Programme specification

1. Overview/ factual information

Programme/award title(s)	a. B.Sc. (Hons) in Information Technology , Digital Media Technologies b. B.Sc. in Information Technology, Digital Media Technologies c. Diploma of Higher Education in Information Technology, Digital Media Technologies d. Certificate of Higher Education in Information Technology
Teaching Institution	The American College of Greece
Awarding Institution	The Open University
Date of latest OU validation	
Next revalidation	
Credit points for the award	B.Sc. (Hons) in Information Technology: 360
UCAS Code	
Programme start date	
Underpinning QAA subject benchmark(s)	Computing
Professional/statutory recognition	
Duration of the programme for each mode of study (P/T, FT,DL)	FT – 3 years
Dual accreditation (if applicable)	
Date of production/revision of this specification	February 2011

2. Programme aims and objectives

2.1 Educational aims and objectives

Mission

In congruence with the mission of the College, the B.Sc. in Information Technology has been designed to meet the growing demand for information technology skills and to provide a route for students to progress towards information technology careers. Moreover, the programme aims to expose students to a wide range of IT-related subjects while its three pathways offer students the opportunity to pursue the area of specialisation that best matches their needs and their future professional aspirations.

Educational Aims

The primary goals of the IT programme are to:

- Provide students with comprehensive background knowledge in Information and Communication Technologies.
- Develop the students' analytical and critical skills for problem identification, analysis and solution implementation.
- Provide students with specialized computing knowledge and skills to implement information technologies in the areas of software development, networking or digital media.
- Develop students' understanding of the ethical framework that governs the use of information technologies.
- Providing the students with the broad range of knowledge necessary to pursue graduate studies and/or careers in information technology.

The **Digital Media Technologies** pathway aims at providing an in-depth understanding of processes and the concepts, practices and principles involved with digital media technologies.

Objectives

Upon successful completion of the digital media technologies pathway, students will be able to:

- Have knowledge of digital media technologies including 2D and 3D graphics, video, audio and animation.
- Analyse, design, develop and evaluate digital media solutions.

2.2 Relationship to other programmes and awards

(Where the award is part of a hierarchy of awards/programmes, this section describes the articulation between them, opportunities for progression upon completion of the programme, and arrangements for bridging modules or induction)

This programme specification is part of a US bachelor's degree programme that consists of 42 modules, comprising 19 General Education modules, and 25 Concentration modules.

3. Programme outcomes

Upon completion of the programme, the student will be able to:

3A. Knowledge and understanding

Learning outcomes:	Learning and teaching strategy/ assessment methods
A.1. Demonstrate knowledge and understanding of basic mathematics and statistics that is relevant to Information Technology.	Where it is taught: **MA 1105 - Applied Calculus (level 4),** Functions, limits and continuity. Derivative of polynomials, and rational, exponential and logarithmic functions. Sketching the graph of a function. Indefinite and definite integral. Integration techniques. Area as an integral. Functions of several variables. Partial derivatives of first and second order. Application of differentiation and integration to problems in business, economics, and related fields. **MA 2118 - Statistics for Business and Economics I (level 4)** Methods for summarizing data (frequency distribution, statistical descriptions). Distribution functions, including the binomial, hyper geometric, Poisson, normal and the t-and chi-square distributions. Sampling and sampling distribution of the mean. Confidence intervals for the population mean, standard deviation and proportion. **MA2106 – Mathematics for Computing (Level 5)** Matrices. Vectors in 2-space and 3-space. Euclidean Vector Spaces. General Vector Spaces. Linear Transformations. Eigenvalues and Eigenvectors. Linear Algebraic Codes. The Logic of Compound Statements. Set Theory. Relations on Sets Learning and Teaching Strategy: In congruence with the Learning and Teaching strategy of the College, the following tools are used: o MA 1105: Classes consist of lectures where the concepts of the course are introduced. Their application to the discussion of problems arising from business, economics and related fields is illustrated through several examples. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. In MA 1105, students are required to attend 1 hour/week recitation session. o MA 2118: The concepts of the course are introduced, exemplified and illustrated through extensive problem solving. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. o MA2106: Classes consist of lectures where the concepts of the course are introduced. Their application to the discussion of problems arising from information technology related fields is illustrated through several examples. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. In MA 2106, students are required to attend 1 hour/week recitation session. Assessment Methods: Assessment methods give students the opportunity to display knowledge and understanding and staff the opportunity to identify issues in either. Students get timely feedback (within 21 days) on their formative test and midterm exam by their lecturer. Student performance is assessed as follows:

		MA 1105, MA2118	MA2106
In-class, 1-hour, "diagnostic" test - **formative**	0	numerical problems	numerical problems/essay questions
In-class 1-hour midterm examination - **summative**	40	numerical problems	numerical problems/essay questions
Final examination (2-hour, comprehensive) - **summative**	60	numerical problems	numerical problems/essay questions

A.2. Demonstrate knowledge and understanding of the basic psychological principles guiding mental processes and behavior.

Taught in:

PS1000, Psychology as a Natural Science (Level 4)

Overview of the field of psychology as a natural science: theoretical perspectives and research methods, biological basis of behaviour, sensory systems, perception, states of consciousness, learning, memory and forgetting, thinking, language, problem solving, motivation and emotion.

PS1001, Psychology as a Social Science (Level 4)

Overview of the field of psychology as a social science: theoretical perspectives and research methods, life-span development, mental abilities, personality theory and assessment, stress and coping, psychological disorders and treatment, social behaviour.

Learning and Teaching Strategy: In congruence with the Learning and Teaching strategy of the College, the following tools are used:

- Lectures and class discussions.
- Relevant educational films are also shown.
- Office hours
- Use of Blackboard site

Assessment Method:

In-class, 1-hour, "diagnostic" test - **formative**	0%	Multiple choices & short answer questions
In-class 1-hour midterm examination - **summative**	40%	Multiple choices & short answer questions
In-class final examination (2-hours) - **summative**	60%	Multiple choices & short answer questions

A.3. Demonstrate awareness of moral theories and ethical issues and evaluate their impact on information technologies.

Taught in:

PH 2005, Business Ethics (Level 5)

Introduction to major theories and basic moral problems in the domain of business. The use of reasoning in moral assessment of business practices. Application of moral theories to specific cases of corporate conduct ranging from the individual to society in general, in the local and the international context.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Learning activities include lectures, class discussions, and case analysis.
- Office Hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test –**formative**	0	Case study
1-hour midterm exam - **summative**	40	short essay-type questions
Final examination (2-hour, comprehensive) - **summative**	60	short essay-type questions of an informative and argumentative character.

A.4. Demonstrate knowledge and understanding of structured and object-oriented programming.

Taught in:

CS 2188, Introduction to Programming (Level 4)

Problem solving; problem analysis; top-down algorithm design; implementation; testing and debugging techniques; documentation. Style and portability. Modular programming and the JAVA language structure. Identifiers, constants, variables. Input and output. Elementary file handling. Selection. Looping. Classes and Methods. GUI. Arrays. Elementary sorting and searching.

CS2276, C language programming (Level 4)

C language logic and structure; data types; arrays and strings; pointers; file handling; programming and debugging techniques.

CS2234, Object Oriented Programming (Level 5)

Advanced object oriented concepts and problem solving techniques. Advanced GUI components. Applets. Event handling, collections, multithreading and networking. Efficiency issues.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures and class discussions. Laboratory practical sessions and programming problem solving.
- Office hours held by the instructor to provide further assistance to students.
- Use of the online content management system (Blackboard CMS) to further facilitate communication, by posting lecture notes, assignment instruction, announcements, and online submission.

Assessment Methods:

Student performance in **CS2188** is assessed as follows:

In-class, 1-hour, "diagnostic" test –**formative**	**0**	programming problems
Coursework-**summative**	**40**	programming problems
Final Examination (2-hour comprehensive) -**summative**	**60**	programming problems

Student performance in **CS2276** is assessed as follows:

In-class, 1-hour, "diagnostic" test –**formative**	**0**	programming problems
Coursework - **formative**	**0**	Take home assignments and/or in-class quizzes
Coursework-**summative**	**40**	programming problems
Final Examination (2-hour comprehensive) -**summative**	**60**	programming problems and short answers to essay questions

Student performance in **CS2234** is assessed as follows:

Coursework –**formative**	**0**	Short programming exercises
Coursework-**summative**	**50**	Programming project
Final Examination (2-hour comprehensive) -**summative**	**50**	short answers to essay questions and short programming exercises

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<tr>
<td>A.5 Demonstrate knowledge and understanding of several database models with emphasis to the relational model, of database design methods, of normalization and data integrity rules.</td>
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Taught in:

CS 3260, Fundamentals of RDBMS (Level 5)
Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL).

Learning and Teaching Strategy- In congruence with the Learning and Teaching strategy of the College, the following tools are used:

o Lectures and class discussions. Laboratory practical sessions and programming problem solving.
o Office hours held by the instructor to provide further assistance to students.
o Use of the online content management system (Blackboard CMS) to further facilitate communication, by posting lecture notes, assignment instruction, announcements, and online submission.

Taught in:

Assessment Methods:
<table>
<tr><td>Take-home "diagnostic" test - formative</td><td>0</td><td>short answers to essay questions</td></tr>
<tr><td>Coursework - formative</td><td>0</td><td>programming problems</td></tr>
<tr><td>Project (1,000 words &application) - summative</td><td>40</td><td>requirements analysis/application development/documentation</td></tr>
<tr><td>Final examination (2-hour, comprehensive) - summative</td><td>60</td><td>short answers to essay questions</td></tr>
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A.6 Demonstrate knowledge and understanding of the concepts of computer architecture and the principles of computer communications.

A.6.1 Demonstrate knowledge and understanding of networking models and configurations, of networking standards and protocols, of the characteristics of local and wide area networks, and of different communication transmission media and data.

Taught in:

CS 3375, Communications and Networking Essentials (Level 5)

Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Classroom lectures, discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test - **formative**	**0**	short answers to essay questions
Coursework - **formative**	**0**	case problems
Research Paper (2,000 – 3,000 words) - **summative**	**40**	literature review/data collection/ methodology/interpretation
Final examination (2-hour, comprehensive) - **summative**	**60**	short answers to essay questions and case problems combination

A. 6.2 Demonstrate knowledge and understanding of the design of computer hardware.

Taught in:

CS2186, Computer Systems Architecture (Level 4)

Computer architecture. Digital circuits and components. Types of data representation. Computer organisations and design. Logic design.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Classroom lectures, discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In class 1-hour "diagnostic" test –**formative**	**0**	short answers to essay questions and mathematical problems
Coursework –**summative**	**40**	design and implementation of a digital circuit
Final Examination (2-hour, comprehensive)- **summative**	**60**	short answers to essay questions and mathematical problems

A.7 Demonstrate knowledge and understanding of the fundamental concepts underlying an operating system and relate them to its function, evolution and design.

Taught in:

CS 2293, Operating Systems Concepts (Level 4)

Structures for operating systems. Theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. CPU scheduling algorithms and segmented vs paged types of memory. Polled, interrupt-driven and DMA-based access to I/O. Operating system design and functionality. Performance, avoidance of deadlock, security issues and basic processing of transactions.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Classroom lectures, discussions, laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test **–formative**	**0**	short answers to essay questions
Coursework-**summative**	**40**	Case Problems
Final Examination (2-hour comprehensive) - **summative**	**60**	combination of short answers to essay questions and case problems

A.8. Select, design, and apply several interdisciplinary project management techniques in order to ensure highly effective and efficient project outcomes.

Taught in:

MG/CS 3157, Project Management (Level 6)

Project management as an interdisciplinary and cross-functional activity in an organization. Emphasis on the relationship of projects to the management of change and to the approaches and roles required to achieve successful implementation.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, class discussions, and review of cases taken from the real world and applicable to specific theoretical concepts.
- Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Methods:

In-class, 1-hour, "diagnostic" test - **formative**	0	short answers to essay-questions
Coursework - **formative**	0	case studies
Project (4,000 words) - **summative**	40	case study
Final Examination (2-hour comprehensive) - **summative**	60	essay type

A.9. Demonstrate knowledge and understanding of media technologies and their role in computing.

A.9.1 Demonstrate awareness of digital imaging including editing, adjustments and post production techniques.

Taught in:

CS 2128, Digital Imaging (Level 5)

Digital Imaging fundamentals. Digital capture. Platforms and output devices. Colour management. Image adjustments. Image enhancements. Post production techniques.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures and class discussions.
- Laboratory sessions involving training on image editing.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments

Assessment Methods:

In-class, 1-hour, "diagnostic" test –**formative**	**0**	short answers to essay questions
Coursework - **formative**	**0**	practical exercises / creation of a digital image/ case problems
Project- **summative**	**40**	preparation of an image editing solution
Final examination (2-hour, comprehensive) - **summative**	**60**	combination of short answers to essay questions and case problems

A.9.2 Demonstrate knowledge and understanding of objects and their manipulation in a 3D scene.

Taught in:

CS 2229 3D Modelling Methodologies, (Level 5)

3D object manipulation. Modelling methodologies. Lighting and rendering effects. Camera manipulation. Textures creation and use. Dynamic animation. Characters creation and manipulation.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- o Classroom lectures, class discussions.
- o Laboratory sessions, involving training and practice in the creation of 3D scenes.
- o Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- o Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test –**formative**	**0**	short answers to essay questions
Coursework - **formative**	**0**	practical exercises / creation of 3D scenes/ case problems
Project- **summative**	**50**	Model Creation/ Development of a 3D scene/Animation
Final examination (2-hour, comprehensive) - **summative**	**50**	combination of short answers to essay questions and case problems

A.9.3 Describe and discuss the use and manipulation of video and audio in digital media technologies.	Taught in: **CS 3220, Digital Video and Audio Technologies (Level 5)** Digital video and audio technologies, file formats, compression strategies, codecs, editing techniques, transitions, effects, titling, motion graphics, recorded audio, processing and transformation. Methods of audio/video hardware and software integration. Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:* o Classroom lectures, class discussions. o Laboratory sessions, involving training and practice in the creation of video and audio clips. o Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material. o Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources. Assessment Method:

Coursework - **formative**	0	Case Problems studied in class
In-class, 1-hour, "diagnostic" test –**formative**	0	short answers to essay questions
Project - **summative**	50	System modelling
Final examination (2-hour, comprehensive) - **summative**	50	combination of short answers to essay questions and case problems

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<td>A.10 Demonstrate knowledge and understanding of Web 2.0 rich Internet application-development methodologies and programming principles.</td>
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Taught in:

CS3414, Internet Programming (Level 6)
Internet standards and infrastructure. Internet browsers functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy.

Learning and Teaching Strategy- In congruence with the Learning and Teaching strategy of the College, the following tools are used:
o Classroom lectures, discussions, laboratory practical sessions and problem solving.
o Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
o Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:
<table>
<tr><td>Coursework - formative</td><td>0</td><td>Short programming exercises</td></tr>
<tr><td>Project- summative</td><td>60</td><td>Rich internet application development</td></tr>
<tr><td>Final examination (2-hour, comprehensive) - summative</td><td>40</td><td>combination of short answers to essay questions and case problems</td></tr>
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A.11 Demonstrate knowledge and understanding of designing systems involving the use of digital media technologies.

A.11.1 Understand the integration of digital media in a multimedia application. Recognize and identify key issues in the analysis and design of an interactive multimedia system.

Taught in:

CS 3371 Interactive Multimedia Systems, (Level 6)

Multimedia technologies, hardware and software tools. Issues on interactivity environments and systems. Graphics design for multimedia projects. Multimedia system analysis and design methodologies. Application of interactive multimedia concepts. Usability of interfaces and systems.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, class discussions on the requirements and design specifications of multimedia systems. Laboratory practical sessions on Interactive Multimedia Systems development.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Method:

In-class, 1-hour “diagnostic” test - **formative**	**0**	short answers to essay questions
Coursework - **formative**	**0**	practical exercises using multimedia authoring tools/ case problems
Project - **summative**	**50**	functional requirements/ analysis /design/prototype application development/ documentation
Final examination (2-hour, comprehensive) - **summative**	**50**	combination of short answers to essay questions and case problems.

A.11.2 Demonstrate knowledge and understanding of game design methods and their application on game development.	Taught in: **CS 4535 Game Design, (Level 6)** Game design process. Player's psychology. Media definitions. Single-player games. Interactive stories. Characters. Worlds. Mechanics. Balancing attributes. Testing. Interface types and design issues. Multiplayer games. Aesthetics. Ethics Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:* o Lectures and class discussions. o Laboratory sessions for practical training. o Office hours held by the instructor to provide further assistance to students. o Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments Assessment Method:

In class exercises - **formative**	**0**	short answers to essay questions
Research Project - **summative**	**40**	1,500-2,000 words; case study: data collection, synthesis, critical evaluation, prototype design
Final examination (2-hour, comprehensive) - **summative**	**60**	short answers to essay questions

A.12. Demonstrate knowledge and understanding of game programming tools and techniques.

Taught in:

CS4417, Game Programming (Level 6)

The conceptual framework of interactive environments. Game programming approaches. Techniques and tools. Manipulation of visual effects and sound. Object animation. Movement control. 2D games and 3D worlds. The Open Graphics Library. Interactivity.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Classroom lectures. Laboratory practical sessions and problem solving.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Method:

In class exercises - **formative**	**0**	analysis, synthesis and implementation exercises
Programming project - **summative**	**60**	group project with distinct user participation in project modules
Final examination (2-hour, comprehensive) - **summative**	**40**	short answers to essay question and problem solving

A.13 Demonstrate knowledge and understanding of fundamental concepts of AI.

Taught in:

CS3480, Artificial Intelligence Principles (Level 6)

Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP).

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Method:

In class exercises- **formative**	**0**	problem solving
Research Project (1,500-2,000 words)- **summative**	**50**	case study, data collection, synthesis, critical evaluation, program development
Final Examination (2-hour comprehensive)**- summative**	**50**	Short answers to essay questions, problem solving

A.14 Demonstrate comprehensive knowledge in the area of Human Computer Interaction focusing in the practice of interface design and its evaluation.	Taught in: **CS 3330, Human Computer Interaction (Level 6)** Foundations of human computer interaction. Interaction design basics. HCI in the software process. Cognitive models and theories. Application of concepts and methodologies of software engineering, human factors and psychology to address ergonomic, cognitive, and social factors in the design and evaluation of interactive computer systems. Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:* o Lectures, class discussions, problem-solving sessions, and review of real-world cases based on specific theoretical concepts. o Office hours held by the instructor to provide further assistance to students. o Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments. Assessment Methods:

In-class, 1-hour, "diagnostic" test - **formative**	0	short answers to essay questions
Research Project (1,500 – 2,000 words) - **summative**	40	case study: data collection/ synthesis/critical evaluation/ interface design
Final examination (2-hour, comprehensive) - **summative**	60	short answers to essay questions

3B. Cognitive skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
B.1. Locate, extract, analyze data from library and other resources including the acknowledgement and referencing of sources. (Levels 5 and 6).	Taught in: **CS 3375, Communications and Networking Essentials** Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies. **CS 3330, Human Computer Interaction** Foundations of human computer interaction. Interaction design basics. HCI in the software process. Cognitive models and theories. Application of concepts and methodologies of software engineering, human factors and psychology to address ergonomic, cognitive, and social factors in the design and evaluation of interactive computer systems. **CS 3480, Artificial Intelligence Principles** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS4535, Game Design** Game design process. Player's psychology. Media definitions. Single-player games. Interactive stories. Characters. Worlds. Mechanics. Balancing attributes. Testing. Interface types and design issues. Multiplayer games. Aesthetics. Ethics **CS 4959, Digital Media Capstone Project (Level 6)** Focus on the development of an interactive, user-friendly product, involving the use of several digital media technologies. Step-by-step design and development process. Learning and Teaching Strategy: Students use library and other resources in carrying out the major research project required in this course. Assessment Method: The assessment rubric used in this course includes an assessment of these cognitive skills; assessment is summative.

B.2. Interpret, analyze, and solve structured problems, and to a limited extent unstructured problems, from a generated data set. (Levels 4, 5, and 6)	Taught and/or assessed in: **MA 2118, Statistics for Business and Economics I** Methods for summarizing data (frequency distribution, statistical descriptions). Distribution functions, including the binomial, hyper geometric, Poisson, normal and the t-and chi-square distributions. Sampling and sampling distribution of the mean. Confidence intervals for the population mean, standard deviation and proportion. **CS 3260, Fundamentals of RDBMS** Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL). **MG/CS 3157, Project Management** Project management as an interdisciplinary and cross-functional activity in an organization. Emphasis on the relationship of projects to the management of change and to the approaches and roles required to achieve successful implementation. **CS 3480, Artificial Intelligence Principles** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). Learning and Teaching Strategy: Students analyze real world cases and suggest suitable solutions. Assessment Method: Assessed in exams, projects or coursework.

B.3. Develop and critically evaluate arguments and evidence including identifying assumptions and detecting false logic. (Levels 5, and 6)	Taught in: **CS 3480, Artificial intelligence principle** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS 4959, Digital Media Capstone Project (Level 6)** Focus on the development of an interactive, user-friendly product, involving the use of several digital media technologies. Step-by-step design and development process. Learning and Teaching Strategy: Students apply theory and processes and develop critical thought through class discussions and case studies. Assessment Method: Assessed in coursework, programming problems and projects and research papers.

B.4. Apply critical thinking to create, evaluate and assess a range of options in solving complex problems. (Levels 6)	Taught in: **CS 3480, Artificial intelligence principles** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS3330, Human Computer Interaction** Foundations of human computer interaction. Interaction design basics. HCI in the software process. Cognitive models and theories. Application of concepts and methodologies of software engineering, human factors and psychology to address ergonomic, cognitive, and social factors in the design and evaluation of interactive computer systems. **CS3414, Internet Programming** Internet standards and infrastructure. Internet browsers functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy. **CS 4959, Digital Media Capstone Project** Focus on the development of an interactive, user-friendly product, involving the use of several digital media technologies. Step-by-step design and development process. Learning and Teaching Strategy: Students evaluate a range of alternatives and choose an action plan to meet specified needs for various situations. Assessment: Assessed in examinations, projects and research paper.
B.5. Analyze and evaluate ethical choices. Assess the moral and ethical dimensions of actions, persons, and organisational practices and develop an awareness of and framework for ethical decision-making. (Levels 4, 5, and 6)	Taught in: **PH 2005, Business Ethics (15 UK Credits – Compulsory)** Introduction to major theories and basic moral problems in the domain of business. The use of reasoning in moral assessment of business practices. Application of moral theories to specific cases of corporate conduct ranging from the individual to society in general, in the local and the international context. *Discussion about ethical choices is embedded in almost all IT courses.* Learning and Teaching Strategy: Students learn through lectures, class discussions, and analysis of cases. Assessment Methods: Assessed in exams and case studies

B.6. Analyze various aspects of professional communication and evaluate effectiveness of oral as well as written communication. (Level 5)

Taught in:

EN 2342, Professional Communication (Level 5)

A study of communication modes in professional contexts with focus on the development of communication expertise needed within businesses as well as technical and academic communities.

Learning and Teaching Strategy - *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Classes consist of lectures and class discussions.
- Office Hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of a Blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

Drafts of assignments listed below -- **formative**	0	Exercises + Drafts of assignments listed below
Professional Presentation Skills -- **summative**	50%	Individual Presentation Skills with Power Point Team Presentation Skills with Power Point
Professional Writing Skills -- **summative**	50%	Analytical Group Report of about 1500 words Portfolio: memo, email, business letter

B.7. Apply appropriate theory, practices and tools to address design and development issues of information technology related problems. (Levels 4, 5, and 6)	Taught in: **CS 2188, Introduction to Programming** Problem solving; problem analysis; top-down algorithm design; implementation; testing and debugging techniques; documentation. Style and portability. Modular programming and the JAVA language structure. Identifiers, constants, variables. Input and output. Elementary file handling. Selection. Looping. Classes and Methods. GUI. Arrays. Elementary sorting and searching. **CS2276, C language programming** C language logic and structure; data types; arrays and strings; pointers; file handling; programming and debugging techniques. **CS2186, Computer System Architecture** Computer architecture. Interfacing processors and peripherals. Input / Output techniques. Storage techniques. Instruction set. Data representation. Logic design **CS2293, Operating system concepts** Structures for operating systems. Theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. CPU scheduling algorithms and segmented vs paged types of memory. Polled, interrupt-driven and DMA-based access to I/O. Operating system design and functionality. Performance, avoidance of deadlock, security issues and basic processing of transactions. **CS 3375, Communications and Networking Essentials** Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies. **CS2234, Object Oriented programming** Advanced object oriented concepts and problem solving techniques. Advanced GUI components. Applets. Event handling, collections, multithreading and networking. Efficiency issues. **CS3260, Fundamental of RDBMS** Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL). **CS3414, Internet Programming** Internet standards and infrastructure. Internet browser functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy. **CS 3371 Interactive Multimedia Systems** Multimedia technologies, hardware and software tools. Issues on interactivity environments and systems. Graphics design for multimedia projects. Multimedia system analysis and design methodologies. Application of interactive multimedia concepts. Usability of interfaces and systems. **CS 4535 Game Design** Game design process. Player's psychology. Media definitions. Single-player games. Interactive stories. Characters. Worlds. Mechanics. Balancing attributes. Testing. Interface types and design issues. Multiplayer games. Aesthetics. Ethics

	CS4417, Game Programming The conceptual framework of interactive environments. Game programming approaches. Techniques and tools. Manipulation of visual effects and sound. Object animation. Movement control. 2D games and 3D worlds. The Open Graphics Library. Interactivity. **CS 4959, Digital Media Capstone Project** Focus on the development of an interactive, user-friendly product, involving the use of several digital media technologies. Step-by-step design and development process. Learning and Teaching Strategy: During class discussions, and laboratory sessions students are practicing program design and development techniques. Assessment method: Assessed in all formative and summative methods presented in section A.
B.8. Exhibit reasoning ability and creativity to address a given problem. (Levels 4, 5 and 6)	*Taught throughout the curriculum.*
B.9. Evaluate the design of interactive application interfaces based on human factors and psychology to address ergonomic, social and cognitive issues. (Level 6)	Taught in: **CS 3330, Human Computer Interaction** Learning and Teaching Strategy: Students evaluate computer interface designs using real life case studies, applications and web sites. Assessment methods: Assessed in the diagnostic test (formative) and the final examination (summative).

3C. Practical and professional skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
C.1. Use numeric skills, including quantitative techniques in problem solving of increasing complexity and with increasing autonomy depending on the course level. (Levels 4, 5, and 6)	Taught and assessed in: MA 2118, Statistics for Business and Economics MA 1105, Applied Calculus MA 2106, Mathematics for computing MG/CS 3157, Project Management CS2186, Computer System Architecture
C.2. Use Information Technology effectively to retrieve, process, analyze and communicate information. (Levels 4, 5, and 6)	*Taught throughout the curriculum.*
C.3. Relate the importance of people management within projects in terms of resource allocation, leadership, teamwork, and motivation. (Levels 6)	Taught and assessed in: MG/CS 3157 Project Management
C.4. Specify, design and construct solutions involving programming to given problems. (Levels 4, 5, and 6)	Taught and assessed in: CS 2188 Introduction to Programming CS 2276, C language Programming CS 2234, Object Oriented Programming CS 3260 Fundamentals of RDBMS CS 3371, Interactive Multimedia Systems CS 3414, Internet Programming CS 3480, Artificial Intelligence Principles CS 4417, Game Programming CS 4959, Digital Media Capstone Project

C.5. Determine the risks, controls and safety measures in the use of computing technologies. (Levels 4, 5, and 6)	Taught and assessed in: CS 2293, Operating system concepts CS 3260 Fundamentals of RDBMS CS 3375 Communications and Networking Essentials CS 3414, Internet Programming CS 4959, Digital Media Capstone Project
C.6. Synthesize prior acquired knowledge to design and develop information technology solutions. (Level 6)	Taught and assessed in: CS 4959, Digital Media Capstone Project

3D. Key/transferable skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
D.1. Communicate ideas successfully orally and in writing following English discourse conventions. Adapt message content to a particular audience and medium of communication in a professional context. (Levels 4, 5, and 6)	<u>Taught and assessed in:</u> EN 2342, Professional Communication *English language skills are reinforced through assignments, projects, class participation and oral presentations in all courses*. The courses listed below are considered the most language intensive: PS1000, Psychology as a Natural Science PS1001, Psychology as a Social Science PH 2005, Business Ethics CS 3375, Communications and Networking Essentials CS 3260, Fundamentals of RDBMS CS 3330, Human Computer Interaction CS 3480, Artificial Intelligence Principles MG/CS3157, Project Management CS 4959, Digital Media Capstone Project
D.2. Develop interpersonal, teamwork and/or leadership skills. Work effectively with others in small groups or teams.(Levels 4, 5, and 6)	<u>Taught and/or assessed in</u>: CS 2188, Introduction to Programming CS 3260, Fundamentals of RDBMS CS 3330, Human Computer Interaction CS 4417, Game Programming CS 4535, Game Design EN 2342, Professional Communications MG/CS 3157, Project Management
D.3. Reflect intellectually and become an independent self managed lifelong learner.(Levels 4, 5, and 6)	*Taught throughout the curriculum.*

4. Programme Structure

Programme Structure - LEVEL 4				
Compulsory modules		**Credit points**	**Optional modules**	**Credit points**
PS 1001	PSYCHOLOGY AS A SOCIAL SCIENCE	15		
PS 1000	PSYCHOLOGY AS A NATURAL SCIENCE	15		
MA 1105	APPLIED CALCULUS	15		
MA 2118	STATISTICS FOR BUSINESS AND ECONOMICS I	15		
CS 2188	INTRODUCTION TO PROGRAMMING	15		
CS 2186	COMPUTER SYSTEMS ARCHITECTURE	15		
CS 2293	OPERATING SYSTEMS CONCEPTS	15		
CS 2276	“C” LANGUAGE PROGRAMMING	15		
TOTAL LEVEL 4		**120**		

Programme Structure - LEVEL 5				
Compulsory modules		**Credit points**	**Optional modules**	**Credit points**
EN 2342	PROFESSIONAL COMMUNICATION	15		
PH 2005	BUSINESS ETHICS	15		
CS 2234	OBJECT ORIENTED PROGRAMMING	15		
MA 2106	MATHEMATICS FOR COMPUTING	15		
CS 3260	FUNDAMENTALS OF RDBMS	15		
CS 3375	COMMUNICATIONS AND NETWORKING ESSENTIALS	15		
CS 2128	DIGITAL IMAGING	10		
CS 2229	3D MODELLING METHODOLOGIES	10		
CS 3220	DIGITAL VIDEO AND AUDIO TECHNOLOGIES	10		
TOTAL LEVEL 5		**120**		

Programme Structure - LEVEL 6			
Compulsory modules	**Credit points**	**Optional modules**	**Credit points**
MG/CS3157 PROJECT MANAGEMENT	15		
CS 3480 ARTIFICIAL INTELLIGENCE PRINCIPLES	15		
CS 3414 INTERNET PROGRAMMING	15		
CS 3371 INTERACTIVE MULTIMEDIA SYSTEMS	15		
CS 4535 GAME DESIGN	15		
CS 3330 HUMAN COMPUTER INTERACTION	15		
CS 4417 GAME PROGRAMMING	15		
CS 4959 DIGITAL MEDIA CAPSTONE PROJECT	15		
TOTAL LEVEL 6	**120**		

5. Distinctive features of the programme structure

Where applicable, this section provides details on distinctive features such as:

- *where in the structure above a professional/placement year fits in and how it may affect progression*
- *any restrictions regarding the availability of elective modules*
- *where in the programme structure students must make a choice of pathway/route*

Annexe 1: Curriculum map

Annexe 2: Notes on completing the OU programme specification template

Annexe 3: General Education Requirements

Annexe 4: Exit Awards

Annexe 1: Curriculum map

			KNOWLEDGE & UNDERSTANDING														COGNITIVE									PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 4	1	PS1000		✔																												✔		
	2	PS1001		✔																												✔		
	3	MA1105	✔																							✔								
	4	MA2118	✔															✔								✔								
	5	CS2188				✔																	✔						✔				✔	
	6	CS2186						✔															✔			✔								
	7	CS2293							✔														✔							✔				
	8	CS2276				✔																	✔						✔					

			KNOWLEDGE & UNDERSTANDING														COGNITIVE									PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 5	1	EN2342																				✔										✔	✔	
	2	PH2005			✔																✔											✔		
	3	CS2234				✔																	✔						✔					
	4	MA2106	✔																							✔								
	5	CS3260					✔											✔					✔						✔	✔		✔	✔	
	6	CS3375						✔									✔						✔							✔		✔		
	7	CS2128									✔																							
	8	CS2229									✔																							
	9	CS3220									✔																							

			KNOWLEDGE & UNDERSTANDING														COGNITIVE									PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 6	1	MG/CS3157								✔								✔								✔		✔				✔	✔	
	2	CS3480													✔		✔	✔	✔	✔									✔			✔		
	3	CS3414										✔								✔			✔						✔	✔				
	4	CS3371											✔										✔						✔					
	5	CS3330														✔	✔			✔					✔							✔	✔	
	6	CS4535											✔										✔										✔	
	7	CS4417												✔									✔						✔				✔	
	8	CS4959																	✔	✔									✔	✔	✔	✔		

Annexe 2: Notes on completing programme specification templates

1 **-** This programme specification should be aligned with the learning outcomes detailed in module specifications.

2 – The expectations regarding student achievement and attributes described by the learning outcome in section 3 must be appropriate to the level of the award within the **QAA frameworks for HE qualifications**: http://www.qaa.ac.uk/academicinfrastructure/FHEQ/default.asp

3 – Learning outcomes must also reflect the detailed statements of graduate attributes set out in **QAA subject benchmark statements** that are relevant to the programme/award: http://www.qaa.ac.uk/academicinfrastructure/benchmark/default.asp

4 – In section 3, the learning and teaching methods deployed should enable the achievement of the full range of intended learning outcomes. Similarly, the choice of assessment methods in section 3 should enable students to demonstrate the achievement of related learning outcomes. Overall, assessment should cover the full range of learning outcomes.

5 - Where the programme contains validated **exit awards** (e.g. Cer HE, Dip HE, PG Dip), learning outcomes must be clearly specified for each award.

6 - For programmes with distinctive study **routes or pathways** the specific rationale and learning outcomes for each route must be provided.

7 – Validated programmes delivered in **languages other then English** must have programme specifications both in English and the language of delivery.

Annex 3 - General Education Requirements

In US colleges and universities, undergraduates usually are admitted to the institution, not to a programme as in the UK, and may choose their major academic field after completion of one or two years of general education courses in the fields of the humanities and arts, social sciences, and physical and natural sciences. *General Education* refers partly to foundation skills, but also to knowledge, cognitive skills, state of mind, life habits that are developed primarily through a set of required courses and which prepare students for success in their major course of study, and their personal and professional lives after the college experience.

General Education courses provide the core of what it means to be an educated person; moreover, such broad exposure to the disciplines gears students towards lifelong learning, exposes them to the mainstreams of thought and interpretation and promotes their understanding of the interrelationships among the various fields of study. While not directly relating to the students' vocational preparation, these courses help them build a strong set of educational skills and acquire knowledge necessary for a successful personal, professional and civic life. The students' last two or three years are devoted to more specialized study in their chosen major field.

The General Education core aims to help students to:

1. Enhance their oral and written communication skills along with the acquisition of knowledge for the use of technology in communication
2. develop analytical thinking and information literacy skills (retrieval, evaluation and integration of information), influencing them in becoming life-long learners and teaching them the process for learning
3. inspire them to lead lives governed by strong ethical values and enable them to make meaningful decisions on moral dilemmas
4. prepare students as conscientious global citizens, providing them with the opportunity to be involved in cross-cultural learning, gaining respect for different perspectives and diversity
5. instill in them appreciation of our cultural heritage and of examining it from different perspectives
6. understand the present through the study of the past
7. recognize the value of science in shaping our present and comprehending its methodology in attaining knowledge

DEREE's general education curriculum which consists of 47 US credits (equivalent to 235 UK credits) ensures that students will acquire breadth of knowledge in the traditional disciplines of the liberal arts that will enable them to become successful contributors to a diverse global community. Consisting of courses in English, natural sciences, social sciences, ethics, the arts and humanities, the general education curriculum is a balanced program in the liberal arts with specific learning outcomes: communication abilities in written and spoken form; critical thinking and reasoning; values and ethical decision-making; an appreciation of the arts and humanities as an essential component of the human experience; recognition of the relevance of science in the world; technological competence; and a knowledge of the ways in which political, social, and economic forces shape global experiences.

DEREE's minimum general education requirements are as follows:

- 3 courses in English (composition)
- 1 course in Public Speaking
- 1 course in Ethics
- 3 courses in at least two areas of the Humanities
- 2 courses in the natural sciences with laboratory
- 4 courses in at least two areas of the social sciences
- 1 introductory course in Information Systems

Individual majors may have additional requirements (such as Mathematics and Foreign languages) or reduce choice in the Humanities, the Social Sciences, and/or the Natural Sciences, but all specifics are included in the college's catalog. Through this set of General Education courses, each with its own rationale, objectives, and assessments, DEREE -ACG strives to promote tolerance and a love for lifelong learning and free expression.

Programme specification

1. Overview/ factual information

Programme/award title(s)	a. B.Sc. (Hons) in Information Technology (Network Technologies) b. B.Sc. in Information Technology c. Diploma of Higher Education in Information Technology d. Certificate of Higher Education in Information Technology
Teaching Institution	The American College of Greece
Awarding Institution	The Open University
Date of latest OU validation	
Next revalidation	
Credit points for the award	B.Sc. (Hons) in Information Technology: 360
UCAS Code	
Programme start date	
Underpinning QAA subject benchmark(s)	Computing
Professional/statutory recognition	
Duration of the programme for each mode of study (P/T, FT,DL)	FT – 3 years
Dual accreditation (if applicable)	
Date of production/revision of this specification	February 2011

2. Programme aims and objectives

2.1 Educational aims and objectives

Mission

In congruence with the mission of the College, the B.Sc. in Information Technology has been designed to meet the growing demand for information technology skills and to provide a route for students to progress towards information technology careers. Moreover, the programme aims to expose students to a wide range of IT-related subjects while its three pathways offer students the opportunity to pursue the area of specialisation that best matches their needs and their future professional aspirations.

Educational Aims

The primary goals of the IT programme are to:

- Provide students with comprehensive background knowledge in Information and Communication Technologies.
- Develop the students' analytical and critical skills for problem identification, analysis and solution implementation.
- Provide students with specialized computing knowledge and skills to implement information technologies in the areas of software development, networking or digital media.
- Develop students' understanding of the ethical framework that governs the use of information technologies.
- Providing the students with the broad range of knowledge necessary to pursue graduate studies and/or careers in information technology.

The **Network Technologies** pathway aims to provide an in-depth understanding and skills needed to design and manage computer networks.

Objectives

Upon successful completion of the network technologies pathway, students will be able to:

- use high-end network equipment and tools
- configure and operate the principal components of network infrastructure
- use network operating systems and apply data communication techniques in linking computer systems
- apply practical competencies in network design
- evaluate secure networked system feasibility, sustainability in concert with current and future needs.

2.2 Relationship to other programmes and awards

(Where the award is part of a hierarchy of awards/programmes, this section describes the articulation between them, opportunities for progression upon completion of the programme, and arrangements for bridging modules or induction)

This programme specification is part of a US bachelor's degree programme that consists of 42 modules, comprising 19 General Education modules, and 25 Concentration modules.

3. Programme outcomes

Upon completion of the programme, the student will be able to:

3A. Knowledge and understanding

Learning outcomes:	Learning and teaching strategy/ assessment methods
A.1. Demonstrate knowledge and understanding of basic mathematics and statistics that are relevant to Information Technology.	Where it is taught: **MA 1105 - Applied Calculus (level 4),** Functions, limits and continuity. Derivative of polynomials, and rational, exponential and logarithmic functions. Sketching the graph of a function. Indefinite and definite integral. Integration techniques. Area as an integral. Functions of several variables. Partial derivatives of first and second order. Application of differentiation and integration to problems in business, economics, and related fields. **MA 2118 - Statistics for Business and Economics I (level 4)** Methods for summarizing data (frequency distribution, statistical descriptions). Distribution functions, including the binomial, hyper geometric, Poisson, normal and the t-and chi-square distributions. Sampling and sampling distribution of the mean. Confidence intervals for the population mean, standard deviation and proportion. **MA2106 – Mathematics for Computing (Level 5)** Matrices. Vectors in 2-space and 3-space. Euclidean Vector Spaces. General Vector Spaces. Linear Transformations. Eigenvalues and Eigenvectors. Linear Algebraic Codes. The Logic of Compound Statements. Set Theory. Relations on Sets Learning and Teaching Strategy: In congruence with the Learning and Teaching strategy of the College, the following tools are used: o MA 1105: Classes consist of lectures where the concepts of the course are introduced. Their application to the discussion of problems arising from business, economics and related fields is illustrated through several examples. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. In MA 1105, students are required to attend 1 hour/week recitation session. o MA 2118: The concepts of the course are introduced, exemplified and illustrated through extensive problem solving. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. o MA2106: Classes consist of lectures where the concepts of the course are introduced. Their application to the discussion of problems arising from information technology related fields is illustrated through several examples. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. In MA 2106, students are required to attend 1 hour/week recitation session. Assessment Methods: Assessment methods give students the opportunity to display knowledge and understanding and staff the opportunity to identify issues in either. Students get timely feedback (within 21 days) on their formative test and midterm exam by their lecturer. Student performance is assessed as follows:

		MA 1105, MA2118	MA2106
In-class, 1-hour, "diagnostic" test - **formative**	0	numerical problems	numerical problems/essay questions
In-class 1-hour midterm examination - **summative**	40	numerical problems	numerical problems/essay questions
Final examination (2-hour, comprehensive) - **summative**	60	numerical problems	numerical problems/essay questions

A.2. Demonstrate knowledge and understanding of the fundamental concepts, principles and theories of Psychology and their role to the development of Information technology solutions

Taught in:

PS1000, Psychology as a Natural Science (Level 4)

Overview of the field of psychology as a natural science: theoretical perspectives and research methods, biological basis of behaviour, sensory systems, perception, states of consciousness, learning, memory and forgetting, thinking, language, problem solving, motivation and emotion.

PS1001, Psychology as a Social Science (Level 4)

Overview of the field of psychology as a social science: theoretical perspectives and research methods, life-span development, mental abilities, personality theory and assessment, stress and coping, psychological disorders and treatment, social behaviour.

Learning and Teaching Strategy: In congruence with the Learning and Teaching strategy of the College, the following tools are used:

- Lectures and class discussions.
- Relevant educational films are also shown.
- Office hours
- Use of Blackboard site

Assessment Method:

In-class, 1-hour, "diagnostic" test - **formative**	0%	Multiple choices & short answer questions
In-class 1-hour midterm examination - **summative**	40%	Multiple choices & short answer questions
In-class final examination (2-hours) - **summative**	60%	Multiple choices & short answer questions

A.3. Demonstrate awareness of moral theories and ethical issues and evaluate their impact on information technologies.

Taught in:

PH 2005, Business Ethics (Level 5)

Introduction to major theories and basic moral problems in the domain of business. The use of reasoning in moral assessment of business practices. Application of moral theories to specific cases of corporate conduct ranging from the individual to society in general, in the local and the international context.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Learning activities include lectures, class discussions, and case analysis.
- Office Hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test –**formative**	0	Case study
1-hour midterm exam - **summative**	40	short essay-type questions
Final examination (2-hour, comprehensive) - **summative**	60	short essay-type questions of an informative and argumentative character.

A.4. Demonstrate knowledge and understanding of structured and object-oriented programming.

CS 2188, Introduction to Programming (Level 4)

Problem solving; problem analysis; top-down algorithm design; implementation; testing and debugging techniques; documentation. Style and portability. Modular programming and the JAVA language structure. Identifiers, constants, variables. Input and output. Elementary file handling. Selection. Looping. Classes and Methods. GUI. Arrays. Elementary sorting and searching.

CS2276, C language programming (Level 4)

C language logic and structure; data types; arrays and strings; pointers; file handling; programming and debugging techniques.

CS2234, Object Oriented Programming (Level 5)

Advanced object oriented concepts and problem solving techniques. Advanced GUI components. Applets. Event handling, collections, multithreading and networking. Efficiency issues.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures and class discussions. Laboratory practical sessions and programming problem solving.
- Office hours held by the instructor to provide further assistance to students.
- Use of the online content management system (Blackboard CMS) to further facilitate communication, by posting lecture notes, assignment instruction, announcements, and online submission.

Assessment Methods:

Student performance in **CS2188** is assessed as follows:

In-class, 1-hour, "diagnostic" test –**formative**	**0**	programming problems
Coursework-**summative**	**40**	programming problems
Final Examination (2-hour comprehensive) -**summative**	**60**	programming problems

Student performance in **CS2276** is assessed as follows:

In-class, 1-hour, "diagnostic" test –**formative**	**0**	programming problems
Coursework - **formative**	**0**	Take home assignments and/or in-class quizzes
Coursework-**summative**	**40**	programming problems
Final Examination (2-hour comprehensive) -**summative**	**60**	programming problems and short answers to essay questions

Student performance in **CS2234** is assessed as follows:

Coursework –**formative**	**0**	Short programming exercises
Coursework-**summative**	**50**	Programming project
Final Examination (2-hour comprehensive) -**summative**	**50**	short answers to essay questions and short programming exercises

A.5	Demonstrate knowledge and understanding of several database models with emphasis to the relational model, of database design methods, of normalization and data integrity rules.	Taught in: **CS3260, Fundamentals of RDBMS (Level 5)** Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL). Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*: o Classroom lectures and discussions. Laboratory practical sessions and problem solving. o Office hours held by the instructor to provide further assistance to students. o Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments. Assessment Methods:

Take-home "diagnostic" test - **formative**	0	short answers to essay questions
Coursework - **formative**	0	programming problems
Project (1,000 words &application) - **summative**	40	requirements analysis/application development/documentation
Final examination (2-hour, comprehensive) - **summative**	60	short answers to essay questions

A.6 Demonstrate knowledge and understanding of the concepts of computer architecture and the principles of computer communications.

A.6.1 Demonstrate knowledge and understanding of networking models and configurations, of networking standards and protocols, of the characteristics of local and wide area networks, and of different communication transmission media and data.

Taught in:

CS3375, Communications and Networking Essentials (Level 5)

Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Classroom lectures, discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test - **formative**	0	short answers to essay questions
Coursework - **formative**	0	case problems
Research Paper (2,000 – 3,000 words) - **summative**	40	literature review/data collection/ methodology/interpretation
Final examination (2-hour, comprehensive) - **summative**	60	short answers to essay questions and case problems combination

A.6.2 Demonstrate knowledge and understanding of the design of computer hardware.

Taught in:

CS2186, Computer Systems Architecture (Level 4)

Computer architecture. Digital circuits and components. Types of data representation. Computer organisations and design. Logic design.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Classroom lectures, discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In class 1-hour "diagnostic" test –**formative**	**0**	short answers to essay questions and mathematical problems
Coursework –**summative**	**40**	design and implementation of a digital circuit
Final Examination (2-hour, comprehensive)- **summative**	**60**	short answers to essay questions and mathematical problems

A.7 Demonstrate knowledge and understanding of the fundamental concepts underlying an operating system and relate them to its function, evolution and design.

Taught in:

CS 2293, Operating Systems Concepts (Level 4)

Structures for operating systems. Theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. CPU scheduling algorithms and segmented vs paged types of memory. Polled, interrupt-driven and DMA-based access to I/O. Operating system design and functionality. Performance, avoidance of deadlock, security issues and basic processing of transactions.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Classroom lectures, discussions, laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test **–formative**	**0**	short answers to essay questions
Coursework-**summative**	**40**	Case Problems
Final Examination (2-hour comprehensive) - **summative**	**60**	combination of short answers to essay questions and case problems

A.8. Select, design, and apply several interdisciplinary project management techniques in order to ensure highly effective and efficient project outcomes.

Taught in:

MG/CS 3157, Project Management (Level 6)

Project management as an interdisciplinary and cross-functional activity in an organization. Emphasis on the relationship of projects to the management of change and to the approaches and roles required to achieve successful implementation.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, class discussions, and review of cases taken from the real world and applicable to specific theoretical concepts.
- Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Methods:

In-class, 1-hour, "diagnostic" test - **formative**	0	short answers to essay-questions
Coursework - **formative**	0	case studies
Project (4,000 words) - **summative**	40	case study
Final Examination (2-hour comprehensive) - **summative**	60	essay type

A.9 Demonstrate knowledge and understanding of Web 2.0 rich Internet application-development methodologies and programming principles.

Taught in:

CS3414, Internet Programming (Level 6)
Internet standards and infrastructure. Internet browsers functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used*:

- Classroom lectures, discussions, laboratory practical sessions and problem solving.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

Coursework - **formative**	0	Short programming exercises
Project- **summative**	60	Rich internet application development
Final examination (2-hour, comprehensive) - **summative**	40	combination of short answers to essay questions and case problems

A.10 Demonstrate knowledge and understanding of fundamental concepts of AI.

Taught in:

CS3480, Artificial Intelligence Principles (Level 6)

Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP).

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Method:

In class exercises- **formative**	**0**	problem solving
Research Project (1,500-2,000 words)- **summative**	**50**	case study, data collection, synthesis, critical evaluation, program development
Final Examination (2-hour comprehensive)**- summative**	**50**	Short answers to essay questions, problem solving

A.11. Demonstrate knowledge and understanding of network administration on both operate system and hardware levels.

Taught in:

CS3419, Network Administration (Level 5)

Installation and administration concepts. Configuring and troubleshooting devices and access to resources. Management, monitoring, and optimization of system performance, reliability, and availability. Design issues and support in a corporate environment. Troubleshooting and end user support.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, lab sessions, class discussions, problem-solving sessions, and review of real-world cases based on specific theoretical concepts.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Method:

In class exercises- **formative**	0	
Project - **summative**	50	evaluation of a network, or design and set-up of a network solution
Final Examination (2 hour comprehensive)-**summative**	50	short answers to essay questions including problem solving

A.12. Demonstrate knowledge and understanding of converged network architectures, technologies, and connectivity for voice, messaging, video and multimedia networking.

Taught in:

CS3421, Telecommunications Essentials (Level 5)

Data communications technologies. Voice communication systems. Messaging systems. Connectivity and internetworking of LANs. Broadband networking environments. Network convergence and regulation frameworks. Cellular radio concepts.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, class discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Method:

In-class, 1-hour, "diagnostic" test - **formative**	0	short answers to essay questions
Coursework - **formative**	0	case problems
Project: **summative**	50	the design and implementation of a small scale telecommunications system
Final Examination (2-hour comprehensive) - **summative**	50	combination of short answers to essay questions and case problems

A.13. Demonstrate knowledge and understanding on the techniques of cryptography and network security.

Taught in:

CS3522, Network Security and Cryptography (Level 6)

Security trends and solutions. Encryption techniques and standards. Symmetric and public key encryption. Hash functions. Confidentiality issues. Authentication and identity management. System security issues.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, class discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Method:

In-class, 1-hour, "diagnostic" test **- formative**	**0**	short answers to essay questions
Coursework: case problems**- formative**	**0**	
Research Paper (2,000 – 3,000 words)- **summative**	**50**	Literature review/data collection/ methodology/interpretation
Final Examination (2-hour comprehensive) - **summative**	**50**	Combination of short answers to essay questions and case problems.

A.14 Demonstrate comprehensive knowledge in the area of virtualization, tools and principles.	Taught in: **CS3443, Virtualization Concepts and Applications (Level 6)** Virtualization forms; system level; architectures; techniques for virtualizing and managing the hardware components of a single system; virtualization at server, client and desktop level. Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:* o Lectures, class discussions, and laboratory sessions. o Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material. o Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments. **Assessment Methods:**

In-class, 1-hour, "diagnostic" test **- formative**	**0**	Short answers to essay-questions
Coursework - **formative**	**0**	Practical Training)
Research Project - **summative**	**50**	Literature Review / Benchmarking / Report (1,500 words)
Final Examination (2-hour comprehensive) – short answers to essay questions - **summative**	**50**	short answers to essay questions

A.15 Demonstrate comprehensive knowledge in the area of distributed computing, and their real-world applications.	Taught in: **CS4726, Distributed Systems (Level 6)** Distributed systems communication, processes, naming, synchronization, consistency and replication. Fault tolerance and Security. Object-based systems. Document-based systems. Distributed file systems. Coordination-based systems. Payment systems. Internet and web protocols. Scalability. Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:* o Lectures, class discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions. o Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material. o Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources. o **Assessment Methods:**

In-class, 1-hour, "diagnostic" test - **formative**	0	short answers to essay questions
Coursework- **formative**	0	Case problems
Research Paper (1,500 – 2,000 words)**- summative**	40	literature review/data collection/ methodology/interpretation
Final Examination (2-hour comprehensive)**- summative**	60	combination of short answers to essay questions and case problems

A.16 . Demonstrate comprehensive knowledge in the area of designing enterprise networks.	Taught in: **CS4442 Network Design (Level 6)** A hands-on approach to the design of enterprise computer networks. Network management and security concepts and practices. Assessment of network operations. Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:* o Lectures, class discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions. o Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material. o Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources. **Assessment Methods:**

In-class, 1-hour, “diagnostic” test -formative	0	short answers to essay questions
Coursework – formative	0	case problems
Case Study (2,000 – 3,000 words)-summative	40	Problem review / data collection / methodology / interpretation
Final Examination (2-hour comprehensive) -summative	60	combination of short answers to essay questions and case problems

3B. Cognitive skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
B.1. Locate, extract, analyze data from library and other resources including the acknowledgement and referencing of sources. (Levels 5 and 6).	**CS 3375, Communications and Networking Essentials** Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies. **CS3480, Artificial Intelligence Principles** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS3443, Virtualization Concepts and Applications** Virtualization forms; system level; architectures; techniques for virtualizing and managing the hardware components of a single system; virtualization at server, client and desktop level. **CS3522, Network Security and Cryptography** Security trends and solutions. Encryption techniques and standards. Symmetric and public key encryption. Hash functions. Confidentiality issues. Authentication and identity management. System security issues. **CS4726, Distributed Systems** Distributed systems communication, processes, naming, synchronization, consistency and replication. Fault tolerance and Security. Object-based systems. Document-based systems. Distributed file systems. Coordination-based systems. Payment systems. Internet and web protocols. Scalability. **CS4927, Networking Capstone Project** Focus on the on the design of a reliable, secure, performance efficient, fault-tolerant network or network component. Step-by-step design, development and evaluation process. <u>Learning and Teaching Strategy:</u> Students use library and other resources in carrying out the major research project required in this course. <u>Assessment Method:</u> The assessment rubric used in this course includes an assessment of these cognitive skills; assessment is summative.

B.2. Interpret, analyze, and solve structured problems, and to a limited extent unstructured problems, from a generated data set. (Levels 4, 5, and 6)	Taught and/or assessed in: **MA 2118, Statistics for Business and Economics I** Methods for summarizing data (frequency distribution, statistical descriptions). Distribution functions, including the binomial, hyper geometric, Poisson, normal and the t-and chi-square distributions. Sampling and sampling distribution of the mean. Confidence intervals for the population mean, standard deviation and proportion. **CS 3260, Fundamentals of RDBMS** Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL). **MG/CS 3157, Project Management** Project management as an interdisciplinary and cross-functional activity in an organization. Emphasis on the relationship of projects to the management of change and to the approaches and roles required to achieve successful implementation. **CS3480, Artificial Intelligence Principles** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). Learning and Teaching Strategy: Students analyze real world cases and suggest suitable solutions. Assessment Method: Assessed in exams, projects or coursework.

B.3. Develop and critically evaluate arguments and evidence including identifying assumptions and detecting false logic. (Levels 5, and 6)	Taught in: **CS3480, Artificial intelligence principle** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS4726, Distributed Systems** Distributed systems principles: communication, processes, naming, synchronization, fault tolerance, security, consistency and replication. Object-based systems. Document-based systems. Distributed file systems. Coordination-based systems. Payment systems. Internet and web protocols. Scalability. **CS4442, Network Design** A hands-on approach to the design of enterprise computer networks. Network management and security concepts and practices. Assessment of network operations. **CS4927, Networking Capstone Project** Focus on the on the design of a reliable, secure, performance efficient, fault-tolerant network or network component. Step-by-step design, development and evaluation process. Learning and Teaching Strategy: Students apply theory and processes and develop critical thought through class discussions and case studies. Assessment Method: Assessed in coursework, programming problems and projects and research papers.

B.4. Apply critical thinking to create, evaluate and assess a range of options in solving complex problems. (Levels 5 and 6)	**CS3421, Telecommunication Essentials** Data communications technologies. Voice communication systems. Messaging systems. Connectivity and internetworking of LANs. Broadband networking environments. Network convergence and regulation frameworks. Cellular radio concepts. **CS3480, Artificial intelligence principle** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS3414, Internet Programming** Internet standards and infrastructure. Internet browser functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy. **CS3522, Network Security and Cryptography** Security trends and solutions. Encryption techniques and standards. Symmetric and public key encryption. Hash functions. Confidentiality issues. Authentication and identity management. System security issues. **CS4726, Distributed Systems** Distributed systems principles: communication, processes, naming, synchronization, fault tolerance, security, consistency and replication. Object-based systems. Document-based systems. Distributed file systems. Coordination-based systems. Payment systems. Internet and web protocols. Scalability. **CS4442, Network Design** A hands-on approach to the design of enterprise computer networks. Network management and security concepts and practices. Assessment of network operations. **CS4927, Networking Capstone Project** Focus on the on the design of a reliable, secure, performance efficient, fault-tolerant network or network component. Step-by-step design, development and evaluation process. Learning and Teaching Strategy: Students evaluate a range of alternatives and choose an action plan to meet specified needs for various situations. Assessment: Assessed in examinations, projects and research paper.

<table>
<tr>
<td>B.5. Analyze and evaluate ethical choices. Assess the moral and ethical dimensions of actions, persons, and organisational practices and develop an awareness of and framework for ethical decision-making. (Level 5)</td>
<td>Taught in:

PH 2005, Business Ethics
Introduction to major theories and basic moral problems in the domain of business. The use of reasoning in moral assessment of business practices. Application of moral theories to specific cases of corporate conduct ranging from the individual to society in general, in the local and the international context.

Discussion about ethical choices is embedded in almost all IT courses.

Learning and Teaching Strategy:

Students learn through lectures, class discussions, and analysis of cases.

Assessment Methods:
Assessed in exams and case studies</td>
</tr>
<tr>
<td>B.6. Analyze various aspects of professional communication and evaluate effectiveness of oral as well as written communication. (Level 5)</td>
<td>Taught in:

EN 2342, Professional Communication (Level 5)

A study of communication modes in professional contexts with focus on the development of communication expertise needed within businesses as well as technical and academic communities.

Learning and Teaching Strategy:

In congruence with the Learning and Teaching strategy of the College, the following tools are used:

o Classes consist of lectures and class discussions.
o Office Hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
o Use of a Blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:
<table>
<tr><td>Drafts of assignments listed below -- formative</td><td>0</td><td>Exercises + Drafts of assignments listed below</td></tr>
<tr><td>Professional Presentation Skills -- summative</td><td>50%</td><td>Individual Presentation Skills with Power Point
Team Presentation Skills with Power Point</td></tr>
<tr><td>Professional Writing Skills -- summative</td><td>50%</td><td>Analytical Group Report of about 1500 words
Portfolio: memo, email, business
letter</td></tr>
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B.7. Apply appropriate theory, practices and tools to address design and implementation issues of IT related problems. (Levels 4, 5, and 6)	Taught in: **CS 2188, Introduction to Programming** Problem solving; problem analysis; top-down algorithm design; implementation; testing and debugging techniques; documentation. Style and portability. Modular programming and the JAVA language structure. Identifiers, constants, variables. Input and output. Elementary file handling. Selection. Looping. Classes and Methods. GUI. Arrays. Elementary sorting and searching. **CS2276, C language programming** C language logic and structure; data types; arrays and strings; pointers; file handling; programming and debugging techniques. **CS2186, Computer System Architecture** Computer architecture. Interfacing processors and peripherals. Input / Output techniques. Storage techniques. Instruction set. Data representation. Logic design **CS2293, Operating system concepts** Structures for operating systems. Theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. CPU scheduling algorithms and segmented vs paged types of memory. Polled, interrupt-driven and DMA-based access to I/O. Operating system design and functionality. Performance, avoidance of deadlock, security issues and basic processing of transactions. **CS 3375, Communications and Networking Essentials** Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies. **CS2234, Object Oriented programming** Advanced object oriented concepts and problem solving techniques. Advanced GUI components. Applets. Event handling, collections, multithreading and networking. Efficiency issues. **CS3260, Fundamental of RDBMS** Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL). **CS3414, Internet Programming** Internet standards and infrastructure. Internet browser functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy. CS 3421, Telecommunications Essentials **CS3522, Network Security and Cryptography** Security trends and solutions. Encryption techniques and standards. Symmetric and public key encryption. Hash functions. Confidentiality issues. Authentication and identity management. System security issues. **CS3443, Virtualization Concepts and Applications** Virtualization forms; system level; architectures; techniques for virtualizing and managing the hardware components of a single system; virtualization at server, client and desktop level.

	CS4442, Network Design A hands-on approach to the design of enterprise computer networks. Network management and security concepts and practices. Assessment of network operations. **CS4726, Distributed Systems** Distributed systems communication, processes, naming, synchronization, consistency and replication. Fault tolerance and Security. Object-based systems. Document-based systems. Distributed file systems. Coordination-based systems. Payment systems. Internet and web protocols. Scalability. **CS4927, Networking Capstone Project** Focus on the on the design of a reliable, secure, performance efficient, fault-tolerant network or network component. Step-by-step design, development and evaluation process. Learning and Teaching Strategy: During class discussions, and laboratory sessions students are practicing program design and development techniques. Assessment method: Assessed in all formative and summative methods presented in section A.
B.8. Exhibit reasoning ability and creativity to address a given problem. (Levels 4, 5 and 6)	*Taught throughout the curriculum.*

3C. Practical and professional skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
C.1. Use numeric skills, including quantitative techniques in problem solving of increasing complexity and with increasing autonomy depending on the course level. (Levels 4, 5, and 6)	Taught and assessed in: MA 2118, Statistics for Business and Economics MA 1105, Applied Calculus MA 2106, Mathematics for computing MG/CS 3157, Project Management CS2186, Computer System Architecture
C.2. Use Information Technology effectively to retrieve, process, analyze and communicate information. (Levels 4, 5, and 6)	*Taught throughout the curriculum.*
C.3. Relate the importance of people management within projects in terms of resource allocation, leadership, teamwork, and motivation. (Levels 6)	Taught and assessed in: MG/CS 3157 Project Management
C.4. Specify, design and construct solutions to given problems. (Levels 4, 5, and 6)	Taught and assessed in: CS 2188 Introduction to Programming CS 2276, C language Programming CS 2234, Object Oriented Programming CS 3260 Fundamentals of RDBMS CS 3414, Internet Programming CS 3480, Artificial Intelligence Principles CS 3522, Network Security and Cryptography CS 4442, Network Design CS 3443, Virtualization Concepts and Applications CS 4726, Distributed Systems CS 4927, Networking Capstone Project
C.5. Determine the risks, controls and safety measures in the use of	Taught and assessed in: CS 3260 Fundamentals of RDBMS

computing technologies. (Levels 4, 5, and 6)	CS 3375 Communications and Networking Essentials CS2293, Operating system concepts CS3414, Internet Programming CS3522, Network Security and Cryptography CS4442, Network Design CS4726, Distributed Systems CS4927, Networking Capstone Project
C.6. Synthesize prior acquired knowledge to design and develop information technology solutions. (Level 6)	Taught and assessed in: CS4927, Networking Capstone Project

3D. Key/transferable skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
D.1. Communicate ideas successfully orally and in writing following English discourse conventions. Adapt message content to a particular audience and medium of communication in a professional context. (Levels 4, 5, and 6)	<u>Taught in:</u> EN 2342, Professional Communication (Level 5) *English language skills are reinforced through assignments, projects, class participation and oral presentations in all courses.* The courses listed below are considered the most language intensive: CS 3260, Fundamentals of RDBMS CS 3375, Communications and Networking Essentials CS 34380, Artificial Intelligence Principles CS 4927 Networking Capstone Project MG/CS3157, Project Management PH 2005, Business Ethics PS1000, Psychology as a Natural Science PS1001, Psychology as a Social Science
D.2. Develop interpersonal, teamwork and/or leadership skills. Work effectively with others in small groups or teams.(Levels 4, 5, and 6)	<u>Taught and assessed in</u>: EN 2342, Professional Communications MG/CS 3157, Project Management CS 2188, Introduction to Programming CS 3260, Fundamentals of RDBMS CS4442, Network Design
D.3. Reflect intellectually and become an independent self managed lifelong learner.(Levels 4, 5, and 6)	*Taught throughout the curriculum.*

4. Programme Structure

Programme Structure - LEVEL 4				
Compulsory modules		**Credit points**	**Optional modules**	**Credit points**
PS 1001	PSYCHOLOGY AS A SOCIAL SCIENCE	15		
PS 1000	PSYCHOLOGY AS A NATURAL SCIENCE	15		
MA 1105	APPLIED CALCULUS	15		
MA 2118	STATISTICS FOR BUSINESS AND ECONOMICS I	15		
CS 2188	INTRODUCTION TO PROGRAMMING	15		
CS 2186	COMPUTER SYSTEMS ARCHITECTURE	15		
CS 2293	OPERATING SYSTEMS CONCEPTS	15		
CS 2276	“C” LANGUAGE PROGRAMMING	15		
TOTAL LEVEL 4		**120**		

Programme Structure - LEVEL 5				
Compulsory modules		**Credit points**	**Optional modules**	**Credit points**
EN 2342	PROFESSIONAL COMMUNICATION	15		
PH 2005	BUSINESS ETHICS	15		
CS 2234	OBJECT ORIENTED PROGRAMMING	15		
MA 2106	MATHEMATICS FOR COMPUTING	15		
CS 3260	FUNDAMENTALS OF RDBMS	15		
CS 3375	COMMUNICATIONS AND NETWORKING ESSENTIALS	15		
CS 3419	NETWORK ADMINISTRATION	15		
CS 3421	TELECOMMUNICATIONS ESSENTIALS	15		
TOTAL LEVEL 5		**120**		

Programme Structure - LEVEL 6			
Compulsory modules	**Credit points**	**Optional modules**	**Credit points**
MG/CS3157 PROJECT MANAGEMENT	15		
CS 3480 ARTIFICIAL INTELLIGENCE PRINCIPLES	15		
CS 3414 INTERNET PROGRAMMING	15		
CS 3522 NETWORK SECURITY AND CRYPTOGRAPHY	15		
CS 3443 VIRTUALIZATION CONCEPTS AND APPLICATIONS	15		
CS 4726 DISTRIBUTED SYSTEMS	15		
CS 4442 NETWORK DESIGN	15		
CS 4927 NETWORKING CAPSTONE PROJECT	15		
TOTAL LEVEL 6	**120**		

5. Distinctive features of the programme structure

Where applicable, this section provides details on distinctive features such as :

- *where in the structure above a professional/placement year fits in and how it may affect progression*
- *any restrictions regarding the availability of elective modules*
- *where in the programme structure students must make a choice of pathway/route*

Annexe 1: Curriculum map

Annexe 2: Notes on completing the OU programme specification template

Annexe 3: General Education Requirements

Annexe 4: Exit Awards

Annexe 1: Curriculum map

			KNOWLEDGE & UNDERSTANDING															COGNITIVE								PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 4	1	PS1000		✔																													✔		
	2	PS1001		✔																													✔		
	3	MA1105	✔																							✔									
	4	MA2118	✔																	✔							✔								
	5	CS2188				✔																			✔					✔				✔	
	6	CS2186						✔																	✔		✔								
	7	CS2293							✔																✔						✔				
	8	CS2276				✔																			✔					✔					

			KNOWLEDGE & UNDERSTANDING																COGNITIVE								PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 5	1	EN2342																						✔									✔	✔	
	2	PH2005			✔																		✔										✔		
	3	CS2234				✔																			✔					✔					
	4	MA2106	✔																								✔								
	5	CS3260					✔													✔					✔					✔	✔		✔	✔	
	6	CS3375						✔											✔						✔						✔		✔		
	7	CS3419											✔																						
	8	CS3421												✔								✔			✔										

			KNOWLEDGE & UNDERSTANDING																COGNITIVE								PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 6	1	MG/CS3157								✔										✔							✔		✔				✔	✔	
	2	CS3480										✔							✔	✔	✔	✔								✔			✔		
	3	CS3414									✔											✔			✔					✔	✔				
	4	CS3522													✔				✔			✔			✔					✔	✔				
	5	CS3443														✔			✔						✔					✔					
	6	CS4726															✔		✔		✔	✔			✔					✔	✔				
	7	CS4442																✔			✔	✔			✔					✔	✔			✔	
	8	CS4927																	✔		✔	✔			✔					✔	✔	✔	✔		

Annexe 2: Notes on completing programme specification templates

1 **-** This programme specification should be aligned with the learning outcomes detailed in module specifications.

2 – The expectations regarding student achievement and attributes described by the learning outcome in section 3 must be appropriate to the level of the award within the **QAA frameworks for HE qualifications**: http://www.qaa.ac.uk/academicinfrastructure/FHEQ/default.asp

3 – Learning outcomes must also reflect the detailed statements of graduate attributes set out in **QAA subject benchmark statements** that are relevant to the programme/award: http://www.qaa.ac.uk/academicinfrastructure/benchmark/default.asp

4 – In section 3, the learning and teaching methods deployed should enable the achievement of the full range of intended learning outcomes. Similarly, the choice of assessment methods in section 3 should enable students to demonstrate the achievement of related learning outcomes. Overall, assessment should cover the full range of learning outcomes.

5 - Where the programme contains validated **exit awards** (e.g. Cer HE, Dip HE, PG Dip), learning outcomes must be clearly specified for each award.

6 - For programmes with distinctive study **routes or pathways** the specific rationale and learning outcomes for each route must be provided.

7 – Validated programmes delivered in **languages other then English** must have programme specifications both in English and the language of delivery.

Annexe 3 - General Education Requirements

In US colleges and universities, undergraduates usually are admitted to the institution, not to a program as in the UK, and may choose their major academic field after completion of one or two years of general education courses in the fields of the humanities and arts, social sciences, and physical and natural sciences. *General Education* refers partly to foundation skills, but also to knowledge, cognitive skills, state of mind, life habits that are developed primarily through a set of required courses and which prepare students for success in their major course of study, and their personal and professional lives after the college experience.

General Education courses provide the core of what it means to be an educated person; moreover, such broad exposure to the disciplines gears students towards lifelong learning, exposes them to the mainstreams of thought and interpretation and promotes their understanding of the interrelationships among the various fields of study. While not directly relating to the students' vocational preparation, these courses help them build a strong set of educational skills and acquire knowledge necessary for a successful personal, professional and civic life. The students' last two or three years are devoted to more specialized study in their chosen major field.

The General Education core aims to help students to:

1. Enhance their oral and written communication skills along with the acquisition of knowledge for the use of technology in communication
2. develop analytical thinking and information literacy skills (retrieval, evaluation and integration of information), influencing them in becoming life-long learners and teaching them the process for learning
3. inspire them to lead lives governed by strong ethical values and enable them to make meaningful decisions on moral dilemmas
4. prepare students as conscientious global citizens, providing them with the opportunity to be involved in cross-cultural learning, gaining respect for different perspectives and diversity
5. instill in them appreciation of our cultural heritage and of examining it from different perspectives
6. understand the present through the study of the past
7. recognize the value of science in shaping our present and comprehending its methodology in attaining knowledge

DEREE's general education curriculum which consists of 47 US credits (equivalent to 235 UK credits) ensures that students will acquire breadth of knowledge in the traditional disciplines of the liberal arts that will enable them to become successful contributors to a diverse global community. Consisting of courses in English, natural sciences, social sciences, ethics, the arts and humanities, the general education curriculum is a balanced program in the liberal arts with specific learning outcomes: communication abilities in written and spoken form; critical thinking and reasoning; values and ethical decision-making; an appreciation of the arts and humanities as an essential component of the human experience; recognition of the relevance of science in the world; technological competence; and a knowledge of the ways in which political, social, and economic forces shape global experiences.

DEREE's minimum general education requirements are as follows:

- 3 courses in English (composition)
- 1 course in Public Speaking
- 1 course in Ethics
- 3 courses in at least two areas of the Humanities
- 2 courses in the natural sciences with laboratory
- 4 courses in at least two areas of the social sciences
- 1 introductory course in Information Systems

Individual majors may have additional requirements (such as Mathematics and Foreign languages) or reduce choice in the Humanities, the Social Sciences, and/or the Natural Sciences, but all specifics are included in the college's catalog. Through this set of General Education courses, each with its own rationale, objectives, and assessments, DEREE -ACG strives to promote tolerance and a love for lifelong learning and free expression.

Programme specification

1. Overview/ factual information

Programme/award title(s)	a. B.Sc. (Hons) in Information Technology, (Software Development) b. B.Sc. in Information Technology c. Diploma of Higher Education in Information Technology d. Certificate of Higher Education in Information Technology
Teaching Institution	The American College of Greece
Awarding Institution	The Open University
Date of latest OU validation	
Next revalidation	
Credit points for the award	B.Sc. (Hons) in Information Technology: 360
UCAS Code	
Programme start date	
Underpinning QAA subject benchmark(s)	Computing
Professional/statutory recognition	
Duration of the programme for each mode of study (P/T, FT,DL)	FT – 3 years
Dual accreditation (if applicable)	
Date of production/revision of this specification	February 2011

2. Programme aims and objectives

2.1 Educational aims and objectives

Mission

In congruence with the mission of the College, the B.Sc. in Information Technology has been designed to meet the growing demand for information technology skills and to provide a route for students to progress towards information technology careers. Moreover, the programme aims to expose students to a wide range of IT-related subjects while its three pathways offer students the opportunity to pursue the area of specialisation that best matches their needs and their future professional aspirations.

Educational Aims

The primary goals of the IT programme are to:

- Provide students with comprehensive background knowledge in Information and Communication Technologies.
- Develop the students' analytical and critical skills for problem identification, analysis and solution implementation.
- Provide students with specialized computing knowledge and skills to implement information technologies in the areas of software development, networking or digital media.
- Develop students' understanding of the ethical framework that governs the use of information technologies.
- Providing the students with the broad range of knowledge necessary to pursue graduate studies and/or careers in information technology.

The **Software Development** pathway aims at providing an in-depth understanding of the concepts, methodologies and application of practices involved in software development.

Objectives

Upon successful completion of the software development pathway, students will be able to:

- to identify, formulate, and solve software engineering problems
- have knowledge and skills in programming, together with relevant mathematical structures and concepts
- be productive practitioners skilled in applying methodologies and practices to software components and systems
- manage and develop IT projects.

2.2 Relationship to other programmes and awards

(Where the award is part of a hierarchy of awards/programmes, this section describes the articulation between them, opportunities for progression upon completion of the programme, and arrangements for bridging modules or induction)

This programme specification is part of a US bachelor's degree programme that consists of 42 modules, comprising 19 modules of General Education credits and 23 modules of Concentration.

3. Programme outcomes

Upon completion of the programme, the student will be able to:

3A. Knowledge and understanding

Learning outcomes:	Learning and teaching strategy/ assessment methods
A.1. Demonstrate knowledge and understanding of basic mathematics and statistics that is relevant to Information Technology.	Where it is taught: **MA 1105 - Applied Calculus (level 4),** Functions, limits and continuity. Derivative of polynomials, and rational, exponential and logarithmic functions. Sketching the graph of a function. Indefinite and definite integral. Integration techniques. Area as an integral. Functions of several variables. Partial derivatives of first and second order. Application of differentiation and integration to problems in business, economics, and related fields. **MA 2118 - Statistics for Business and Economics I (level 4)** Methods for summarizing data (frequency distribution, statistical descriptions). Distribution functions, including the binomial, hyper geometric, Poisson, normal and the t-and chi-square distributions. Sampling and sampling distribution of the mean. Confidence intervals for the population mean, standard deviation and proportion. **MA2106 – Mathematics for Computing (Level 5)** Matrices. Vectors in 2-space and 3-space. Euclidean Vector Spaces. General Vector Spaces. Linear Transformations. Eigenvalues and Eigenvectors. Linear Algebraic Codes. The Logic of Compound Statements. Set Theory. Relations on Sets Learning and Teaching Strategy: In congruence with the Learning and Teaching strategy of the College, the following tools are used: o MA 1105: Classes consist of lectures where the concepts of the course are introduced. Their application to the discussion of problems arising from business, economics and related fields is illustrated through several examples. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. In MA 1105, students are required to attend 1 hour/week recitation session. o MA 2118: The concepts of the course are introduced, exemplified and illustrated through extensive problem solving. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. o MA 2106: Classes consist of lectures where the concepts of the course are introduced. Their application to the discussion of problems arising from information technology related fields is illustrated through several examples. Assessed coursework is regularly assigned and discussed in class with students actively participating in the discussion. In MA 2106, students are required to attend 1 hour/week recitation session. Assessment Methods: Assessment methods give students the opportunity to display knowledge and understanding and staff the opportunity to identify issues in either. Students get timely feedback (within 21 days) on their formative test and midterm exam by their lecturer. Student performance is assessed as follows:

		MA 1105, MA 2118	MA2106
In-class, 1-hour, "diagnostic" test - **formative**	0	numerical problems	numerical problems/essay questions
In-class 1-hour midterm examination - **summative**	40	numerical problems	numerical problems/essay questions
Final examination (2-hour, comprehensive) - **summative**	60	numerical problems	numerical problems/essay questions

A.2. Demonstrate knowledge and understanding of the basic psychological principles guiding mental processes and behavior.

Taught in:

PS1000, Psychology as a Natural Science (Level 4)

Overview of the field of psychology as a natural science: theoretical perspectives and research methods, biological basis of behaviour, sensory systems, perception, states of consciousness, learning, memory and forgetting, thinking, language, problem solving, motivation and emotion.

PS1001, Psychology as a Social Science (Level 4)

Overview of the field of psychology as a social science: theoretical perspectives and research methods, life-span development, mental abilities, personality theory and assessment, stress and coping, psychological disorders and treatment, social behaviour.

Learning and Teaching Strategy: In congruence with the Learning and Teaching strategy of the College, the following tools are used:

- Lectures and class discussions.
- Relevant educational films are also shown.
- Office hours
- Use of Blackboard site

Assessment Method:

In-class, 1-hour, "diagnostic" test - **formative**	0%	Multiple choices & short answer questions
In-class 1-hour midterm examination - **summative**	40%	Multiple choices & short answer questions
In-class final examination (2-hours) - **summative**	60%	Multiple choices & short answer questions

A.3. Demonstrate awareness of moral theories and ethical issues and evaluate their impact on information technologies.

Taught in:

PH 2005, Business Ethics (Level 5)

Introduction to major theories and basic moral problems in the domain of business. The use of reasoning in moral assessment of business practices. Application of moral theories to specific cases of corporate conduct ranging from the individual to society in general, in the local and the international context.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Learning activities include lectures, class discussions, and case analysis.
- Office Hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test –**formative**	0	Case study
1-hour midterm exam - **summative**	40	short essay-type questions
Final examination (2-hour, comprehensive) - **summative**	60	short essay-type questions of an informative and argumentative character.

A.4. Demonstrate knowledge and understanding of structured and object-oriented programming.

Taught in:

CS 2188, Introduction to Programming (Level 4)

Problem solving; problem analysis; top-down algorithm design; implementation; testing and debugging techniques; documentation. Style and portability. Modular programming and the JAVA language structure. Identifiers, constants, variables. Input and output. Elementary file handling. Selection. Looping. Classes and Methods. GUI. Arrays. Elementary sorting and searching.

CS2276, C language programming (Level 4)

C language logic and structure; data types; arrays and strings; pointers; file handling; programming and debugging techniques.

CS2234, Object Oriented Programming (Level 5)

Advanced object oriented concepts and problem solving techniques. Advanced GUI components. Applets. Event handling, collections, multithreading and networking. Efficiency issues.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures and class discussions. Laboratory practical sessions and programming problem solving.
- Office hours held by the instructor to provide further assistance to students.
- Use of the online content management system (Blackboard CMS) to further facilitate communication, by posting lecture notes, assignment instruction, announcements, and online submission.

Assessment Methods:

Student performance in **CS2188** is assessed as follows:

In-class, 1-hour, "diagnostic" test –**formative**	**0**	programming problems
Coursework-**summative**	**40**	programming problems
Final Examination (2-hour comprehensive) -**summative**	**60**	programming problems

Student performance in **CS2276** is assessed as follows:

In-class, 1-hour, "diagnostic" test –**formative**	**0**	programming problems
Coursework - **formative**	**0**	Take home assignments and/or in-class quizzes
Coursework-**summative**	**40**	programming problems
Final Examination (2-hour comprehensive) -**summative**	**60**	programming problems and short answers to essay questions

Student performance in **CS2234** is assessed as follows:

Coursework –**formative**	**0**	Short programming exercises
Coursework-**summative**	**50**	Programming project
Final Examination (2-hour comprehensive) -**summative**	**50**	short answers to essay questions and short programming exercises

A.5 Demonstrate knowledge and understanding of several database models with emphasis to the relational model, of database design methods, of normalization and data integrity rules.	**CS 3260, Fundamentals of RDBMS (Level 5)** Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL). Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:* o Lectures and class discussions. Laboratory practical sessions and programming problem solving. o Office hours held by the instructor to provide further assistance to students. o Use of the online content management system (Blackboard CMS) to further facilitate communication, by posting lecture notes, assignment instruction, announcements, and online submission. Taught in: Assessment Methods:

Take-home "diagnostic" test - **formative**	**0**	short answers to essay questions
Coursework - **formative**	**0**	programming problems
Project (1,000 words &application) - **summative**	**40**	requirements analysis/application development/documentation
Final examination (2-hour, comprehensive) - **summative**	**60**	short answers to essay questions

A.6 Demonstrate knowledge and understanding of the concepts of computer architecture and the principles of computer communications. A.6.1 Demonstrate knowledge and understanding of networking models and configurations, of networking standards and protocols, of the characteristics of local and wide area networks, and of different communication transmission media and data.	Taught in: **CS 3375, Communications and Networking Essentials (Level 5)** Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies. Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*: o Classroom lectures, discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions. o Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material. o Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources. Assessment Methods:

In-class, 1-hour, "diagnostic" test - **formative**	**0**	short answers to essay questions
Coursework - **formative**	**0**	case problems
Research Paper (2,000 – 3,000 words) - **summative**	**40**	literature review/data collection/ methodology/interpretation
Final examination (2-hour, comprehensive) - **summative**	**60**	short answers to essay questions and case problems combination

<table>
<tr>
<td>A.6.2 Demonstrate knowledge and understanding of the design of computer hardware.</td>
<td>
Taught in:
CS2186, Computer Systems Architecture (Level 4)
Computer architecture. Digital circuits and components. Types of data representation. Computer organisations and design. Logic design.
Learning and Teaching Strategy- In congruence with the Learning and Teaching strategy of the College, the following tools are used::
o Classroom lectures, discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions.
o Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
o Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.
Assessment Methods:
<table>
<tr><td>In class 1-hour “diagnostic” test –formative</td><td>0</td><td>short answers to essay questions and mathematical problems</td></tr>
<tr><td>Coursework –summative</td><td>40</td><td>design and implementation of a digital circuit</td></tr>
<tr><td>Final Examination (2-hour, comprehensive)- summative</td><td>60</td><td>short answers to essay questions and mathematical problems</td></tr>
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A.7 Demonstrate knowledge and understanding of the fundamental concepts underlying an operating system and relate them to its function, evolution and design.

Taught in:

CS 2293, Operating Systems Concepts (Level 4)

Structures for operating systems. Theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. CPU scheduling algorithms and segmented vs paged types of memory. Polled, interrupt-driven and DMA-based access to I/O. Operating system design and functionality. Performance, avoidance of deadlock, security issues and basic processing of transactions.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*:

- Classroom lectures, discussions, laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

In-class, 1-hour, "diagnostic" test **–formative**	**0**	short answers to essay questions
Coursework-**summative**	**40**	Case Problems
Final Examination (2-hour comprehensive) - **summative**	**60**	combination of short answers to essay questions and case problems

A.8. Select, design, and apply several interdisciplinary project management techniques in order to ensure highly effective and efficient project outcomes.

Taught in:

MG/CS 3157, Project Management (Level 6)

Project management as an interdisciplinary and cross-functional activity in an organization. Emphasis on the relationship of projects to the management of change and to the approaches and roles required to achieve successful implementation.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, class discussions, and review of cases taken from the real world and applicable to specific theoretical concepts.
- Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Methods:

In-class, 1-hour, "diagnostic" test - **formative**	0	short answers to essay-questions
Coursework - **formative**	0	case studies
Project (4,000 words) - **summative**	40	case study
Final Examination (2-hour comprehensive) - **summative**	60	essay type

A.9. Demonstrate knowledge and understanding of algorithms.

A.9.1 Demonstrate knowledge and understanding of algorithmic design and the interaction between algorithm and data structure in creating efficient code

Taught in:

CS3387, Data Structures and Analysis of Algorithms (Level 5)

Algorithmic design; interaction between algorithm and data structure in creating efficient code. Common types of algorithms and data structures; data structures usage and implementation. Lists, stacks, queues, hash tables and trees. Algorithmic mechanisms and problem solving techniques.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, class discussions, and programming practice in problem solving using data structures & algorithms.
- Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Methods:

Take home, "diagnostic" test –**formative**	**0**	programming problems
Coursework- **summative**	**40**	programming problems
Final examination (2-hour, comprehensive) - **summative**	**60**	programming problems

A.9.2 Demonstrate knowledge and understanding of computational models used to analyse and design algorithms for problem solving

Taught in:

CS3413, Algorithms and complexity (Level 5)

Study of algorithms and their complexity. Design, analysis and evaluation of the performance. Complexity theory and classes of complexity. O, Big O and Theta notation. Computational models (Turing engine). Union-Find, Divide and Conquer, Greedy strategy, dynamic programming, search in trees and graphs, backtracking, NP-completeness.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Classroom lectures, discussions, laboratory practical sessions and problem solving.
- Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Methods:

Coursework-formative	**0**	Programming Problems
Course work-summative	**40**	Programming Problems
Final Examination (2-hour comprehensive)-summative	**60**	essay questions and problem solving

A.10 Demonstrate knowledge and understanding of Internet technologies.

A.10.1 Demonstrate knowledge and understanding of Web 2.0 rich Internet application-development methodologies and programming principles.

Taught in:

CS3414, Internet Programming (Level 6)
Internet standards and infrastructure. Internet browsers functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used*:

- Classroom lectures, discussions, laboratory practical sessions and problem solving.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

Coursework - **formative**	0	Short programming exercises
Project- **summative**	60	Rich internet application development
Final examination (2-hour, comprehensive) - **summative**	40	combination of short answers to essay questions and case problems

A.10.2 Demonstrate knowledge and understanding of the evolution of the WWW focusing on the semantic web and the analysis of social networks.

CS3441, Web Science (Level 6)

History of the web. Search engines in information retrieval, ranking. Reputation and recommender systems. Analysis of on-line social networks. Semantic Web.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Classroom lectures, discussions, and review of real-world cases based on specific theoretical concepts. Laboratory practical sessions.
- Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
- Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Method:

Coursework -**formative**	**0**	laboratory exercises
In-class "diagnostic" quizzes- **formative**	**0**	Short answers to essay questions and problem solving
Programming project - **summative**	**50**	analysis of a real world situation in a social network
Final Examination (2-hour comprehensive) - **summative**	**50**	Short answers to essay questions and problem solving

A.11. Demonstrate knowledge and understanding of system analysis, design and validation, required for the creation of reliable and maintainable software systems.

Taught in:

CS3416, Software Engineering (Level 6)

Structured analysis, architectural design, development methodologies, modelling techniques and system visualization. Implementation frameworks. Validation methods. Security. Project Planning.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures and class discussions. Laboratory practical sessions and problem solving.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Method:

Coursework - **formative**	0	Case Problems studied in class
Project - **summative**	60	System modelling
Final examination (2-hour, comprehensive) - **summative**	40	combination of short answers to essay questions and case problems

A.12. Demonstrate knowledge and understanding of game programming tools and techniques.	Taught in: **CS4417, Game Programming (Level 6)** The conceptual framework of interactive environments. Game programming approaches. Techniques and tools. Manipulation of visual effects and sound. Object animation. Movement control. 2D games and 3D worlds. The Open Graphics Library. Interactivity. Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:* o Classroom lectures. Laboratory practical sessions and problem solving. o Office hours held by the instructor to provide further assistance to students. o Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments. Assessment Method:

In class exercises - **formative**	**0**	analysis, synthesis and implementation exercises
Programming project - **summative**	**60**	group project with distinct user participation in project modules
Final examination (2-hour, comprehensive) - **summative**	**40**	short answers to essay question and problem solving

A.13 Demonstrate knowledge and understanding of fundamental concepts of AI.

Taught in:

CS3480, Artificial Intelligence Principles (Level 6)

Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP).

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Method:

In class exercises- **formative**	**0**	problem solving
Research Project (1,500-2,000 words)- **summative**	**50**	case study, data collection, synthesis, critical evaluation, program development
Final Examination (2-hour comprehensive)**- summative**	**50**	Short answers to essay questions, problem solving

A.14 Demonstrate comprehensive knowledge in the area of Human Computer Interaction focusing in the practice of interface design and its evaluation.

Taught in:

CS 3330, Human Computer Interaction (Level 6)

Foundations of human computer interaction. Interaction design basics. HCI in the software process. Cognitive models and theories. Application of concepts and methodologies of software engineering, human factors and psychology to address ergonomic, cognitive, and social factors in the design and evaluation of interactive computer systems.

Learning and Teaching Strategy- *In congruence with the Learning and Teaching strategy of the College, the following tools are used:*

- Lectures, class discussions, problem-solving sessions, and review of real-world cases based on specific theoretical concepts.
- Office hours held by the instructor to provide further assistance to students.
- Use of the Blackboard Learning platform to further support communication, by posting lecture notes, assignment instruction, timely announcements, and online submission of assignments.

Assessment Methods:

In-class, 1-hour, "diagnostic" test - **formative**	0	short answers to essay questions
Research Project (1,500 – 2,000 words) - **summative**	40	case study: data collection/ synthesis/critical evaluation/ interface design
Final examination (2-hour, comprehensive) - **summative**	60	short answers to essay questions

3B. Cognitive skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
B.1. Locate, extract, analyze data from library and other resources including the acknowledgement and referencing of sources. (Levels 5 and 6).	**CS 3375, Communications and Networking Essentials** Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies. **CS 3330, Human Computer Interaction** Foundations of human computer interaction. Interaction design basics. HCI in the software process. Cognitive models and theories. Application of concepts and methodologies of software engineering, human factors and psychology to address ergonomic, cognitive, and social factors in the design and evaluation of interactive computer systems. **CS3480, Artificial Intelligence Principles** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS4918, Software development capstone project** Focus on the software development procedures, including program specification, design, code, testing, documentation, and maintenance. Application of techniques, technologies and practices to form a comprehensive solution. Learning and Teaching Strategy: Students use library and other resources in carrying out the major research project required in this course. Assessment Method: The assessment rubric used in this course includes an assessment of these cognitive skills; assessment is summative.

B.2. Interpret, analyze, and solve structured problems, and to a limited extent unstructured problems, from a generated data set. (Levels 4, 5, and 6)	Taught and/or assessed in: **MA 2118, Statistics for Business and Economics I** Methods for summarizing data (frequency distribution, statistical descriptions). Distribution functions, including the binomial, hyper geometric, Poisson, normal and the t-and chi-square distributions. Sampling and sampling distribution of the mean. Confidence intervals for the population mean, standard deviation and proportion. **CS 3260, Fundamentals of RDBMS** Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL). **MG/CS 3157, Project Management** Project management as an interdisciplinary and cross-functional activity in an organization. Emphasis on the relationship of projects to the management of change and to the approaches and roles required to achieve successful implementation. **CS3480, Artificial Intelligence Principles** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). Learning and Teaching Strategy: Students analyze real world cases and suggest suitable solutions. Assessment Method: Assessed in exams, projects or coursework.

B.3. Develop and critically evaluate arguments and evidence including identifying assumptions and detecting false logic. (Levels 5, and 6)	Taught in: **CS3413, Algorithms and complexity** Study of algorithms and their complexity. Design, analysis and evaluation of the performance. Complexity theory and classes of complexity. O, Big O and Theta notation. Computational models (Turing engine). Union-Find, Divide and Conquer, Greedy strategy, dynamic programming, search in trees and graphs, backtracking, NP-completeness. **CS3387, Data Structures and analysis of algorithms** Algorithmic design. Interaction between algorithm and data structure in creating efficient code. Properties and implementation of different algorithms and data structures. Lists, stacks, queues, hash tables and trees. Recursion, backtracking, divides and conquers, branch and bound, greedy algorithms. **CS3480, Artificial intelligence principle** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS3416, Software Engineering** Structured analysis, architectural design, development methodologies, modelling techniques and system visualization. Implementation frameworks. Validation methods. Security. Project Planning. **CS4918, Software development capstone project** Focus on the software development procedures, including program specification, design, code, testing, documentation, and maintenance. Application of techniques, technologies and practices to form a comprehensive solution. Learning and Teaching Strategy: Students apply theory and processes and develop critical thought through class discussions and case studies. Assessment Method: Assessed in coursework, programming problems and projects and research papers.

B.4. Apply critical thinking to create, evaluate and assess a range of options in solving complex problems. (Levels 5 and 6)	Taught in: **CS3413, Algorithms and complexity** Study of algorithms and their complexity. Design, analysis and evaluation of the performance. Complexity theory and classes of complexity. O, Big O and Theta notation. Computational models (Turing engine). Union-Find, Divide and Conquer, Greedy strategy, dynamic programming, search in trees and graphs, backtracking, NP-completeness. **CS3480, Artificial intelligence principle** Theoretical foundations of artificial intelligence. Unstructured problem solving: problem analysis, research tools. Knowledge representation. Inference rules. Search strategies. Heuristics. Expert systems. Uncertainty. Natural language understanding. Symbol-based machine learning. Neural networks. Genetic algorithms. Agents. AI application languages (Prolog, LISP). **CS3414, Internet Programming** Internet standards and infrastructure. Internet browsers functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy. **CS3416, Software Engineering** Structured analysis, architectural design, development methodologies, modelling techniques and system visualization. Implementation frameworks. Validation methods. Security. Project Planning. **CS3441, Web Science** History of the web. Search engines in information retrieval, ranking. Reputation and recommender systems. Analysis of on-line social networks. Semantic Web. **CS4918, Software development capstone project** Focus on the software development procedures, including program specification, design, code, testing, documentation, and maintenance. Application of techniques, technologies and practices to form a comprehensive solution. **CS 3330, Human Computer Interaction** Foundations of human computer interaction. Interaction design basics. HCI in the software process. Cognitive models and theories. Application of concepts and methodologies of software engineering, human factors and psychology to address ergonomic, cognitive, and social factors in the design and evaluation of interactive computer systems. Learning and Teaching Strategy: Students evaluate a range of alternatives and choose an action plan to meet specified needs for various situations. Assessment: Assessed in examinations, projects and research paper.

<table>
<tr>
<td>B.5. Analyze and evaluate ethical choices. Assess the moral and ethical dimensions of actions, persons, and organisational practices and develop an awareness of and framework for ethical decision-making. (Levels 4, 5, and 6)</td>
<td>Taught in:

PH 2005, Business Ethics (15 UK Credits – Compulsory)
Introduction to major theories and basic moral problems in the domain of business. The use of reasoning in moral assessment of business practices. Application of moral theories to specific cases of corporate conduct ranging from the individual to society in general, in the local and the international context.

Discussion about ethical choices is embedded in almost all IT courses.

Learning and Teaching Strategy:

Students learn through lectures, class discussions, and analysis of cases.

Assessment Methods:
Assessed in exams and case studies</td>
</tr>
<tr>
<td>B.6. Analyze various aspects of professional communication and evaluate effectiveness of oral as well as written communication. (Level 5)</td>
<td>Taught in:

EN 2342, Professional Communication (Level 5)

A study of communication modes in professional contexts with focus on the development of communication expertise needed within businesses as well as technical and academic communities.

Learning and Teaching Strategy - In congruence with the Learning and Teaching strategy of the College, the following tools are used:

o Classes consist of lectures and class discussions.
o Office Hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
o Use of a Blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

Assessment Methods:

<table>
<tr><td>Drafts of assignments listed below -- formative</td><td>0</td><td>Exercises + Drafts of assignments listed below</td></tr>
<tr><td>Professional Presentation Skills -- summative</td><td>50%</td><td>Individual Presentation Skills with Power Point
Team Presentation Skills with Power Point</td></tr>
<tr><td>Professional Writing Skills -- summative</td><td>50%</td><td>Analytical Group Report of about 1500 words
Portfolio: memo, email, business letter</td></tr>
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B.7. Apply appropriate theory, practices and tools to address design and development issues of information technology related problems. (Levels 4, 5, and 6)	**CS 2188, Introduction to Programming** Problem solving; problem analysis; top-down algorithm design; implementation; testing and debugging techniques; documentation. Style and portability. Modular programming and the JAVA language structure. Identifiers, constants, variables. Input and output. Elementary file handling. Selection. Looping. Classes and Methods. GUI. Arrays. Elementary sorting and searching. **CS2276, C language programming** C language logic and structure; data types; arrays and strings; pointers; file handling; programming and debugging techniques. **CS2186, Computer System Architecture** Computer architecture. Interfacing processors and peripherals. Input / Output techniques. Storage techniques. Instruction set. Data representation. Logic design **CS2293, Operating system concepts** Structures for operating systems. Theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. CPU scheduling algorithms and segmented vs paged types of memory. Polled, interrupt-driven and DMA-based access to I/O. Operating system design and functionality. Performance, avoidance of deadlock, security issues and basic processing of transactions. **CS 3375, Communications and Networking Essentials** Computer communications systems components, models, operation, and applications. Networking standards, protocols and connectivity aspects. Local area networks design, implementation, management and troubleshooting. Wide area network services, Intranets and emerging technologies. **CS2234, Object Oriented programming** Advanced object oriented concepts and problem solving techniques. Advanced GUI components. Applets. Event handling, collections, multithreading and networking. Efficiency issues. **CS3260, Fundamental of RDBMS** Relational Database Management Systems concepts. Data modelling, systems development and data administration in a database environment. The relational model, normalization, transaction management, concurrency, control, database security and the Structured Query Language (SQL). **CS3414, Internet Programming** Internet standards and infrastructure. Internet browser functionality. Web 2.0. Client/server structures. Standardized services. Rich Internet applications. Client and server technologies. Security and privacy. **CS4417, Game Programming** The conceptual framework of interactive environments. Game programming approaches. Techniques and tools. Manipulation of visual effects and sound. Object animation. Movement control. 2D games and 3D worlds. The Open Graphics Library. Interactivity. **CS3416, Software Engineering** Structured analysis, architectural design, development methodologies, modelling techniques and system visualization. Implementation frameworks. Validation methods. Security. Project Planning. **CS4918, Software development capstone project** Focus on the software development procedures, including program specification, design, code, testing, documentation, and maintenance. Application of techniques, technologies and practices to form a comprehensive solution.

	Learning and Teaching Strategy: During class discussions, and laboratory sessions students are practicing program design and development techniques. Assessment method: Assessed in all formative and summative methods presented in section A.
B.8. Exhibit reasoning ability and creativity to address a given problem. (Levels 4, 5 and 6)	*Taught throughout the curriculum.*
B.9. Evaluate the design of interactive application interfaces based on human factors and psychology to address ergonomic, social and cognitive issues. (Level 6)	Taught in: **CS 3330, Human Computer Interaction** Learning and Teaching Strategy: Students evaluate computer interface designs using real life case studies, applications and web sites. Assessment methods: Assessed in the diagnostic test (formative) and the final examination (summative).

3C. Practical and professional skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
C.1. Use numeric skills, including quantitative techniques in problem solving of increasing complexity and with increasing autonomy depending on the course level. (Levels 4, 5, and 6)	Taught and assessed in: MA 2118, Statistics for Business and Economics MA 1105, Applied Calculus MA 2106 Mathematics for computing MG/CS 3157, Project Management CS 2186, Computer System Architecture CS 3413, Algorithms and Complexity
C.2. Use Information Technology effectively to retrieve, process, analyze and communicate information. (Levels 4, 5, and 6)	*Taught throughout the curriculum.*
C.3. Relate the importance of people management within projects in terms of resource allocation, leadership, teamwork, and motivation. (Levels 6)	Taught and assessed in: MG/CS 3157 Project Management
C.4. Specify, design and construct solutions involving programming to given problems. (Levels 4, 5, and 6)	Taught and assessed in: CS 2188 Introduction to Programming CS 2276, C language Programming CS 2234, Object Oriented Programming CS 3260 Fundamentals of RDBMS CS 3414, Internet Programming CS 3416, Software Engineering CS 3480, Artificial Intelligence Principles CS 4417, Game Programming CS 4918, Software development capstone project

C. 5. Determine the risks, controls and safety measures in the use of computing technologies. (Levels 4, 5, and 6)	Taught and assessed in: CS2293, Operating system concepts CS 3260 Fundamentals of RDBMS CS 3375 Communications and Networking Essentials CS3416, Software Engineering CS3414, Internet Programming CS4918, Software development capstone project
C.6. Synthesize prior acquired knowledge to design and develop information technology solutions. (Level 6)	Taught and assessed in: CS4918, Software development capstone project

3D. Key/transferable skills	
Learning outcomes:	Learning and teaching strategy/ assessment methods
D.1. Communicate ideas successfully orally and in writing following English discourse conventions. Adapt message content to a particular audience and medium of communication in a professional context. (Levels 4, 5, and 6)	<u>Taught and assessed in:</u> **EN 2342, Professional Communication (Level 5)** *English language skills are reinforced through assignments, projects, class participation and oral presentations in all courses*. The courses listed below are considered the most language intensive: PS1000, Psychology as a Natural Science PS1001, Psychology as a Social Science PH 2005, Business Ethics CS 3260, Fundamentals of RDBMS CS 3375, Communications and Networking Essentials CS 3330, Human Computer Interaction CS3480, Artificial Intelligence Principles MG/CS3157, Project Management CS3416, Software Engineering CS4918, Software development capstone project
D.2. Develop interpersonal, teamwork and/or leadership skills. Work effectively with others in small groups or teams.(Levels 4, 5, and 6)	<u>Taught and/or assessed in</u>: CS 2188, Introduction to Programming EN 2342, Professional Communications CS 3260, Fundamentals of RDBMS MG/CS 3157, Project Management CS3416, Software Engineering CS4417, Game Programming CS 3330, Human Computer Interaction
D.3. Reflect intellectually and become an independent self managed lifelong learner.(Levels 4, 5, and 6)	*Taught throughout the curriculum.*

4. Programme Structure

Programme Structure - LEVEL 4				
Compulsory modules		**Credit points**	**Optional modules**	**Credit points**
PS 1001	PSYCHOLOGY AS A SOCIAL SCIENCE	15		
PS 1000	PSYCHOLOGY AS A NATURAL SCIENCE	15		
MA 1105	APPLIED CALCULUS	15		
MA 2118	STATISTICS FOR BUSINESS AND ECONOMICS I	15		
CS 2188	INTRODUCTION TO PROGRAMMING	15		
CS 2186	COMPUTER SYSTEMS ARCHITECTURE	15		
CS 2293	OPERATING SYSTEMS CONCEPTS	15		
CS 2276	“C” LANGUAGE PROGRAMMING	15		
TOTAL LEVEL 4		**120**		

Programme Structure - LEVEL 5				
Compulsory modules		**Credit points**	**Optional modules**	**Credit points**
EN 2342	PROFESSIONAL COMMUNICATION	15		
PH 2005	BUSINESS ETHICS	15		
CS 2234	OBJECT ORIENTED PROGRAMMING	15		
MA 2106	MATHEMATICS FOR COMPUTING	15		
CS 3260	FUNDAMENTALS OF RDBMS	15		
CS 3375	COMMUNICATIONS AND NETWORKING ESSENTIALS	15		
CS 3387	DATA STRUCTURES AND ANALYSIS ALGORITHMS	15		
CS 3413	ALGORITHMS AND COMPLEXITY	15		
TOTAL LEVEL 5		**120**		

Programme Structure - LEVEL 6			
Compulsory modules	**Credit points**	**Optional modules**	**Credit points**
MG/CS3157 PROJECT MANAGEMENT	15		
CS 3480 ARTIFICIAL INTELLIGENCE PRINCIPLES	15		
CS 3414 INTERNET PROGRAMMING	15		
CS 3416 SOFTWARE ENGINEERING	15		
CS 3441 WEB SCIENCE	15		
CS 3330 HUMAN COMPUTER INTERACTION	15		
CS 4417 GAME PROGRAMMING	15		
CS 4918 SOFTWARE DEVELOPMENT CAPSTONE PROJECT	15		
TOTAL LEVEL 6	**120**		

5. Distinctive features of the programme structure

Where applicable, this section provides details on distinctive features such as :

- *where in the structure above a professional/placement year fits in and how it may affect progression*
- *any restrictions regarding the availability of elective modules*
- *where in the programme structure students must make a choice of pathway/route*

Annexe 1: Curriculum map

Annexe 2: Notes on completing the OU programme specification template

Annexe 3: General Education Requirements

Annexe 4: Exit Awards

Annexe 1. Curriculum map

			KNOWLEDGE & UNDERSTANDING													COGNITIVE									PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 4	1	PS1000		✔																												✔		
	2	PS1001		✔																												✔		
	3	MA1105	✔																							✔								
	4	MA2118	✔															✔								✔								
	5	CS2188				✔																	✔						✔				✔	
	6	CS2186						✔															✔			✔								
	7	CS2293							✔														✔							✔				
	8	CS2276				✔																	✔						✔					

			KNOWLEDGE & UNDERSTANDING													COGNITIVE									PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 5	1	EN2342																				✔										✔	✔	
	2	PH2005			✔																✔											✔		
	3	CS2234				✔																	✔						✔					
	4	MA2106	✔																							✔								
	5	CS3260					✔											✔					✔						✔	✔		✔	✔	
	6	CS3375						✔									✔						✔							✔		✔		
	7	CS3387									✔								✔										✔					
	8	CS3413									✔								✔	✔						✔								

			KNOWLEDGE & UNDERSTANDING													COGNITIVE									PRACTICAL						TRANSFERABLE		
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	D1	D2	D3
LEVEL 6	1	MG/CS3157								✔								✔								✔		✔				✔	✔	
	2	CS3480													✔		✔	✔	✔	✔									✔			✔		
	3	CS3414										✔								✔			✔						✔	✔				
	4	CS3416											✔						✔	✔			✔						✔	✔		✔	✔	
	5	CS3441										✔								✔														
	6	CS3330														✔	✔			✔					✔							✔	✔	
	7	CS4417												✔									✔						✔				✔	
	8	CS4918																	✔	✔									✔	✔	✔	✔		✔

Annexe 2: Notes on completing programme specification templates

1 **-** This programme specification should be aligned with the learning outcomes detailed in module specifications.

2 – The expectations regarding student achievement and attributes described by the learning outcome in section 3 must be appropriate to the level of the award within the **QAA frameworks for HE qualifications**: http://www.qaa.ac.uk/academicinfrastructure/FHEQ/default.asp

3 – Learning outcomes must also reflect the detailed statements of graduate attributes set out in **QAA subject benchmark statements** that are relevant to the programme/award: http://www.qaa.ac.uk/academicinfrastructure/benchmark/default.asp

4 – In section 3, the learning and teaching methods deployed should enable the achievement of the full range of intended learning outcomes. Similarly, the choice of assessment methods in section 3 should enable students to demonstrate the achievement of related learning outcomes. Overall, assessment should cover the full range of learning outcomes.

5 - Where the programme contains validated **exit awards** (e.g. Cer HE, Dip HE, PG Dip), learning outcomes must be clearly specified for each award.

6 - For programmes with distinctive study **routes or pathways** the specific rationale and learning outcomes for each route must be provided.

7 – Validated programmes delivered in **languages other then English** must have programme specifications both in English and the language of delivery.

Annex 3 - General Education Requirements

In US colleges and universities, undergraduates usually are admitted to the institution, not to a programme as in the UK, and may choose their major academic field after completion of one or two years of general education courses in the fields of the humanities and arts, social sciences, and physical and natural sciences. *General Education* refers partly to foundation skills, but also to knowledge, cognitive skills, state of mind, life habits that are developed primarily through a set of required courses and which prepare students for success in their major course of study, and their personal and professional lives after the college experience.

General Education courses provide the core of what it means to be an educated person; moreover, such broad exposure to the disciplines gears students towards lifelong learning, exposes them to the mainstreams of thought and interpretation and promotes their understanding of the interrelationships among the various fields of study. While not directly relating to the students' vocational preparation, these courses help them build a strong set of educational skills and acquire knowledge necessary for a successful personal, professional and civic life. The students' last two or three years are devoted to more specialized study in their chosen major field.

The General Education core aims to help students to:

1. Enhance their oral and written communication skills along with the acquisition of knowledge for the use of technology in communication
2. develop analytical thinking and information literacy skills (retrieval, evaluation and integration of information), influencing them in becoming life-long learners and teaching them the process for learning
3. inspire them to lead lives governed by strong ethical values and enable them to make meaningful decisions on moral dilemmas
4. prepare students as conscientious global citizens, providing them with the opportunity to be involved in cross-cultural learning, gaining respect for different perspectives and diversity
5. instill in them appreciation of our cultural heritage and of examining it from different perspectives
6. understand the present through the study of the past
7. recognize the value of science in shaping our present and comprehending its methodology in attaining knowledge

DEREE's general education curriculum which consists of 47 US credits (equivalent to 235 UK credits) ensures that students will acquire breadth of knowledge in the traditional disciplines of the liberal arts that will enable them to become successful contributors to a diverse global community. Consisting of courses in English, natural sciences, social sciences, ethics, the arts and humanities, the general education curriculum is a balanced program in the liberal arts with specific learning outcomes: communication abilities in written and spoken form; critical thinking and reasoning; values and ethical decision-making; an appreciation of the arts and humanities as an essential component of the human experience; recognition of the relevance of science in the world; technological competence; and a knowledge of the ways in which political, social, and economic forces shape global experiences.

DEREE's minimum general education requirements are as follows:

- 3 courses in English (composition)
- 1 course in Public Speaking
- 1 course in Ethics
- 3 courses in at least two areas of the Humanities
- 2 courses in the natural sciences with laboratory
- 4 courses in at least two areas of the social sciences
- 1 introductory course in Information Systems

Individual majors may have additional requirements (such as Mathematics and Foreign languages) or reduce choice in the Humanities, the Social Sciences, and/or the Natural Sciences, but all specifics are included in the college's catalog. Through this set of General Education courses, each with its own rationale, objectives, and assessments, DEREE -ACG strives to promote tolerance and a love for lifelong learning and free expression.