University of Wollongong, Australia

Bachelor of Computer Science (Multimedia and Game Development)

YEAR 1

CSCI102 Systems

This subject establishes the position of Computer Science and Information Technology in a non-programming context. Areas introduced include Human-Computer Interface, Information Modelling, Intelligent Systems, Networks, Operating Systems, Software Design and Development and Professional ethics, rights and responsibilities.

ECTE182 Internet Technology

This subject introduces students to the fundamentals of computer communications. These fundamentals are then used to outline the Internet Architecture, and describe its key components. Following this, the operation of the World Wide Web (WWW) will be detailed. Topics covered include packet switching, switched networks, layered protocols, Local and Wide Area networks, WWW operation, network components (e.g., routers), access technologies (e.g., modems). Laboratory exercises will illustrate key computer communications concepts.

CSCI110 Introduction to W3 Technologies

This subject introduces the technologies that underlie the World Wide Web and its commercial applications. Topics include an overview of internet communications covering basic protocols such as TCP/IP and HTTP, an introduction to the web-browser/web-server client-server systems, HTML/XHTML/XML markup languages, web forms, client side scripting technologies, basics of relational databases, and server side scripting languages. Students will build working web-sites with dynamic content. Working in groups, students will explore the uses of one or more of the more elaborate framework applications for web-based collaboration (Web-2 technologies).

STAT131 Understanding Variation and Uncertainty

Variation and uncertainty occur in most aspects of life. Students will learn about techniques, concepts and theory which assist in making sense of this variability and uncertainty through three major components; Exploring Variation in Data; Modelling Uncertainty; Estimation and Hypothesis Testing.

MATH121 Discrete Mathematics

Students will be introduced to the spirit of mathematical inquiry and critical analysis, and encouraged to develop the ability to apply mathematical principles to the formulation and solution of problems. This is done through the use of non-calculus techniques, especially those of logic and number theory.

CSCI103 Algorithms and Problem Solving

This subject introduces the basic concepts of algorithms and their relationship to data structures and problem solving. This subject emphasises problem solving techniques leading to the development of algorithms rather than their implementation or a formal mathematical treatment of algorithms. Topics include sorting, searching and counting problems and the principal algorithms used in their solution. Common approaches to algorithm development and analysis will be examined.

CSCI114 Procedural Programming

This subject introduces the procedural approach to programme design and implementation. Covers basic language constructs for defining variables of built-in types, flow control constructs and simple I/O. Explores functional decomposition as a design technique, and the implementation of functions. Introduces simple user-defined data types and aggregates.

CSCI124 Applied Programming
Pre-Requisites: CSCI103 & CSCI114

This subject develops a thorough understanding of programme design using data structures. It extends CSCI114 and presents pointers, dynamic memory management and exception handling. Other topics include implementation of Sorting and Searching Algorithms including the use of typedefs, void pointers and indexes to generalise algorithms; Implementation of data structures: queues, stacks, linked lists, dequeues, trees; Use of arrays as an implementation structure – hashing, radix sort, heaps and Heapsort; Random Access files and internal I/O; Testing of programmes: black and white box testing, and the use of debuggers; Use of multi-file organisation in encapsulation and data hiding, with make files; These concepts will be treated through formal lectures, tutorials, assignments and laboratory sessions employing an object oriented language.

YEAR 2

CSCI203 Algorithms and Data Structures
Pre-requisites: CSCI124

Approaches to analysing algorithm complexity. The use of abstract data types as a design technique, and their implementation in solutions to problems, will form a large part of the subject. The concept of efficient code and ways to measure efficiency (both empirically, by timings, and theoretically) will be studied.

IACT201 Professional Practice and Ethics
This subject will examine the information technology industry which encompasses: telecommunications; computing; broadcasting and publishing. It will analyse the encroachment of industry activities that use electronic media on: citizens' rights in matters of data surveillance; freedom of access to information and ownership of intellectual property. The extent to which technical solutions to these problems can and cannot be provided will be discussed and alternative non-technical solutions will also be treated. An investigation of the current legal safeguards, their legislative histories and the need for new legislation will be covered.

CSCI205 Software Development Methods and Tools
Pre-requisites: CSCI124

This subject provides an introduction to the process of design and analysis of software. Students will receive a formal introduction to the software design process and techniques, pattern design and reuse, as well as general approaches of interface design. A UML supporting tool will be used for practice of object oriented development approach.
1. Explain the techniques and stages of a selected modern analysis and design method.
2. Describe the range of application domains to which a method can properly be applied.
3. Demonstrate proficiency in the correct use of the techniques learnt.
4. Properly apply the method to a particular analysis and design problem within the methods application domain.
5. Correctly use UML notation to document the analysis and design.

CSCI213 Java Programming and Applications
Pre-requisites: CSCI124

An introduction to the Java language and some of its standard class libraries; and Experience with object oriented design and implementation techniques. Topics covered will include: use of a Java Integrated Development Environment, Java language, subset of the standard Java class packages (Standard Edition: windowing, graphics, TCP/IP networking, threads, database access, applet, media), security issues with portable code, Java "Micro Edition" (ME) and its associated packages and applications. Development of applications for different environments.

CSCI204 Object and Generic Programming in C++
Pre-requisites: CSCI124

CSCI204 develops a thorough understanding of the object oriented approach and introduces such object concepts as encapsulation, inheritance, polymorphism and runtime binding. This is complemented by an introduction to object-oriented design, with UML representations at the programme level. Templates are introduced as a method of achieving generalisation. Container classes and the Standard Template Library are presented as examples of generic programming.

CSCI212 Interacting Systems
Pre-requisites: CSCI124
Develops an understanding of the operating system and tools from a programmer's viewpoint. Topics covered include the file system, processes, communication and tools. In particular, access, security, organisation, operating system effect on performance of a programme, support, control; process and interaction, inter-process communication; use of shell scripts and commands to enhance problem solving; tools for development process; programme paradigms; parallel, distributed, etc.

CSCI222 Systems Development
Pre-requisites: CSCI102 & CSCI124
Provides a framework for understanding and developing the necessary skills to successfully undertake the major third year software project. The emphasis of this subject is on the design and development process and its application to real world problems. The subject combines a formal introduction to the discipline of software engineering with a practical application of its methods.

CSCI235 Database Systems
Pre-requisites: CSCI124
This subject investigates the major areas of modern database systems:
• Design and programming of relational databases
• Design and programming of semistructured databases (XML native database systems)
• Design and programming of distributed database systems (NoSQL database systems)
• Concurrency control and data recovery in database systems

Topics will include: Introduction to conceptual modelling; Principles of relational database model; Processing relational databases with Structured Query Language (SQL) and its procedural extension (PL/SQL); Principles of semistructured database model; Processing of semistructured databases with Query and XPath; Design and implementation of distributed database systems; normalisation of relational databases; Transaction management and recovery in database systems.

YEAR 3

CSCI367 Multimedia Computing
Pre-requisites: CSCI204
This subject will introduce the acquisition, representation, compression, transportation/communication and consumption of multimedia data including, images, video and audio. The treatment will be general and cover commonly used acquisition devices including digital still and video cameras, audio microphones; colour representation techniques for images and video; modern compression techniques for compact representation (JPEG, JPEG2000, H.264/AVC, MPEG4); RTSP, etc. The subject will include a laboratory component where students design and implement simple applications of multimedia including computer games.

CSCI236 3D Modelling and Animation
This subject provides students with a hands-on introduction to the use of computers for developing models of three dimensional objects and viewing them in 3D as still images and animations. Topics covered include basic modelling primitives, from polygons to spline surfaces; tools to modify simple objects; surfacing concepts such as textures and bump maps; basic lighting of scenes; the animation process including key frames, articulated structures, camera movement and morphing; lighting effects such as volumetrics and radiosity. The subject uses the industry standard software package LightWave.

CSCI356 Game Engine Essentials
Pre-requisites: CSCI204
This subject will employ an appropriate game engine to illustrate the use of an application programming interface (API) in the design and development of physics and artificial intelligence models for computer games. The subject will cover topics including, dynamics of particles, collision, rigid body dynamics and collision, gravity and projectiles, spring systems, water and waves. "Artificial intelligence" topics include finite state machines, fuzzy state machines, etc. The subject also covers the development of terrain, sound, etc, for games.

CSCI346: Game Development

This subject introduces the game development and production lifecycle. Students are exposed to the different game genre and how they affect game play. The design and development of different game plays are introduced. The subject allows students to explore the appreciation and critical review of modern games. There is a hands-on aspect of the subject where students design and develop games of different genres using appropriate game development framework.

CSCI336 Interactive Computer Graphics

Pre-requisites: CSCI204

Introduction to computer representation of lines and points; mathematical models; transformations in 2 and 3 dimensions; homogenous coordinate systems; fill algorithms; solid modelling; hidden line and surface algorithms; lighting models; and current trends.

CSCI322 Systems Administration

Pre-requisites: CSCI204 + 6 credit points @ 200 level

This subject will cover the practical and theoretical aspects of system administration. The various resource areas which have to be managed will be discussed and examined. And the possible methods of monitoring and controlling them in various systems will be investigated. The features unique to both single processor and networked systems will be investigated.

CSCI321 Project

Pre-requisites: CSCI222

Working in groups, students design, implement, and document a software system. Involves: project planning and scheduling, seminars and individual presentations, group co-ordination, research of proposed application domain, use of design methodologies, design documentation, coding, module and system integration, testing verification, and implementation.