Dept. of Applied Information Technology

This Graduate School program for the interdisciplinary studies offers an excellent education of applied information technology (AIT). The AIT focuses on the emerging high - technologies of science and engineering in a student - chosen application area. Therefore the wide range courses of this postgraduate study are provided by the Departments of Computer Science, Electronics Engineering, Mathematics, Physics, as well as College of Forest Science.

Graduate training in AIT aims to meet the advancing research and emerging needs of the information technology industry for creating new markets. The master program is rooted in educating classic information technology, centered around its applications such as professional development of security-related technology and of bio-medical engineering based on human welfare.

□ Courses

Data Structure and Algorithm (3)

An introduction to the design of algorithms. The emphasis is on learning techniques for creating algorithms, analyzing them, and proving their correctness. Topics include models of computation, asymptotic notation for analysis of algorithms, sorting and searching algorithms, design techniques such as divide - and conquer and dynamic programming, graph algorithms including spanning tree, shortest paths. Additional topics chosen from pattern matching, NP - hard, and NP – complete.

Numerical Analysis (3)

Advanced topics in scientific computation. Topics include differentiation, integration, solution of differential equations, equation solving, minimization/ maximization, linear algebra, interpolation.

Wireless Network (3)

The course includes the wireless networks protocols and physical layers for wireless multimedia applications. It covers WLAN, WPAN, ad - hoc networks, sensor networks. The course also deals with IPv6, Mobile IP, Cellular IP, and QoS MAC protocols.

Operating System (3)

This course covers in detail many advanced topics in operating system design and implementation. It starts with topics such as operating systems structuring, multi - threading and synchronization and then moves on to systems issues in parallel and distributed computing systems.

Digital Communication System (3)

This course is devoted to a detailed and unified treatment of digital communication theory as applied to communication system focused on the system reliability. Topics include source coding, signal encoding, representation, and quantization; methods of modulation, synchronization, and transmission; optimum demodulation techniques; and communication through band -limited and random channels.

Advanced Artificial Intelligence (3)

This course addresses the use of artificial intelligence and cognitive psychology to build computer-based intelligent tutoring systems. Students will learn empirical and theoretical methods for creating cognitive models of human problem solving. Such models have been used to create educational software that has been demonstrated to dramatically enhance student learning in domains like mathematics and computer programming. This course will have three components: a literature review of some of the fundamental papers in the field; lectures on the needed cognitive psychology and human -computer interaction (HCI) background; and a significant project component in which students will be practicing the use of methods used to design tutors.

Ubiquitous Sensor Network (3)

We introduce ubiquitous sensor network and its applications. Sensor network protocol and sensor node's architecture will be studied. We will cover physical layer, localization, tracking, MAC protocol, network layer including routing protocols, sensor tasking and control, sensor network platform, and mesh network. Convergence with WLAN, cellular network, satellite network, and greedy system will be studied, and the future of sensor network also will be explored.

Telegeoinformatics (3)

An introduction to mobile mapping. The course deal with 4 features, i.e., geopositioning of mobile devices, data and processing generally performed on spatial objects, distributed database management and processing, and location -based techniques required for computing and decision making.

Precision Agroforestry (3)

Advanced technology to both farm and forest production, management and manufacturing at a new scale of resolution and accuracy with the goal of producing economic and environmental benefits. The course provides practice examples on RS, GIS and GPS as a tool to support precision agroforestry.

Digital Photogrammetry (3)

This course provides the useful understanding of modern photogrammetry for deriving and

acquiring digital imagery. It includes image processing algorithms for image correlation and calculation.

Theory of Discrete Distribution (3)

Probability generating functions, Poisson distribution, mixed discrete distribution, multivariate discrete distribution.

Applied Optics (3)

This course is intended to serve as a graduate level introductory course on optics. This course focuses on introducing general theories of optics such as geometric and physical optics, aberrations, optical instrumentation, interference, and polarization in optics. In addition, brief description of current researches in optics and their applications in modern technologies will be presented.

Database System (3)

Introduction to advanced database systems from a perspective of implementation. Topics include query processing, transaction management, concurrency control techniques, database recovery, database security and authorization, and how these concepts are implemented in real systems.

- **Image Processing (3)**

The course will provide mathematical foundations and practical techniques for digital manipulation of images; image acquisition; preprocessing; image transforms, image enhancement, image restoration, image coding, edge detection and segmentation, feature extraction, and image analysis.

- **Programming Language (3)**

This course covers formal and practical study of the definition, application and implementation of programming languages. It includes linguistic concepts of syntax and semantics, translation of high level languages into executable form. Data structuring, sequencing constructs and modularization features of representative languages.

- **Sampling Theory (3)**

Study on sampling theory, problem in sampling methods, decision of sample size, and sample survey.

- **GPS Applications (3)**

Introduction to the concepts needed to use GPS, GLONASS and QZSS. This course is also intended to increase student's enabling many kinds of GPS applications.

Web Information Processing Applications (3)

Introduction to the methods used to search for and discover information in the Web and Web information systems. Methods that are covered include techniques for searching, browsing and filtering information, classification, clustering, filtering, web mining, the use of classification systems and thesaurus, and Web search systems.

Advanced Object Oriented Programming (3)

Introduction to the principles underlying state of the art object-oriented technology. Besides the object-oriented programming language, topics also include object-oriented analysis and design, unified process, and design patterns issues.

Concepts of Functional Programming Languages (3)

Introduction to the concepts of programming languages which combine functional and logic programming techniques. The course covers high-order functions, pure functions, recusion, strict versus non-strict evaluation, type systems and pattern matehing, functional programming in non-functional languages.

Advanced Information-Technology Mathematics (3)

Study the math. fundamentals of information theory in the foundation of information technology. The course deal with uncertainty, entropy, and channel coding theory based on statistics and probability.

Signal Processing for Remote Sensing (3)

Fundamentals of signal Processing application in remote sensing. This course covers principal component analysis, projected principal component analysis, Kalman adaptive filtering, time series analysis, neural network parameter retrieval, and independent component analysis.

'Radiometry (3)

Fundamentals of measuring the radiation of various objects. This course also involves both the techniques of calculating radiative transfer and the measurement of fluxes and radiometric properties of different sorts.

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