Graduate Program: Master of Science in Computer Science & Engineering (MCSE)

Department of Computer Science and Engineering of the University of Asia Pacific proposes to offer the graduate program, namely Master of Science in Computer Science and Engineering (MCSE), abbreviated as M. Sc. Engg. (CSE), to meet the increasing demand of high-tech professionals in computer and its related fields.

MCSE program is strictly applicable for CSE bachelors or EEE bachelors with proven efficiency in computer related subjects. This section describes common activities such as program and semester duration, enrollment, class schedule, registration and evaluation policy applicable for the program. Eligibility, program requirement, degree requirement and course list has been elaborated for the program in subsequent sections.

Program and Semester Duration

The University of Asia Pacific would confer the Degree of MCSE after a student has satisfactorily completed all the required courses offered over a maximum period of four academic years. The academic year is divided into three semesters i,e. Fall, Spring, Summer. Fall and Spring semesters are of 17 weeks. The breakdown of these semesters is as follows:

Classes	14 weeks
Midterm Examination	1 week
Preparatory Leave	1 week
Semester Final Examination	1 week
	Total 17 weeks

The Summer semester is of 10 weeks as shown below:

Classes	7 weeks
Midterm Examination	1 week
Preparatory Leave	1 week
Semester Final Examination	1 week
	Total 10 weeks

Commencement of Fall, Spring and Summer semesters are as follows:

Semester	**Duration .**
Fall	October to February
Spring	March to June
Summer	July to September

Admission

In order to get admitted in MCSE program, a candidate must fulfill the MCSE requirements, described in the eligibility section.

Enrolment

A student enrolled as a full time may take a minimum of 6 credit hours and a maximum of 12 credit hours in Fall or Spring semesters. For part time enrollment, the minimum 3 credit hours and maximum 6 credit hours in the mentioned semesters will be allowed. In Summer semester both full time and part time students may take minimum 3 credit hours and maximum 6 credit hours. Thesis registration can only be done after completion of two semesters with completion of minimum 12 credit theoretical courses.

Class Schedule

Classes will be held from 5:30 P.M. to 8:30 P.M. The duration of each class hour is 55 Minutes.

Registration

A student must register within two weeks of the semester commencement. He might be allowed to register within the third week with an additional late fee. No student will be allowed to register after three weeks of the commencement of respective semester. A student applying for withdrawal from a course after the registration deadline of three weeks, shall not be eligible to get refund of his tuition or registration fees. However, a student applying for incompleteness in a particular course has to pay an additional amount on a per credit basis as decided by the University authority. In this case, eligibility of being awarding incomplete grade (I) in a course is subjected to the approval of Board of graduate Studies (BGS) of the CSE department.

Evaluation Policy

Every course will be supplemented by assignments and marks will be allotted for the assignment. Marks will be in whole number; no fractional marks can be given. The distribution of marks for a course will be as follows:

Attendance & Assessment	20%
Mid-Semester Examination	25%
Assignment	15%
Final Examination	40%
Total	**100%**

Thesis work will be done under the supervision of a faculty member assigned by the CSE department. A project must be of six credit hours and a thesis must be of twelve credit hours and must be carried out in at least two semesters. Evaluation of a Project/thesis will be done by a committee (Project/thesis evaluation committee) constituted as follows:

Chair	Thesis supervisor
One Member	From the department

One Member	External
Ex-officio Member	Head of CSE Department

On the basis of the presentation and the project work done, the committee may award either “S” (Satisfactory) grade or “U" (Unsatisfactory) grade to the student. An oral Examination (Viva-Voce) consisting of 25% of the total project/Thesis mark will be ear marked for the thesis evaluation.

Grading System

Letter Grade	Grade Point	Scoring Range
A+	4.00	90% or above
A	3.50	80% — 89%
B+	3.00	70% — 79%
B	2.50	60% — 69%
C	2.00	50% — 59%
F	0.00	Less than 50%
W	-	Withdrawn
I	-	Incomplete
S	-	Satisfactory
U	-	Unsatisfactory

A student may apply to the BGS for withdrawal of one or more courses. No withdrawal application shall be processed after midterm examination. In such cases the relevant student would be awarded **I** grade in the corresponding course. However a student may apply to BGS for incompleteness of a course after mid-term examination mentioning an appropriate reason. A student can apply for incompleteness in only one course in a semester. Upon approval, the corresponding student’s grade must be reported within one month from the end of the concerned semester; otherwise **F** grade will be assigned for that course.

Project/Thesis Requirement

Although the thesis need not necessarily represent a contribution to fundamental knowledge, it must demonstrate the student’s ability to identify and solve an acceptable problem in the area of computer applications and to reflect the work in a document of acceptable literary quality. The appropriateness of the topic is determined by the Board of Graduate Studies. At the conclusion of the thesis work and report preparation, the student must prepare for the presentation of the thesis.

Program Approval

Any graduate program must receive the signed approval of the BGS prior to the admission in that program.

Formation of Board of Graduate Studies (BGS)

The Board of graduate studies would be constituted as follows:

Chair	Head of the department of CSE

Member	All Faculty members of the rank Assistant Professor or above.

Eligibility of Faculty Member Conducting the Course

A faculty member, who would be chosen to conduct courses in MCSE program, must have at least one postgraduate degree.

A faculty member, who would be chosen to supervise the project/thesis of the graduate program, must have at least one postgraduate degree also.

Program: Masters of Science in Computer Science and Engineering (MCSE)

Eligibility

A candidate must fulfill all of the following requirements confirmation of the admission in the MCSE program:

1. A bachelor degree in Computer Science and Engineering or Computer Science or Computer Engineering or Electrical & Electronic Engineering from a recognized institute/university at home or abroad.
2. A CGPA of at least 2.5 on a scale of 4.0 or second class (50% or above) in bachelor program.
3. No third class/division in any public examinations (SSC/HSC/ Dakhil/ Fazil) and its equivalent examination.
4. Must clear all the prerequisite courses suggested by the Board of Graduate Studies (BGS).

MCSE Requirement

1. Completion of at least 16 credit hours of mathematics and basic science courses.
2. Completion of at least 12 credit hours of computer science courses.

Degree Requirements

1. Completion of minimum thirty-six credit hours including twelve credit hours thesis work.
2. Completion of four MCSE core courses from the list below.
3. Completion of two courses from MCS elective list and two courses from MCSE elective list.
4. Completion of a thesis work of appropriate depth and length and fulfillment of the thesis requirement.
5. Obtaining a minimum CGPA of 2.50 out of 4.0.

Summarized Course List

MCSE Core Courses:

Course Code	**Course Title**	**Credit Hour**
MCSE 6001	Programming Language Implementation	3.0
MCSE 6003	Microprocessor Design	3.0
MCSE 6005	Advanced VLSI Design	3.0
MCS 6011	Advanced Artificial Intelligence & Expert System	3.0
MCSE Elective Courses		
MCSE 6002	Advanced Topics in Computer Architecture	3.0
MCSE 6004	Network Architecture Design	3.0
MCSE 6006	Parallel & Distributed Processing	3.0

Course Code	Course Title	Credit Hour
MCSE 6007	Advanced Topics in Data Communication	3.0
MCSE 6008	Algorithmic Graph Theory	3.0
MCSE 6009	Computational Geometry	3.0
MCSE 6010	Neural Network & Fuzzy Systems	3.0
MCSE 6011	Mobile Communication	3.0
MCSE 6012	Parallel Communication	3.0
MCSE 6014	Topics on Current Interest	3.0
MCS Elective Courses		
MCS 6002	Advanced Data Structure & Algorithm	3.0
MCS 6003	Advanced Database Management System	3.0
MCS 6004	Multimedia System Design	3.0
MCS 6005	E-Commerce & Security System	3.0
MCS 6006	Advanced Topics in Computer Graphics	3.0
MCS 6007	Advanced Topics in Operating System	3.0
MCS 6008	Information System Project Management	3.0
MCS 6009	Internet Engineering	3.0
MCS 6010	Advanced Topics in Computer Networks	3.0
MCS 6012	Advanced Topics in Pattern Recognition	3.0
MCS 6013	Theory of Computing	3.0
Thesis Work		
MCSE 6000	Thesis	12.0

Detailed Graduate Syllabus

Courses Offered in Master of Science in Computer Science and Engineering Program

MCSE Core Courses

Course No: MCSE 6001

Course Title: Programming Language Implementation

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

The objective of this course is for students to get familiar with important concepts and techniques in programming language implementation; to develop a general appreciation of the constraints imposed on programming languages by implementation considerations; and to understand the basic ideas behind implementation of the programming language paradigms: imperative, object-oriented, functional and logic programming.

Topics covered include compilers and interpreters; compiler structures; intermediate representations of programs: and global tables, run-time structures, lexical analysis, parsing, semantic analysis, code generation, optimization.

Reference:

1. Compiler Design, Reinhard Wilhelm and Dieter Maurer, Addison-Wesley, 1995.
2. Ullman. Compilers: Principles, Techniques, and Tools, Alfred Aho, Ravi Sethi, and Jeffery Addison-Wesley, 1986.

Course No: MCSE 6003

Course Title: Microprocessor Design

Credit: 3.00

Course Description:

At the completion of this course, a student will be able to develop, compile/assemble, link and debug simple programs on the target system. This course covers the Microprocessor and its Application, General Architecture of Microprocessor Systems, Programming the 80X86 in Assembly Language, Memory and Input/Output and Interrupts.

Reference:

1. Assembly Language Programming by Kip R Irvine

2. "Assembly Language Programming & Organization of IBM PC" by Yathu Yu & Charles Marut

Course No: MCSE 6005

Course Title: Advanced VLSI Design

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

The goal of this course is to learn and participate in the process of design, simulation and layout of a complex digital system. The topics to be covered include:

Overview of modern VLSI technology, Review of COMS logic circuits, Impact of fabrication issues on design, Deep sub micron design issues, Low Power design, high speed switching circuits, High performance memory structures, Advanced clocking strategies, clock distribution trees, Performance optimization, ASIC design flow, Logic synthesis, Technology mapping, Floor planning, Placement algorithms, Routing algorithms, Design simulation, Design verification, Design for testability.

Reference:

1. Principles of CMOS VLSI Design by Neil Weste and K Eshrghian,
2. Synthesis and Optimization of digital Circuits by Giovanni De Micheli.
3. Mentor Graphics CAD Tool Tutorials on the World Wide Web.

Course No: MCS 6011

Course Title: Advanced Artificial Intelligence & Expert Systems

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

Basic principles and techniques of artificial intelligence will be covered. Concepts of knowledge representation including formalized symbolic logic, inconsistency and uncertainty, probabilistic reasoning, and structured knowledge will be presented. Introduction to artificial intelligence as well as historical and current trends and characterization of knowledge-based systems. Search, logic and education, knowledge representation. Production systems, and expert systems will be examined. Other areas are:

(1) Knowledge organization and manipulation including search and control strategies, matching techniques, and knowledge management;

(2) Perception and communication including natural language processing and pattern recognition. Additional areas include architecture of expert systems and criteria for selection expert system shells,

such as end-user interface, developer interface, system interface, inference engine, knowledge base and data interface. The student will use a commercial shell to build a working expert system.

Reference:

1. Artificial Intelligence: A Modern Approach, Stuart Russell, Peter Norvig; ISBN: 0131038052: Edition: 1st, 1994: Publisher: Prentice Hall.

MCSE Elective Courses

Course No: MCSE 6002

Course Title: Advanced Topics in Computer Architecture

Credit: 3.00

Prerequisite: MCA 6010

Course Description:

This course will cover advanced topics in computer architecture. An emphasis will be placed on state-of – the-art architectures and trends in architecture research that are likely to achieve prominence in the near future. Each topic will begin with a discussion of general principles followed by a detailed examination of a system. Course topics include: Super scalar architectures, Shared-memory, MIMD architectures, Distributed-memory MIMD architectures, Parallel optimizing compilers, Fault tolerant systems.

Reference:

1. Advanced Computer Architectures: A Design Space Approach by D Sima, T Fountain, P Kacsuk,.

Course No: MCSE 6004

Course Title: Network Architecture Design

Credit: 3.00

Prerequisite: MCA 6015

Course Description:

An introduction to the design of networks. Topics include network architectures, protocols, Ethernet- Fast Ethernet & Gigabit Ethernet LANs, token ring LANs, FDDI LANs, established networks, network relays, repeaters, bridges, routers, Gateways, network administration, inter-network design, and advanced network architectures.

Reference:

As suggested by course instructor.

Course No: MCSE 6006

Course Title: Parallel and Distributed Processing

Prerequisite: MCA 6006, MCA 6013

Credit: 3.00

Course Description:

Overview, Shared-Memory and Distributed-Memory Programming: Processes and synchronization, locks and barriers, semaphores, monitors, implementations; Distributed Programming: Message passing, RPC and rendezvous, paradigms for process interaction, implementations: Parallel Programming: scientific computing, Languages, compilers, Libraries, and tools.

Reference:

1. Multithreaded, Parallel, and Distributed Programming, By G.R. Andrews

Course No: MCSE 6007

Course Title: Advanced Topics in Data Communication

Credit: 3.00

Prerequisite: MCA 6009

Course Description:

This is an advanced topic aimed at familiarizing students with the theory and application of advanced receiver processing algorithms. The focus will be on signaling formats with memory, system with time-varying random distortion, and systems with like-signal interference. The topics to be covered include:

Algorithms: Viterbi Algorithm for MLSD, Linear and Decision Feedback solutions, Forward-Backward algorithm and iterative ("turbo") detection, Adaptive MLSD and adaptive iterative detection.

Applications: Intersymbol Interference (ISI) channels, multi-user detection. Turbo Codes and general Code Network, Fading Channels, Trellis Codes, Multidimensional Systems

Reference:

As suggested by course instructor.

Course No: MCSE 6008

Course Title: Algorithmic Graph Theory

Credit: 3.00

Pre-requisite: MCA 6006/ As decided by the Board of Graduate Studies

Course Description:

It is an established paradigm in computer science to express real-life problems in terms of graphs with the solution taking the form of a graph computation. In turn, due to their wide spectrum of application, graph problems require fast solutions. In many contexts, inefficient solutions to graph problems are the

bottleneck hampering any increase in computational power from translation into increased performance of the same order of magnitude. The main goal of this course is to equip the students to gather theoretical tools needed in various problem-solving environments. Course contents include: Review of Graph-Theory Concepts; Using Graphs as Models for Real-Life Phenomena; Graphs Traversal Algorithms: Expected Performance of Graph Algorithms: Using Interval Graphs as Descriptors of Linear Phenomena: Using Chordal Graphs to Model Tree-Related Computations; Parallel Graph Algorithms; Search Algorithms for Discrete Optimization Problems.

Textbook:

1. J.A. Mchugh, Algorithmic Graph Theory, Prentice Hall, 1990

Reference:

1. M. Atallah, Algrithms and Theory of Computation Handbook, M. Atallah(ed.), CRC Press 1999
2. G. Chartrand & O. Oellermann, Applied and Algorithmic Graph Theory, McGraw hill, 1993
3. A.Gibbons, Algorithmic Graph Theory, Cambridge University Press, 1985
4. M.C. Golumbic, Algorithmic Graph Theory and Perfect Graphs, Academic Press. 1980
5. D. West, Introduction to Graph Theory, prentice Hall, 1996
6. R. Wilson, Introduction to Graph Theory, 4th ed. Longman, 1996

Course No: MCSE 6009

Course title: Computational Geometry

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

Preliminaries: Mathematical and geometric review. Review of algorithm analysis techniques, mathematical models of computation, randomized algorithms and probabilistic analysis techniques, representation of basic geometric objects, convexity, polytopes.

Spatial decompositions: Planar subdivisions, triangulations, trapezoidal decompositions.

Geometric Searching: Point location, interval and segment trees, data structures for nearest neighbors, range searching, multi-dimensional search trees.

Convex hulls: Geometric duality, deterministic and randomized algorithms for two and higher dimensional convex hulls, linear programming.

Proximity problems: Closest pair, Voronoi diagrams and Delaunay triangulations, relationship to convex hulls, and applications.

Arrangements: Line, hyper plane, and line segment arrangements, incremental construction techniques, complexity of lower envelops, duality.

Visibility and motion planning: Visibility graphs, Shortest paths, ray shooting

Textbook:

1. Computational Geometry in C, Joseph O'Rourke, Cambridge University Press, 1994

Reference:

1. Computational Geometry : An Introduction, F.P. Preparata and M.I.Shamos, Springer-Verlag, 1985
2. Algorithms in Combinatorial Geometry, H.Edelsbrunner Springer-Verlag, 1987.
3. Computational Geometry: An Introduction through Randomized Algorithms, by Ketan Mulmuley, Perntice Hall, 199945

Course No: MCSE 6010

Course Title: Neural Network and Fuzzy Systems

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

This course presents an overview of the theory and applications of artificial neural network and fuzzy systems to engineering applications with emphasis on signal processing and control. The objective of this course is focused on the understanding of various neural network and fuzzy systems models and the applications of these models to solve engineering problems. Topics of this course include: Multi-Layer Perception and Back –propagation learning, Self-Organization Map and Vector Quantization, Radial Basis Network Regularization, and approximation, Hop field Network, Adaptive Resonant Theory (ART), Recurrent Network, Fuzzy Set Theory and Fuzzy Logic Control, Adaptive Fuzzy Neural Network, Genetic Algorithm and Evolution Computing, Applications to Pattern Classification, Applications to Control, Modeling, Identifications, and Predication, Applications to Image, Speech Processing.

Reference:

1. Neural Networks: A Comprehensive Foundation, Simon Haykin, Prentice Hall, New Jersey, Second edition, 1999
2. Fuzzy System Theory And Its Application, T. Terano, K. and M. Sugeno, Academic Press, San Diego, CA, 1992.
3. Fuzzy and Neural Approaches in Engineering: Lefteri H. Tsoukalas, Robert E. Uhrig

Course No: MCSE 6011

Course Title: Mobile Communications

Credit: 3.00

Prerequisite: MCA 6009, MCSE 6007

Course Description:

This is introductory course with objective being to become familiar with design trade-offs involved with mobile radio systems. The topics to be covered include:

Overview of Mobile Communication Systems, Cellular System Design, Large-scale channel models (Path loss and shadowing), Multiple access techniques, Channel assignment, Reuse and sectoring system Capacity, Example Systems, Physical Layer Mobile Communications: The basics of digital modulation and detection, Spread spectrum techniques, Small-scale channel models (Multipath fading), Diversity. Overview of existing and developing systems/standards, Resource allocation (channel assignment, call admission, etc) Protocols for data-oriented networks, Mobility management and hand-off, Wireless LAN, satellite systems, etc. Source coding (speech coders), TBD.

Reference:

As suggested by course instructor.

Course No: MCSE 6012

Course Title: Parallel Algorithm

Credit: 3.00

Prerequisite: MCA 6006

Course Description:

Introduction: Parallel processing, Parallel Models, Time-work presentation framework of Parallel Algorithms, etc.

Basic Techniques: Balanced Trees, Pointer Jumping, Divide and Conquer, Partitioning, Pipelining, etc.

Lists and Tress: List Ranking, Euler-Tour Technique, Tree Contraction, Lowest Common Ancestor, etc.

Searching, Merging and Sorting: Different algorithms of Searching, Merging and Sorting.

Graphs: Connected and Bi-connected Components, Minimum Spanning Trees, Ear Decomposition, etc.

Planar Geometry: Convex-Hull Problem, Plane Sweeping, etc

Strings: String matching, Text and Pattern analysis, Suffix Trees, etc

Arithmetic Computations: Linear recurrences, Polynomial Division, Evaluation and Interpolation, etc

Randomized Algorithms.

Reference:

As suggested by course instructor.

Course No: MCSE 6014

Course Title: Topics on Current Interest

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

As suggested by the course instructor.

Reference:

As suggested by the course instructor.

Elective Courses Offered from Master of Science (MCS) in Computer Science Program

Course No MCS 6002

Course Title: Advanced Data Structures and Algorithm

Credit: 3.00

Pre-requisite: MCA 6006 / As decided by the Board of Graduate Studies

Course Description:

Data Structure: Arrays, Lists, Stack and Queue: Array and List representation. Trees: Linked representation, Left and Right Pointers, Threaded Trees, Extended Binary Trees. Searching: Binary search Trees, Hash Tables. Sorting: External Sorting. Red-Black Trees. Binomial and Fibonacci Heaps.

Algorithms: Divide and Conquer: Strassen Matrix Multiplication, Divide and Conquer in Multidimensional spaces.

Greedy Method: Theoretical Foundations for Greedy Methods, Knapsack problem, A task scheduling problem.

Dynamic Programming: Elements of Dynamic Programming, 0/1 knapsack. Matrix-chain multiplication, longest common subsequence.

Graph Algorithms: Minimum spanning trees, All-pairs shortest paths, Maximum flow. Arithmetic Circuits, Polynomials and FFT, String matching, NP-Completeness and Approximation algorithms.

References:

As suggested by course instructor.

Course No MCS 6003

Course Title: Advanced Database Management

Credit: 3.00

Pre-requisite: MCA 6007 / As decided by the Board of Graduate Studies

Course Description:

Overview: This course covers on-going trends in database systems, focusing on database fundamentals, but also illustrating new research directions and current problems. We will study a collection of papers, some of these are "classical" from the early days of relational databases, and others are more recent papers that have influenced the field. At the end of the course, you will have an in-depth understanding of the state of the art in database systems.

Tentative Course Outline: Introduction, Buffer management, Join Processing, Query optimization, Selectivity estimation, Concurrency control, Recovery, Distributed database systems, Distributed Query processing, Replication (and its dangers), Main memory database systems, Decision support: Bitmap induces, Decision support: Computing the cube, Decision support: OLAP, Database Tuning Online aggregation, Parallel database systems and SML, Deductive database systems.

References:

As suggested by course instructor.

Course No MCS 6004

Course Title: Multimedia System Design

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

Multimedia: Medium, Main properties of a Multimedia system, Traditional data streams characteristics;

Audio: Music, Speech;

Images and Graphics: Digital image representation, Image format, Computer image processing;

Video and Animation: Computer Video Format, Television, Computer-based Animation;

Data Compression: Coding requirements, Source, Entropy, Hybrid Coding;

JPEG: Image Preparation, DCT-based Mode, Lossy and Lossless mode;

H.2631: Image Preparation, Coding Algorithms, Data streams;

MPEG: Video Encoding, Audio Encoding, MPEG-2, MPEG-4;

DVI: Audio and Still Image Encoding, Video Encoding, Data streams, Optical Storage;

Media: Video disk, Compact Disk Digital Audio, Compact Disk Read Only Memory, CDROM extended architecture, Compact disk magneto optical;

Computer Technology: Hybrid systems, Digital Systems, Multimedia workstation;

Multimedia Operation Systems: Real time, Resource management, Process Management, File system, System Architecture;

Network Systems: Layer, Protocols and Services;

Multimedia Communication Systems: Application subsystem, Transport subsystem, QoS and Resource Management;

Database Systems: Multimedia Database Management System, Integration in a database Model;

Document, Hypertext and MHEG: Document, Hypertext, Hypermedia and multimedia, Document Architecture SGML, Document Architecture ODA, MHEG; User interface; synchronization; Multimedia Application.

Reference:

1. Emerging Multimedia Computer communication Technologies; J.David Irwin, Chwan-Hwa "John" WU
2. Emerging Technologies and Instruction: Hypertext, hypermedia, and Interactive Multimedia: A Selected Bibliography (Educational Technology Selectd); Annette C. Lamb; Publisher: Educational Technology Publication; ISBN: 0877782342

Course No: MCS 6005

Course Title: E-Commerce and Security System

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

The Internet market space, e-commerce in Hong knog and china, e-payment and security solutions supply chain management, customer relationship management, intra-organizational e-commerce, B-to-B and B-to-C e-commerce, establishing trust and managing regulatory harmonization.

Protecting information using symmetric and public key cryptography; key management; trust Models and public key infrastructure; system security; mobile code security; authentication and handshake protocols; digital cash and payment mechanisms.

Reference:

As suggested by course instructor.

Course No: MCS 6006

Course Title: Advanced Topics in Computer Graphics

Credit: 3.00

Pre-requisite: MCA 6012/ As decided by the Board of Graduate Studies

Course Description:

This course covers advanced rendering and modeling techniques. Topics covered include: Three-dimensional viewing, visible-surface detection methods, illumination models and surface rendering methods, color models and applications, and computer animation.

Reference:

As suggested by course instructor.

Course No: MCS 6007

Course Title: Advanced Topics in Operation Systems

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

An advanced study on modern operating systems intended for graduate students who have mastered the fundamental material in an undergraduate course. Emphasis on advanced theoretical material on topics introduced in undergraduate courses and material not generally covered in undergraduate courses. Advanced material on process synchronization, deadlock, virtual memory, and new material on parallel processing, security, distributed systems and control, object-oriented programming, and modeling and analysis.

This course is also intented to further the knowledge of operating systems design and development. This will focus on distributed and real-time systems, with wireless, rewards, value, scheduling, time, and security as the mainstays.

Reference:

As suggested by course instructor

Course No: MCS 6008

Course Title: Information System Project Management

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

The Application of information system concepts to the collection, retention, and dissemination of information for management planning and decision-making. Issues such as personnel selection budgeting, policy development, and organizational interfacing are discussed. Conceptual foundations and planning and development of management information systems(MIS). The role of MIS in an organization and the between the system and the organization.

Reference:

1. management information systems, Laudon Kenneth C.; And Jane p.Laudon;Edition:6th Edition: publisher :prentice Hall
2. Essentials of Management Information Systems ; Author: Kenneth C. Laudon Jane P. Laudon; Edition :4th edition.

Course No: MCS 6009

Course Title: Internet Engineering

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

Introduces the Internet design, planning and management stages. Provides a comprehensive introduction to the architecture of the Internet, the TCP/IP technology and the associated design issues. Introduces concepts and principles, defines Internet terminology, and presents examples of Internet topologies, interconnecting solutions, and routing strategies. Provides an engineering approach to the Internet by questioning every design decision and understanding how these decisions would change if we change the assumptions. Main topics of focus are: current LAN technologies, TCP/IP protocol suite, configuration and troubleshooting, real-time traffic support and flows in Internet," ""unplugged"" Internet", transition the Internet, internetworking solutions, performance, and other design considerations

HTML: Creating Static Web Pages and Dynamic Web Pages, XNL (the new standard)

XML: New Specification, XML Document Authoring, Deployment

Scripting Languages and CGI: Perl, JavaScipt

Java: Java Programming Environment, Primitive Data Types, Class, Objects and methods, Control Structures, Strings and Arrays, File I/O Streams, Applets

Course No: MCS 6010

Course Title: Advanced Topics in Computer Networks

Credit: 3.00

Prerequisite: MCA 6015

Course Description:

The subject matters will be diverse, ranging from highly theoretical to practical system, mathematical to intuitive.

Topics in Optical Networks: Routing and Wavelength assignment in WDM networks; signaling and control for IP over WDM networks, Traffic analysis and engineering.

Topics in Wireless Networks: Wireless communications basics, Cellular systems, Third generation wireless network standards and issues; Ad hoc networks.

Other topics: Call admission control, IP Inter-domain routing issues, MPLS traffic engineering Multimedia transport, Congestion control.

Reference:

1. Next Generation Optical Networks by P. Tomsu and C. Schmutzer
2. Ah Hoc Networks by C-K Toh
3. Ad Hoc Networking by C. Perkins

Course No: MCS 6012

Course Title: Advanced Topics in Pattern Recognition

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

This course introduces the structures and problems of digital pattern recognition. It covers the mathematical model of statistical pattern recognition, multivariate probability, Baye's decision theory, maximum likelihood estimation, whitening transformations, parametric and now-parametric techniques, linear discriminant functions, gradient-descent procedure, clustering and unsupervised learning, and selection algorithms.

Reference:

As Suggested by course instructor.

Course No: MCS 6013

Course Title: Theory of Computing

Credit: 3.00

Prerequisite: As decided by the Board of Graduate Studies

Course Description:

Theory of Computation: Finite state automate and Regular languages, context free grammars and push down automata, generative grammars, The Chomsky Hierarchy, Turing machines, Theoretical results :universality, and the halting problem, cellular automata and the game of life computational complexity , Definition of complexity, Big O, theta (θ) Notation, Complexity of sorting, NP-Completeness and Cook's Theorem, Public key cryptography.

Formal systems in Computer Science: Formal systems, A formal system for prepositional logic, Soundness and completeness, Hoare Logic for automatic program verification, Predicate calculus and Godel's Theorem.

Textbook:

1. Languages and Machines-An introduction to the Theory of Computer Science, Thomas A. Sudkamp

Reference:

1. Hein J, Theory of Computation, Jones and Bartlett.
2. Dewdney AK, The Turing Omnibus, Computer Science Press
3. Harel D, Algorithmics: the Spirit of Computing, Addison Wesley
4. Barwise J and Etchemendy J, Turing's World, Stanford
5. Cohen D, Introduction to Computer Theory, Eiley
6. Sipser M, Introduction to the Theory of Computation, PWS/Thompso
7. Hey AJG, Feynman Lectures on Computation, Addison Wesley
8. Jones ND Computability and Complexity, MIT
9. Gruska J, Foundations of Computing, Thomson

Thesis Work

Course No: MCSE 6000

Course Title: Thesis

Credit: 12.00

Course Description: Thesis work should demonstrate the student's ability to identify and solve an acceptable problem in the area of computer applications and to reflect the work in a document of acceptable literary quality. The appropriateness of the topic is determined by the Board of Graduate Studies. At the conclusion of the thesis work and report preparation, the student must prepare for the presentation of the thesis.

Course Description of MCSE Pre-requisite Courses

Course No: MCA 6006

Course Title: Data Structure and Algorithm

Credit: 3.00

Prerequisite: Assessment by the Board of Graduate Studies on case-by-case basis

Course Description:

Goals: Be able to use the Standard Template Library. Be able to know when and how to use various data structures including, skip lists, hashing, sets, priority queues, binary trees, search trees and graphs. Be able to design algorithms using greedy, divide and conquer, dynamic programming, backtracking and branch and bound techniques.

Outline: This course studies the representation and transformation of information, between data structures and algorithms. Data representation topics include hashing, advanced tree structures, programming, backtracking and branch and bound techniques.

Textbooks:

1. Theory and Problems of Data Structures, Seymour Lipschutz, Schaum's Outline Series, Mcgraw-Hill

Reference:

1. Data Structures and algorithm Analysis in C++, 2nd Edition, by Mark Allen Weiss, Addison Wesley
2. The C++ Standard Library (A tutorial And Reference) By Josuttis, Addison Wesley

Course No: MCA 6007

Course Title: Database Management System

Credit: 3.00

Prerequisite: Assessment by Board of Graduate Studies on case-by-case basis

Course Description:

Content: methodologies and principles of database analysis and design are presented. Conceptual modeling and specifications of databases, database design process and tools, functional analysis and methodologies for database design; entity relationship model and advanced semantic modeling methods are discussed. Topics include theories of database systems, including the architectures of database systems, Logical and physical database organizations, data models for database systems (network, hierarchical, relational, and object-oriented model), relational algebra and calculus, query languages,

normal forms, null values and partial information, relational database design utilizing dependencies, view design and integration, concurrency control, query optimization, client-server database applications, distributed databases, object-oriented databases, and the current research and development trends of database analysis, design, modeling, and applications.

Textbook:

1. Database System Concepts**,** Fourth Edition, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill

Reference:

1. Database Management Systems, Raghu Ramakrishna and Johannes Gehrke.
2. Database System: Concepts, Languages and Architectures, Atzeni, Ceri, Paraboschi, And Torlon; ISBN 0072353872; Edition 1st , 2000; McGraw Hill.
3. Database Systems: Practical Approach to Design Implementation and Management, Thomas Connolly, Caroltyn Begg; ISBN: 0-201-34287-1; Edition; 2nd Publisher:
4. Foundations of Database Systems, Elmasre and Navath; ISBN: 0072315393; Edition: 3rd 2000; Publisher: Benjamin Cummings.
5. Introduction to Database Systems, Date, C. J.; Edition: (any edition); Publisher: Adison Wesley

Course No: MCA 6009

Course Title: Data Communication

Credit: 3.00

Prerequisite: Assessment by the Board of Graduate Studies on case-by-case basis

Course Description:

Introduction to Signals; Review of Fourier analysis and its application. Amplitude Modulation: DSB, DSBC, AM, QAM, SSB, VSB. Angle Modulation: Concept of Instantaneous frequency, Bandwidth of angle modulated waves, Generation of FM, Demodulation of FM, Interference, FDM.

Sampling Theorem, Quantization Noise, SQNR, Companding, PCM, T1 carrier systems, DPCM, Delta Modulation and Adaptive Delta Modulation, TDM. A digital communication system, line coding, Pulse Shaping, M-ary communication, Digital Carrier systems, Digital Multiplexing.

Emerging Digital Communication Technologies: North American Hierarchy: D4 Framing, ESF Framing, B8ZS line code, Digital Hierarchy, Classification of digital signals, Digital services: ISDN, Frame Relay; Broadband Digital Communications: SONET; Digital Switching Technologies: SS7, ATM; Broadband ISDN, Switched Multimegabit Data Service, ADSL.

Mobile Radio System, Spread Spectrum Systems: DS/SS, FH/SS, Applications of Spread Spectrum: Cellular Telephony, GPS; Public Switched Telephone Network (PSTN), GSM, CDMA

Introduction to Information Theory: Measure of Information, Source Encoding

Error Correcting Codes: Linear Block Codes, Cyclic Codes, Convolutional Codes

Reference:

Modern Digital and Analog Communication Systems (3rd Edition) by B. P. Lathi

Course No: MCA 6010

Course Title: Computer Architecture

Credit: 3.00

Prerequisite: Assessment by the Board of Graduate Studies on case-by-case basis

Course Description:

Instruction codes: Computer instructions, Timing and control execution of instruction.

Central processor organization: Process bus organization, ALU stack organization, Instruction format, Addressing modes, data transfer and manipulation, program control.

Address sequencing: Micro programming sequencer, Micro instruction formats, Arithmetic processor design; comparison and subtraction of unsigned binary numbers, Addition, Subtraction, Multiplication, Division algorithms, processor configuration.

I/O unit: Peripheral devices, I/O interface asynchronous data transfer, Interrupt handling, DMA, Bus scheduling, Standard Interface, I/O channels.

Memory organization: Magnetic core memory, various core memory organization, various semiconductor RAMs, Magnetic drum, disks, tape; Digital recording techniques, ROM-PROM-Bubble memory-Cache memory-Virtual memory-Associative memory.

Super Computers: Classification of computer systems, pipeline and vector processors, Array processor (SIMD), multiprocessing system (MIMD).

Reference:

1. Computer Architecture & Organization by John P. Hayes (3rd edition)
2. Computer Organization & Design by John L. Hennessy & David A. Patterson

Course No: MCA 6012

Course Title: Computer Graphics

Credit: 3.00

Prerequisite: Assessment by the Board of Graduate Studies on case-by-case basis

Course Description:

An introduction to the acquisition, manipulation and display of graphical information using digital techniques. Implementation of graphics concepts of 2D and 3D viewing, clipping and transformation. Topics include discussion of the various hardware devices used for input and output, the classical

algorithms and data structures used in manipulation of graphical objects, the user interface to the graphics system, and applicable standards. Design of interactive graphics conversation.

Textbook:

1. "Theory and Problems of Computer Graphics", Z. Xiang & Roy Plastock, Schaum's Outline Series, Mcgraw-Hill.

Reference:

1. Computer Graphics – principles & practice, James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, Addison Wesley.

Course No: MCA 6013

Course Title: Operating System

Credit: 3.00

Prerequisite: MCA 6001

Course Description:

Introduction: Operating System Concept; Operating System Structure; Monolithic Systems; Virtual Machines; Client-Server Model functions of Operating Systems, types of Operating systems, Structure of Operating Systems.

Processes: Introduction to Processes; Inter Process Communication; Race conditions; Mutual Exclusion with Busy Waiting; Semaphores; Monitors; Message Passing; Classical IPC Problems Process Scheduling Algorithms, Communicating Sequential Processes, Critical sections, Monitors).

Input / Output: Principles of I/O Hardware; Principles of I/O Software; Deadlocks; Deadlock Modeling; Deadlock prevention; Deadlock Avoidance.

Memory Management: Basic Memory Management; Mono-programming without swapping or paging; Multiprogramming with Fixed Partitions; Swapping; Memory Management with Bitmaps; Memory Management with Linked Lists; Virtual Memory, Paging, Page Tables Multilevel page Tables.

Course No: MCA 6015

Course Title: Computer Networks

Credit: 3.00

Prerequisite: Assessment by the Board of Graduate Studies on case-by-case basis

Course Description:

Overview of computer networks, Network hardware & software, Reference model- OSI & TCP/IP & their comparison.

Network layer design issues, various routing algorithms & congestion control algorithms, internetworking, and the network layer in the Internet & in ATM networks.

The transport layer service, elements of transport protocols. Internet transport protocols- TCP & UDP, ATM AAL layer protocols, Performance issues. The TCP/IP architecture, The internet protocols, Ipv4, Ipv6, user datagram protocol, DHCP, Internet routing protocols, Multicast routing.

Network security: Principles of cryptography, secret key algorithm, authentication protocols and digital signatures, Domain Name System- the DNS name space, Resource records, Name servers, Simple Network Management Protocol, the SNMP model, Abstract syntax notation, Electronic Mail, Architecture and services, The user agent, Message formats & message transfers, Email privacy. Usenet news- user view of Usenet & Usenet implementation.

Loss less data compression, Digital representation of analog signals, Techniques for increasing Compression, The real- time- transport protocol, and session control protocols.

Reference:

1. Computer Network	by	Andrew S. Tanenbaum
2. Data & Computer Communicarions	by	William Stallings
3. An Engineering Approach to Computer Netwroks	by	S. Keshav