Master's Program (2016-2017)

(English-Taught Program)

Department of Computer Science and Information Engineering

Tamkang University

Tamsui, New Taipei City, Taiwan

Fall Semester: (mid Sept. 2016 to mid Jan. 2017)	
Research Methodology (I)	Dr. Chen, Chien-Chang
Advanced Computer Algorithms	Prof. Lin, Hwei-Jen
Broadband Access Networks	Dr. Lin, Chi-Yi
Wireless Local Area Networks	Prof. Shih, Kuei-Ping
Fundamentals of Digital Image Processing	Dr. Yen, Shwu-Huey
Machine Learning	Prof. Hsu, Hui-Huang
Data Mining	Dr. Chen, Chun-Hao

Spring Semester: (late Feb. 2017 to late June 2017)	
Research Methodology (II)	Dr. Chen, Chien-Chang
Internet Technology	Dr. Pan, Meng-Shiuan
Computer Networks	Dr. Cheng, Chien-Fu
Wireless Sensor Networks an Internet of Things	Prof. Chang, Chih-Yung
Cloud Computing & Virtualization Technology	Dr. Chang, Shih-Hao
Big Data Analytic Techniques	Dr. Hung, Chih-Chieh
Computer Vision	Dr. Tu, Ching-Ting

● Required Courses

Subject	Credit	Description
Research Methodology (I), (II)	2	This course introduces the basics of research methodology, including presentation and paper writing skills. Various research talks given by invited speakers are also arranged to present to the student recent research trends.
Advanced Computer Algorithms	3	This course is to introduce techniques for the design and analysis of efficient algorithms, emphasizing methods useful in practice. Topics include: mathematical notation, sorting, searching, hashing, greedy method, divide-and-conquer, dynamic programming, backtracking, branch-and-bound, and computational complexity.

Elective Courses

Subject	Credit	Description
Internet Technology	3	This course introduces the specifications of wired network, wireless network, and 4G network. During this course, students are required to read some fundamental research papers in these fields, and then present/discuss in class.
Data Mining	3	In this course, concepts, properties, progresses and advantages of Data Mining (DM) are introduced for providing different ways for students to solve problems. The goals of this course include two parts: (1) the spirit of DM; (2) related knowledge of DM, whose are the value of DM, why DM, and related approaches, etc.
Big Data Analytic Techniques	3	This course covers the dominant software systems and computational skills for coping with Big Data, which covers the following topics: scalable computing models, NoSQL databases/in-memory storage systems, and the methodologies which make possible the efficient analysis of large volumes of data in near real time. The course will involve hands-on programming assignments using real-world datasets. Students are expected to understand the pipeline of development of data products.
Computer Networks	3	This course provides an introduction to fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Topics to be covered include: overview of network architectures, applications (HTTP, SMTP, FTP), network transport (TCP, UDP), flow control, congestion control, IP, routing, IPv6, multicast, data link protocols, Ethernet, wireless networks, and network security issues. Examples will be drawn primarily from the Internet (e.g., TCP, UDP, and IP) protocol suite.
Cloud Computing & Virtualization Technology	3	The objective of this course is to provide cloud computing and network virtualization techniques for students. The virtualization technology is the fundamental of cloud computing and this technology can significantly improve resource utilization, simplify resource and service management and maintenance complexity, reducing server utilization. It will not only saves a huge amount of hardware procurement costs, but also reduces power consumption, thereby reducing operating costs in order to meet the requirements of the industrial cloud applications. This course will teach students not only basic cloud virtualization construction skills, but also lead to its practical application, learn content virtualization, infrastructure planning and performance evaluation. The goal is to provide training course for students who want to develop his /her-own virtualization techniques that able to proceed to the practical application of cloud computing.
Machine Learning	3	This course introduces how and why machines can learn. Linear models, overfitting to stochastic and deterministic noise, regularization, generalization and the VC dimension will be discussed. Popular machine learning algorithms like neural networks and support vector machines will then be introduced. The students will also learn how to solve machine learning problems via the Weka machine learning tool.
Wireless Local Area Networks	3	This course is mainly targeted at graduate-level students, at academic and industrial researchers working in the field, and also at engineering developing actual solutions for wireless LANs. This course contains basic concepts of wireless LANs, protocol stack of wireless LANs, and challenges of wireless LANs, and so on.

		Moreover, the students can realize the state-of-the-art technology via literature survey, paper presentation and discussions.
Wireless Sensor Networks and Internet of Things	3	The Internet of Things (IoT) is a technological revolution that represents the future of computing, communications and networking, and its development depends on dynamic technical innovation in a number of important fields, from wireless sensing to cloud computing. This course will initially introduce the applications of Internet of Things. Then several key issues of wireless sensor networks, including network deployment, localization, coverage and communication technologies, will be given. Finally, the relations between wireless sensor networks and the Internet of Things will be established in the class.
Broadband Access Networks	3	In this course we will introduce various broadband access network technologies, including Digital Subscriber Lines, Active Optical Networks, Passive Optical Networks, Metro Ethernet Networks, MPLS networks, and describe the definition of Carrier Ethernet.
Computer Vision	3	The goal of this course is to provide students with both a good theoretical and intuitive understanding of intelligent vision system, and to allow them to use these concepts to make computer vision-based systems easier to use and more effective for people and organizations. This course will first briefly introduce the fundamental principles of computer vision, such as: the geometric relations between multiple views of scenes, the general principles of parameter estimation, and some state-of-the-art algorithms (e.g. Optical Flow, Principal Component Analysis, Support Vector Machine, Adaboost…, and Markov Random Fields). Then, Students will learn the fundamental concepts of intelligent vision system, through discussions and team work on an interaction design project. Students are also encouraged to combine this project with their projects in special topics or other courses.
Fundamentals of Digital Image Processing	3	In this course, the fundamental theories of digital image processing techniques will be introduced. Particularly, their applications in image denoising, restoration, and segmentation will be introduced. This course also aims to develop a foundation that can be used as the basis for further study and research in this field.