CIUJ:UE2121 Software Development 2

Credit Points: 12.5

Contact Hours: 48 Hours

Duration: 1 Semester

Campus: CIUJ

Prerequisites: Nil

Corequisites: Nil

Teaching Method

Lecture (2 Hours per Week), Laboratory/Tutorial (2 Hours per Week)

Assessment

SUT:HIT1052 Software Development 2

Assignments, Examinations

Aims & Objectives

* To extend and strengthen basic concepts of object-oriented programming using Java.
* To study GUI software development using Java.

Content

* Intermediate programming.
* The dynamic model.
* Java language and Java system.
* Graphical User Interface programming in Java.
* Exceptions.
* Files and streams.
* Design principles and introduction to patterns.

Reading Materials

Allen, R.K., Software Development 2, 6th edn. Swinburne, 2004.
Allen, R.K., Bluff, K., Oppenheim, A., Software Development 1, 7th edn. Swinburne, 2004.
Savitch, W., Java: An Introduction to Computer Science and Programming, 3rd Edition, Prentice Hall, 2004.
Horstmann, C.S., Cornell, G., Core Java 2, Vol. 1: Fundamentals, Sun Microsystems Press Java Series, Prentice-Hall, 2003.
Horstmann, C.S., Computing Concepts with Java 2, Essentials, 2nd edn, Wiley, 2000.
Riel, A.J., Object-Oriented Design Heuristics, Addison-Wesley, Reading, MS, 1996.

CIUJ:UE2211 Broad casting

SUT:HET 314 Communications Principles

Credit Points: 12.5

Contact Hours: 5.5 Hours per Week

Duration: 1 Semester

Campus: CIUJ

Prerequisites: UG0122

Corequisites: Nil

Teaching Method

Lectures, Tutorials and Laboratory Work

Assessment: Tests, Examinations, Pracs

Aims & Objectives

* The student should become familiar with common terminology, concepts, equipment and techniques of signal processing for communications.
* The student should be able to explain, justify, analyse and critically evaluate common signal processing concepts and methods.
* The student should be able to analyse the performance of various modulation methods for analogue and digital transmission, evaluate the effect of noise on signal reception and assemble signal processing modules to implement communications systems.

Content

* Analogue signals, spectral (fourier) analysis, bandwidth, ideal and real filters, transfer functions, amplitude and phase response, energy and power spectra.
* Analogue modulation and demodulation: amplitude,frequency, phase.
* Noise and its effects in analogue communication systems.
* Receivers.
* Commercial broadcasting: radio and television.
* Pulse modulation.
* Sampling theorem.
* Pulse amplitude modulation, time division and frequency division multiplexing, pulse code modulation.
* Digital methods: digital line codes, modulation and demodulation of ASK, PSK, FSK, DPSK, QAM, QPSK.
* Noise and its effects in digital communication systems, BER, analysis of digital modulation schemes.

Reading Materials

Blake, R, Comprehensive Electronic Communications, West, 1997.

CIUJ:UE2122 Electronic Engineering Project

SUT: HET1005 Electronic Engineering Project

Credit Points: 12.5

Contact Hours: 3 Hours per Week

Duration: 1 Semester

Campus : CIUJ

Prerequisites: Nil

Corequisites: Nil

Teaching Method

Lectures (12 hours), Supervised Workshop/Tutorials (24 hours)

Assessment

Project(s)

Aims & Objectives

By the completion of the project subject students will have:
* Developed an appreciation of the social and professional context of engineering design and implementation work, through active team engagement with these concepts in an application to real-world problems.

Content

Students will work in groups of 2 or 3 throughout the semester to complete an approved engineering project.

The style of projects possible varies widely, from a multi-team design office approach to a large multifaceted infrastructure problem, to the design and construction of individual machines or electronic devices to meet a specific specialised need.

All projects, however, are assessed using the same range of structures, with strong emphasis on the ability to communicate effectively in written and oral forms not only the final outcome of the project, but also to be able to identify and reflect upon the design process and the associated teamwork issues encountered during the semester.

Reading Materials

There are no prescribed texts, though the early lectures will introduce students to a wide range of information resources available through the library, and the procedures for accessing that information. A dedicated engineering librarian is also available to assist students in accessing and interpreting both print and digital information.

CIUJ:UE2111Object Oriented Programming using Java

SUT: HIT1051 Software Development 1

Credit Points: 12.5

Contact Hours: 57 Hours

Duration: 1 Semester

Campus: CIUJ

Prerequisites: Nil

Corequisites: Nil

Teaching Method: Lecture, Tutorial, Laborator

Assessment: Assignments, Examinations

Aims & Objectives

* To explain basic concepts of object-oriented analysis.
* To produce simple object-oriented designs from a written specification.
* To write object-oriented programs using Java.
* To demonstrate understanding of the main features of the software development process in an object-oriented framework.
* To co-operately develop and criticize object-oriented designs.

Content

* The object-oriented world view.
* Introduction to object-modelling.
* Introduction to implementation of objects and classes.
* Contracts: pre- and post-conditions and assertions.
* Control structures.
* Input–output.
* Event-driven programs.
* Introduction to class libraries.
* Use of an OO notation.

Reading Materials

Textbook
Savitch, W., Java: An Introduction to Computer Science & Programming, 3rd edn, Prentice Hall, 2004.

References
Henderson-Sellers, B., A Book of Object-Oriented Knowledge, 2nd edn, Prentice-Hall, Englewood Cliffs, NJ, 1997.
Horstmann, C., Computing Concepts with Java 2 Essentials, 3rd edn., Wiley, 2003.
Lewis, J., Loftus, W., Java Software Solutions, Addison-Wesley, 3rd edn, 2004.

Supplementary materials will be provided.

CIUJ:UE2212 Digital Electronics Design

SUT:HET202 Digital Electronics Design

Credit Points: 12.5 Credit Points

Contact Hours: 5.5 Hours per Week (on average)

Duration: 1 Semester

Campus: CIUJ

Prerequisites: UG0123

Corequisites: Nil

Teaching Method: Lectures, Tutorials, Laboratories, Project

Assessment

Examinations, Labs, Project(s)

Aims & Objectives

To provide the student with a variety of application-oriented digital electronics design skills, including:
* The design of significant synchronous digital systems,
* Timing and hazard analysis for reliable digital circuit designs, and
* The use of Electronic Design Automation (EDA) tools for design, analysis and simulation.

Content

Boolean Algebra and Logic Design
* Basic Theorems of Boolean Algebra
* Canonical and Standard Forms
* Logic Gate Implementations and Characteristics: fan out, propagation delays, power dissipation, logic levels and compatibility.

Simplification of Boolean Functions
* Cubes, Subcubes, Prime Implicants, etc
* Map and Tabulation Methods
* Technology Mapping for Gate Arrays
* Hazard-free Design

Introduction to CMOS Logic Circuits
* Combinatorial Components
* Adders/Subtractors
* Logic and Arithmetic Units
* Decoders/Selectors
* Buses
* Priority Encoders

* Magnitude Comparators
* Shifters and Rotators
* Multipliers

Programmable Logic Devices
* Read Only Memory
* Programmable Logic Arrays (PLAs)
* Programmable Array Logic (PALs) Devices
* Field Programmable Gate Arrays (FPGAs)

Synchronous Sequential Logic
* Latches
* Flip Flops
* Finite-State Machine (FSM) Model
* Synthesis and Analysis
* Designing State Machines using State Diagrams
* Designing State Machines using ASM (Algorithmic State Machine) Charts
* State Minimisation, Optimisation and Timing

Reading Materials

Textbook
Gajski, DD, Principles of Digital Design, Prentice-Hall, 1997.

References
Wakerly, JF, Digital Design: Principles and Practices, 3rd edn, Prentice Hall, 2002.
Van den Bout, D, The Practical Xilinx Designer Lab Book, Prentice-Hall, 1998.
Katz, RH, Contemporary Logic Design, 2nd edn, Benjamin/Cummings Publishing Co, 2003.

CIUJ:UE2213 Programming with C++

SUT:HIT3072 C++ for Programmers

Credit Points: 12.5

Contact Hours: 40 Hours

Duration: 1 Semester

Campus: CIUJ

Prerequisites: UE2121

Teaching Method

Lectures (2 Hrs per Session), Laboratory (1 Hr per Session)

Assessment

Laboratory Test, Assignment, Examination

Aims & Objectives

* To introduce the fundamentals of C++ programming.
* To present the defensive programming style required by the C/C++ programming language.
* To explore the facilities offered by C++ for object-oriented programming.

Content

* Introduction to C++ programming as a hybrid programming language: structure of C++ programs, compilation process.
* Data types: control structures, functions, scoping.
* Composite data types, pointers, references.
* C strings, C++ strings, namespace, uses of 'const'.
* Classes and data abstraction: separating interface and implementation.
* Inheritance, abstract classes, multiple inheritance.
* Friend functions and friend classes, operator overloading.
* Static class members.
* Polymorphism and late binding.
* C++ type conversion, RTTI.
* Exception handling.
* Function templates and class templates, container classes, vectors.
* The STL.

Reading Materials

Savitch, W. J., Problem Solving with C++: The Object of Programming, 4th edn, Addison Wesley, 2003.
Deitel, H.M., Deitel, P.J., C++: How to Program, 4th edn, Prentice-Hall, N.J., 2002.
Ammeraal, L., C++ for Programmers, 3rd edn, John Wiley & Son, 2000.

CIUJ: UE2221 Basic Electronics

SUT:HET214 Circuits and Electronics 1

Credit Points: 12.5

Contact Hours: 5.5 Hours per Week

Duration: 1 Semester

Campus: CIUJ

PrerequisitesUG0122 and UG0123

Corequisites: Nil

Teaching Method: Lectures, Tutorials and Laboratory Reports

Assessment: Assignments, Examinations, Lab Reports

Aims & Objectives

* To develop circuit analysis skills which form the foundation of later electronic and computer engineering subjects, including electronics, controls, fields and power systems.
* Introduce the students to basics of discrete electronic components, such as diodes and transistors and their characteristics and applications.

Content

* Review of circuit analysis techniques.
* Network theorems.
* Response of first-order RC and RL circuits.
* Sinusoidal analysis.
* Introduction to Discrete Devices: Diode: VI Characteristics, Diodes applications, Graphical solution of non-linear components, BJ - models, biasing, DC and AC analysis and applications. Frequency response of amplifier circuits.
* Multi-transistor amplifiers

Reading Materials

Textbooks
Alexander, CK & Sadiku, MNO, Fundamentals of Electric Circuits, 2nd edn, McGraw-Hill, 2004.
Sedra, A & Smith, S, Microelectronic Circuits, 4th edn, Oxford University Press, 1998.

References
Hambley, R, Electronics: A Top-Down Approach to Computer-Aided Circuit Design. Prentice-Hall, 1994.
Gray ,PR & Meyer, RG, Analysis and Design of Analog Integrated Circuits, 3rd edn, Wiley, 1993.
Horenstein, MN, Microelectronic Circuits and Devices, 2nd edn, Prentice Hall, 1996.

CIUJ:UE2222 Embedded Microcontrollers

SUT:HET232 Embedded Microcontrollers

. Credit Points: 12.5

Contact Hours: 5 Hours per Week

Duration: 1 Semester

Campus: CIUJ

Prerequisites
UE2212 and UE2121 and UC1123 and UE 2121 (corequisite in certain courses)

Teaching Method: Lectures, Laboratory Work and Tutorials

Assessment

Assignments, Examinations, Pracs

Aims & Objectives

To understand the basic architecture of microcontrollers, and to be able to use these devices in practical applications. The course will be structured around
the Motorola 68HC12 microcontroller. The programming languages used include Assembly Language and C. Investigative, design and problem-solving skills will be emphasised.

Content

Introduction to Microcontrollers:
* The Motorola 68HC12: overview, configuration, instruction set, programmable timer subsystem, interrupts, serial peripheral interface, A/D converter expansion methods - I/O ports, memory and timing diagrams.
* Expansion methods: I/O ports, memory and timing diagrams, interfacing components.
* Memory interfacing and timing.
* Memory decoding and buffering.
* Software building blocks: queues, tables, strings, state machines.
* Design and interface examples.

Reading Materials

Textbook
Pack, DJ & Barrett, SF, 68HC12 Microcontroller Theory & Applications, Prentice-Hall 2002. ISBN 0-13-033776-5

Reference
Kelley, A & Pohl, I, A Book on C: Programming in C, 4th edn, Addison-Wesley Publishing Company, 1998.

CIUJ:UE2223 Digital Signal and Image Processing

SUT:HET329 Digital Signal and Image Processing

Credit Points: 12.5

Contact Hours: 5.5 Hours per Week

Duration: 1 Semester

Campus: CIUJ

Prerequisites: UG0213

Corequisites: Nil

Teaching Method: Lectures, Tutorials and Practical Sessions

Assessment: Examinations, Pracs

Aims & Objectives

The objective is to introduce the principles of signal processing, with an emphasis on discrete signal and image processing. The theoretical basis for linear processing schemes is presented together with discussions of a range of common algorithms and their implementations and uses.

Content

* Continuous time signals and systems.
* Fourier analysis.
* Continuous systems, linearity and time-invariance.
* Response of LTI systems, stability and causality, rational systems.
* Noise.
* Sampling and the sampling theorem.
* Practical aspects of sampling and reconstruction.
* Discrete time signals.
* Basic operations on signals.
* Discrete time Fourier transform, the DFT and the FFT.
* Discrete LTI systems and discrete linear convolution.
* FIR and IIR systems.
* Difference equations and their solutions.
* The z transform and its application to discrete time system analysis.
* Rational z transforms and the response of pole-zero systems.
* Structures for realising discrete LTI systems.
* Ideal filters.
* Causality and stability constraints.
* Rational transfer functions and approximations to ideal filters.
* Design of FIR filters, non-recursive FIR realisations.
* Linear phase filters.
* Use of DFT.
* Recursive FIR realisations.

* Design of recursive IIR filters.
* Digital integration and differentiation.
* Spectral analysis of continuous signals.
* Power and energy spectral densities, the spectra of random processes and the measurement of spectra.
* Discrete time spectral analysis.
* Calculation of spectra using the DFT.
* Introduction to parametric spectral estimation.
* Correlation techniques, matched filters, signal compression, non-linear processing, DSP hardware.
* Image processing.
* Grey level resolution, spatial resolution, contrast and brightness.
* The video signal, digital images, frame grabbers, colour images.
* Grey level mapping, histograms, point processes and convolution.
* 2D spatial frequency, the Fourier transform and filtering.
* Image segmentation.

Reading Materials

Strum, R & Kirk, D, First Principles of Discrete Systems & Digital Signal Processing, Addison-Wesley, 1989.
Oppenheim, AV & Schafer, RW, Discrete-Time Signal Processing, Prentice-Hall, 1989.
Castleman, KR, Digital Image Processing, Prentice-Hall, 1996.
Gonzales, RC & Wintz, P, Digital Image Processing, 2nd edn, Addison Wesley, 1987.