

Course Title: BSc Computing Science (October 2021- October 2023)

University: University of the West of Scotland (Paisley Campus)

UCAS Code: G401

Exit Award: Diploma of Higher Education in Computing Science (completed year 1 and year 2)

Year 1

Introduction to Web Development – 20 Credits

Module Descriptors:

- The aim of the module is to enable you to understand how the world wide web evolved and has developed over the years as well as look at current technologies used in web development.
- The module will use a mark-up language such as HTML5 for presenting content for a web page and CSS such as CSS3 to control the style and layout of web pages.

Overview of the module:

- There will be discussion on design, navigation and accessibility as well as the use of validators for mark-up and styling.
- There will also be some discussion on client-server architecture, web servers and hosting sites and an introduction to other features such as search engine optimisation and JavaScript.

Learning Outcomes:

At the end of the module, you will be able to:

- L1. Demonstrate awareness of the principles of web development;
- L2. Demonstrate a knowledge and understanding of contemporary techniques for web page creation;
- L3. Develop and upload a web site using a defined range of technologies and fulfilling specific design criteria.

Computing Systems – 20 credits

Module Descriptors:

This is a core module for the undergraduate programmes in Computer Games Technology, Business Technology, Computer Networking and Web Development. It also forms part of the BSc Computing. It is an option on a number of other computing and related degrees.

Two complementary approaches are used in teaching and learning, and woven together over the weeks of teaching. In the first approach, students look at different examples of computer systems, hardware and software, and learn about the different hardware and software components that together form a computer system. In this way, a top-down view of a computer system (whether PC, games console or mobile device) is formed. Second, students learn about how computer processors are built up from simple digital logic circuits into distinct components and then to complete CPUs and GPUs.

This top-down/bottom-up approach is also used to examine the software running on today's computer systems. A broad view of the OS and software environments is complemented by a machine level view. This moves from the machine code used by computers, to the high-level programming languages favoured by human programmers and the processes by which these are translated into machine code for execution on the computer.

The module also introduces the (GCHQ – 'Operational Security Management' discipline) topics: Internet, Network and Applications Security. As each of these topics are covered, students will research, in groups, recent threats targeting new platforms.

Computers and processors are now an ever present part of normal life, found not only in PCs, but in mobile phones, digital cameras, games consoles and in a myriad of places around the home and workplace. Security is now a core requirement when creating systems and software. This module will

introduce students to some of the fundamentals of computer security including internet threats, network security and application security.

Learning Outcomes:

At the end of this module the student will be able to:

- L1. Demonstrate an awareness of the range of hardware and software components and devices that are brought together in modern information, entertainment and ubiquitous computer systems showing an understanding of the security issues which are associated with the components.
- L2. Identify and use a variety of approaches associated with representation of data
- L3. Convey and demonstrate their understanding of the organization and operation of low level computer system organization and architecture.
- L4. Identify and describe concepts from operating system and software translation that demonstrate their understanding of bridging the gap from a problem-oriented level to machine execution level.

Professional Development in Computing – 10 credits

Module Descriptors:

The objective of this coursework is for you to demonstrate your ability to:

- To develop your communication skills.
- To develop Computing Skills
- To develop research skills.

Overview of the module:

During your time at university you will be asked to do presentations either in person or online.

In this module, part of the assessment is a group presentation to help develop communication skills

You will also participate as audience and markers!

As a group come up with an idea for an 'app' that may be commercially viable and make your team rich - or be something that would benefit society.

For the assessment your group is to create a video presentation. In this you should talk about your app idea so that an audience may be able to judge your app idea.

Learning Outcomes:

Formal Group Presentation

- A video presentation (using any software you as a group decide to record your presentation with)
- Normally Groups of 4
- To be submitted online and also made available to other groups within your cohort
- Peer marked

CCNA 1: Introduction to Networks – 20 credits

Module Descriptors:

Overview of the module:

Learning Outcomes:

During this module, you will:

- Demonstrate a broad knowledge of the area of computer networking and its terminology
- Design, implement, and test the operation of a basic computer network
- Demonstrate an understanding of the operation of a range of networking protocols and devices

Design for Interaction – 20 credits

Module Descriptors:

The Design for Interaction module is a 1st Year module that is intended to provide an introduction to the interaction design issues pertaining to the development of interactive content.

Overview of the module:

Assessment

-The assessment for this module is made up of two components, as described below.

Coursework 1 – written report (40%)

-You are required to submit a written report in the first half of the term. This will consist of analysis and comparison of the UWS website with another UK university website.

Coursework 2 – design of a user interface of an interactive system (60%)

-This will consist of a design task that will give you the opportunity to put into practice of the key ideas on interaction design covered in the module. You will be asked to create a design to fulfil a detailed brief. Marks will be awarded for fulfilment of the brief for the relevant task, and for demonstrating understanding of what the task is designed to achieve.

Learning Outcomes:

You will also be expected to undertake appropriate follow-up practical and theoretical study by self-study.

Introduction to programming – 20 credits

Learning Outcomes:

Learn the basics of programming in Python

Year 2

Mathematics for Computing – 10 credits

Module Descriptors:

- To develop mathematics skills
- To develop statistics skills

Database Development – 20 credits

Module Descriptors:

Databases are now such an integral part of our day-to-day life that we are often not aware that we are using one. To illustrate this point, a range of example databases are demonstrated and discussed. The longevity and popularity of a particular type of database software called Database Management System (DBMS) is examined. The typical functions and services (including data integrity, authorisation and security) that enable DBMS to manage and secure data are discussed. Example DBMSs (e.g. Microsoft SQL Server and MySQL) are used to illustrate these services. This module examines how a DBMS can be used to meet the needs of a particular case study. This is achieved using a structured approach to the creation of a database system, which is called the Database Systems Development Lifecycle (DSDL). The stages of the DSDL are discussed with particular attention to the earlier stages including database planning, systems definition, requirements collection and analysis and database design. Ensuring that the database has all of the data required to meet the needs of a particular case study is key to the success of a database system. A popular

database design technique used to identify the required data is called entity-relationship (ER) modelling and this technique is discussed and illustrated. The database design technique of normalisation is also explored as a means of building/validating a database. • This module begins with a discussion on our digital environment and how recent advancements in technologies have resulted in what is commonly referred to as the 'data explosion'. Vast quantities of data (structured and unstructured) are being created and businesses are seeking ways to effectively capture, organise and secure this valuable asset. This module examines how database technologies can fulfil this role. • There are various ways to represent data in a database however this module explores the power and simplicity of the relational data model. Through practical classes, students are introduced to a relational DBMS and learn how to create, maintain and access data using a relational database language called Structured Query Language (SQL). Examples of how relational databases can be maliciously attacked are discussed (e.g. SQL Injections). • This module ensures that students have an excellent grounding in the fundamental knowledge (DBMS functions and services and the Database Development Lifecycle) and skills (ER modelling, normalisation and SQL programming) associated with developing database systems. • This module will work to develop a number of the key 'I am UWS' Graduate Attributes to make those who complete this module: Universal (Critical Thinker, Ethically-minded, Research-minded), Work Ready (Problem-Solver, Effective Communicator, Ambitious) and Successful (Autonomous, Resilient, Driven).

Learning Outcomes:

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

- L1. Demonstrate a broad knowledge of the how database management system (DBMS) software can be used to organise and secure a valuable business asset – namely data.
- L2. Demonstrate a broad knowledge of the stages of the database system development lifecycle which enables the creation of a database system to meet the requirements of users.
- L3. Demonstrate understanding of the core theories and principles associated with the relational data model.
- L4. Use a range of routine skills and techniques to produce a conceptual and logical design for a database.
- L5. Use of a range of standard functions and services provided by a relational database management system (DBMS) to implement a prototype database system.

Object Oriented Analysis – 20 credits

Module Descriptors:

You will work with your peers to develop skills related to the analysis, evaluation, justification, provision, and design of technology-based organisational information systems, using the Unified Modelling Language (UML).

Overview of the module:

Module Experience

Your flow of learning will have these three aspects to it:

- Pre-Meeting Exploration and Activities: Before the live workshop session, you'll complete challenges which will lay down some foundational knowledge and understanding ahead of your live group meetings. Using resources provided by me, you'll work independently to tackle a problem, formulate a solution, and then share & discuss your findings in your individual learning log.
- Team Meeting Discussion & Analysis: In the live meeting, you will collaborate with your teammates and extend your learning, functioning as a project team. You will share responsibilities, create action

steps, and work toward each stage of the project. The live meetings with your teammates and your tutor will happen on MS Teams in the space called COMP08033-2223.

-Post-Meeting Follow-Up: After the live meeting, we will continue the discussion and fill in any gaps in understanding.

Learning Outcomes:

By the end of the module, you will:

- Apply professional object-oriented analysis approaches, specifically UML.
- Produce analysis reports using standard business software and a CASE tool.
- Work as a member of an IT project team.

Operating Systems – 20 credits

Module Descriptors:

To build on to the basic knowledge of the Computing Systems module

To develop an understanding of the concepts of modern computer operating systems

Overview of the module:

Your flow of learning will have these four aspects to it:

- Pre-Class Activity: Before the live session, you'll complete an activity which will lay down some foundational knowledge and understanding ahead of our live class. Using resources provided by me, you'll work together to tackle a problem, formulate a solution and then share & discuss your findings with me and the rest of the class.
- In-Class Exploration: In the live class, we'll explore what we've learned so far and extend our learning as a class through additional discussion and activity.
- Tutorial:
- Post-Class Discussion & Analysis: After the live class, we will continue the discussion and fill in any gaps in understanding.

Learning Outcomes:

Knowledge & Understanding

- To have knowledge and understanding of the principles, structure and functions of operating systems and other system software.

Discipline Skills

- To have a working knowledge of operating systems and their components. To be able to relate operating system functions to the architecture of the machine.

Personal Transferable Skills

- Ability to appraise computer organisation and operating systems.

Structures and Algorithms – 20 credits

Overview of the module:

You will revise core programming concepts covered in year 1 and learn how to apply them using the Java programming language. You will then learn about abstract data types (ADTs) and object oriented principles. The module also covers a number of searching and sorting algorithms. Data structures including arrays and linked lists, as well as their applications as stacks and queues are covered together with an introduction to binary search trees (BSTs).

Learning Outcomes:

On successful completion of this module you will be able to:

- Demonstrate an understanding of program design paradigms: structured and object-oriented design and abstract data types (ADTs);
- Design, implement and use simple collection classes (or ADTs) as components in a software system using an object-oriented programming language;
- Evaluate and select appropriate algorithms for the implementation of the operations of an abstract data type or collection class.

WBL 2- Group Project – 20 credits

Overview of the module:

In this module, you will work in a small group to undertake a series of activities related to the planning, design, implementation, testing and critical evaluation of a piece of work related to your programme of study.

Undertaking this module will develop a range of graduate attributes, including research, critical thinking and analysis, collaborative working, problem solving and effective communication skills.

Each group will maintain regular contact with their tutor so that the necessary technical and organisational assistance can be obtained. It is expected that groups will develop their project in a professional manner, and that the module will provide an insight into how teams in industry work.

Students will produce a written report of the project work, document the design and implementation, and critically evaluate the work done.

Learning Outcomes:

By the end of the module, you will be able to:

- Plan, negotiate and complete a portfolio piece of work according to a specified project brief.
- Demonstrate understanding and appreciation of investigative, planning, design and development techniques appropriate to the project brief.
- Communicate and demonstrate ideas and reflect on work undertaken individually and as part of a group.

Programming for Mobile Devices – 20 credits

Module Descriptors:

In this module you will use a starter file to complete a game application within Android Studio

Overview of the module:

Create a finished game within Android Studio using Java

- use provided code to complete a starter game.
- work in groups
- create a written report for the game to give to buyers
- create a video demonstrating the gameplay
- Peer Assess other groups projects

Learning Outcomes:

- Learn to create a game within android studio based on a given theme
- take creative control on how to finish the project i.e adding sounds, graphics etc.
- work as a team to deliver the project in an organized way
- create a video to showcase the game with your teammates
- peer assess others