

### **Algorithms analysis and design(0102721).**

The course introduces students to a variety of computer problems and methods of their solutions. It enables students to assess the complexity of problems and algorithms. A special attention is given to some advanced problems and algorithms for graphs, text searching, and counting. The course discusses the concepts of parallel and distributed algorithms and some examples.

### **Advanced Computer Architecture (0102731).**

Computer architecture and organization, Micro-programmed control, CPU (Instruction formats, addressing modes, CISC & RISC computers ), Pipeline and vector processing, Memory organization, Multiprocessors.

### **Advanced Operating Systems (0102733).**

In this course important problems in operating system design and implementation are examined. The operating system provides a well-known, convenient, and efficient interface between user programs and the bare hardware of the computer on which they run. The operating system is responsible for allowing resources (e.g., disks, networks, and processors) to be shared, providing common services needed by many different programs (e.g., file service, the ability to start or stop processes, and access to the printer), and protecting individual programs from one another. The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years, and then cover the major components of most operating systems. This discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), file systems, and operating system support for distributed systems.

### **Advanced Database(0102741).**

This course covers the design and implementation of traditional relational database systems and advanced data management systems. The course will treat fundamental principles of databases: the relational model, conceptual design, query languages, and selected theoretical topics. We also cover core database implementation issues including storage and indexing, query processing and optimization, as well as transaction management, concurrency, and recovery. Additional topics will address the challenges of modern Internet-

based data management. These include data mining, provenance, information integration, incomplete and probabilistic databases, and database security.

### **Advanced Data Networking Communications (0102742).**

This course focuses on the advanced principles and workings of Computer Networks. The type of networks covered will include Local Area Network (LAN), Metropolitan Area Network (MAN), and Wide Area Network (WAN). Focus will be on layers 2, 3 and 4 of the OSI Network Model, concentrating on the TCP/IP suite for Internet. Some important topics are: Ethernet Technologies and High Speed Networks, IPv6, traffic congestion and flow control, and QoS support in modern networks. The course will also cover UNIX network programming. At the end of this course, the students will be able to understand the technical features of major LAN and WAN technologies; understand fundamental Internet protocols for flow and congestion control; understand and analyze algorithms for Quality of Service in the Internet; write network programs under UNIX platform; and execute projects in group according to listed topics.

### **Seminar in Computer Science Topics(0120763).**

This course provides studies of emerging areas and specialized topics in computer science.

### **Advanced Internet Technologies (0102771).**

The World Wide Web was proposed originally as a collection of static documents inter-connected by hyperlinks. Today, the web has grown into a rich platform, built on a variety of protocols, standards, and programming languages, that aims to replace many of the services traditionally provided by a desktop operating system. Topics will include: producing dynamic content using a server-based language, content serving databases and XML documents, session state management, multi-tier web-based architectures, web security, and core technologies including HTTP, HTML5, CSS, JavaScript, and SQL will be emphasized. This course will also study concepts and technologies including AJAX, social networking, mashups, JavaScript libraries (e.g., jQuery), and web security. This course is hands-on and project-based; students will construct a substantial dynamic web application based on the concepts, technologies, and techniques presented during lecture.

### **Research Project (0102791).**

The aim of this course is to introduce techniques in conducting research, academic writing and presentation particularly in the area of computer science. This course will provide guidance to the students in selecting research title or problems, in understanding the research process and techniques as well as tools that can be used to support research. It also includes information on methods that are normally used in research such as questionnaire, comparison, proposal, case studies and experiments as well as implementing quality research project. These include methods in analyzing data and conducting evaluation on results obtained either qualitatively or quantitatively to prove the research contribution based on the research design and hypothesis. This course will also provide guidance on presentation of research materials, and quality paper and thesis writing. Students have to work under the supervision of a lecturer. This course is prerequisite for dissertation.

### **Advanced Programming languages (0102712).**

Development of individual skills necessary for designing, implementing, testing and modifying larger programs, including: use of integrated design environments, design strategies and patterns, testing, working with large code bases and libraries, code refactoring, and use of debuggers and tools for version control. There will be significant programming and a mid-term and final examination.

### **Parallel Programming(0102711).**

This course provide a foundation of parallel computing and parallel programming concepts, several models such as Shared Memory (without threads), Threads, Distributed Memory / Message Passing, Data Parallel , Hybrid , Single Program Multiple Data (SPMD) , Multiple Program Multiple Data (MPMD)

### **Intelligent Systems(0102732).**

Intelligent Systems provides a broad coverage of intelligent systems. The Intelligent Systems Masters course utilises the expertise of a world class research group. Thus it will examine areas such as Advanced Reasoning; Computational Biology; Intelligent Robotics; Vision; Graphics and Visualization. This cutting-edge course is specifically designed to be practical, containing a mix of work geared towards building intelligent systems, rather than simply knowing about them.

By graduating in this course the candidate will have mastered the latest theoretical concepts in intelligent systems, and gained direct experience in designing and directing their real-life

applications. This course also ensures that the graduate will be highly conversant in the philosophical, ethical and legal issues that surround artificial intelligence matters, so that will have a truly holistic understanding of this remarkable and fascinating subject.

The well designed course meets the evolving needs of industry, business and government. Graduates should be highly successful in the competitive jobs market precisely because they will possess vocational experience in the latest technologies, which significant employers value very highly. The course also seeks to develop interpersonal, communication and research skills, so that the candidate will have the adaptability to thrive in a constantly changing work environment where team dynamics and individual excellence play their parts in any project's success.

This course will give the graduate a superb education in the theory and application of Intelligent Systems computing which, supported by a cache of practical, technical and personal skills, will stand you in excellent stead for entry into further study, public sector organisations and private companies.

### **Computer and Information Security (0102743).**

The course presents an overview of the history, concepts, practice and theoretical foundations of modern cryptographic algorithms. The course also addresses the issue of using trusted computers to provide various computer security services. The first part of the course will cover historical background, basic concepts and symmetric cryptography (including DES, Blowfish, AES, and other ciphers). The second part of the course will cover asymmetric cryptography and discussion on how these cryptography primitives (symmetric, asymmetric and unkeyed cryptography) address issues such as confidentiality, integrity, authentication, and non-repudiation. In the third part of the course, the class will analyse the most popular implementations of cryptography used on the Internet such as PGP, SSL/TLS, IPsec, Kerberos etc.

### **Wireless Networking(0102744).**

This course provides the main concepts, the architecture of wireless networks. WLAN, wireless distribution systems, roaming and wireless application.

### **Computer Animation(0102751).**

Adobe After Effects is primarily used for creating motion graphics and visual effects. On this course allows users to animate, alter and composite media in 2D and 3D space with various built-in tools and third party plug-ins, as well as individual attention to variables like parallax and user-adjustable angle of observation.

In addition to learning the key elements of the After Effects interface, Including the Global Performance Cache, 3D Camera Tracker, Ray-traced 3D rendering, variable mask feathering, tight integration with Adobe Illustrator, rolling shutter repair, Pro Import files from Avid Media Composer and Final Cut Pro 7, improved mocha AE workflow, and more.

### **Scientific Research Methodology(0102761).**

This course provides research methods for students in computer science. How to write a master thesis. How to write a research paper.

Research evaluation, citation, H index, Impact Factor, Scopus, Web of Science. Students are expected to read the assigned material; lectures are aimed at clarifying concepts, answering students' questions, and taking up some of the assigned problems.

Each class builds on preceding ones and this makes it important to understand each concept as the course proceeds. It is vital for students to read the assigned material on a day to day basis.

### **Advanced Software Engineering (0102781).**

Software has become ubiquitous in our society. It controls life-critical applications, such as air traffic control and medical devices, and is of central importance in telecommunication and electronic commerce. In this course, we will examine state-of-the-art practices for software testing and analysis to verify software quality. We will initially look at techniques for testing and analyzing sequential programs, and then examine the complexity that arises from distributed programs. The students will be required to complete regular homework assignments and exams, and carry out a group research project extending techniques



described in class and/or applying them to new domains. No required text. Papers from the open literature will be assigned and made available.

### **Principles of Virtual Reality(0102782).**

VR is changing the interface between people and information technology by offering new ways for the communication of information, the visualization of processes, and the creative expression of ideas. This course will focus on the fundamentals of Virtual Reality (VR) and introduce cutting-edge virtual reality technology currently available in academia and industry. It provides an introduction to the physical principles, technological challenges, possibilities and limitations for the creation of virtual environments. Projects emphasize the visualization and exploration of scientific data in virtual environments.