification mark will be awarded upon successful completion of all units. This is calculated by finding the average mark of all units that make up the qualification.

Please note that in exceptional circumstances, NCC Education may be required to change the algorithm to calculate a final qualification mark for a learner in order to secure the maintenance of standards over time. Any necessary changes to this algorithm would be shared with Centres and learners promptly by NCC Education. An example is given below:

Unit	Unit Points	Candidate Mark	Unit Points * Candidate Mark
Developing English Language Skills (DELS 2.0)	20	81	1620
English for Academic Purposes (EAP 2.0)	30	88	2640
Mathematics for University Study	10	93	930
Research and Study Skills for University Study	20	82	1640
Introductory Accounting	20	90	1800
Introductory Economics	20	90	1800
	120	**524**	**10430**
			10430/potential 12000 = 86

The final unit grade awarded will depend on the extent to which a candidate has satisfied the Assessment Criteria. A qualification is awarded when the candidate has achieved at least a pass in all relevant units.

After each assessment cycle, results slips are issued (in electronic format) which detail the grades achieved, i.e. Fail, Pass, Merit or Distinction and numerical marks. Certificates which contain your qualification grade and pass mark are then dispatched to Centres.

7. Further Information

For more information about any of NCC Education's products, please contact customer.service@nccedu.com or, alternatively, please visit www.nccedu.com to find out more about our suite of high-quality British qualifications and programmes.