Department of Computer Science and Engineering
College of Engineering and Computer Science
Florida Atlantic University

An 11-Month Weekend Professional Master's Degree Programs in Computer Science with Specializations in

(i) Internet and Web Technologies
(ii) Software Engineering
(iii) Embedded and Wireless Systems

Course Syllabi

ISM 4052 – Internet Application Programming

Course Description:
The purpose of this course is to teach students how to design and develop Web sites at the introductory to intermediate level. This course is project-oriented. Students are required to finish several internet-based projects using the tools introduced in class.

Textbook:
Internet & World Wide Web -- How to Program, 3rd ed., Deitel, Deitel & Nieto, Prentice Hall, 2004.

Instructors:

Dr. Oge Marques, Assistant Professor, omarques@fau.edu

Dr. Roy Levow, Professor, roy@cse.fau.edu

Course objectives:
To understand the essential components of Internet-based applications. Students will learn how to do Web design and Web programming at the introductory to intermediate level. More specifically,
1. To learn the basic concepts of the Internet.
2. To learn how to search, collect, and organize information obtained from the Internet.
3. To learn how to do Web authoring in XHTML, and/or using tools.
4. To learn how to create interactive Web pages using programming tools.
5. To learn how to do Web programming at the introductory to intermediate level.
6. To learn how to design and implement an Internet-based, client/server system.

Course Implementation:
- One weekend (17 hours) of live classes
- Pre-taped lectures on CD-ROMs (18 hours)
- Online group discussions through Blackboard (10 hours)
- Blackboard software (via Web) will be used for assignments, papers, discussions, and exams

Prerequisites: COP 3530 – Data Structures and Algorithm Analysis or permission of instructor

Topics:

Part I – Building a basic Web site with static (X)HTML contents
1. Introduction to the Internet, Web, and Web browsers

2. Creating, manipulating, and adding images to a Web page
3. Extensible Hypertext Markup Language (XHTML)
4. Cascading Style Sheets (CSS)

Part II – Building interactive Web sites using JavaScript
5. JavaScript

Part III – Building rich content Web sites using dynamic HTML and Flash
6. Dynamic HTML
7. Macromedia Flash
8. Adding multimedia contents to Web pages

Part IV – Building data-driven Web sites
9. Extensible Markup Language (XML)
10. Web servers
11. Principles of relational databases and SQL
12. VBScript
13. Active Server Pages (ASP)
14. ColdFusion
15. Case studies and applications

Instructor's Bio

Oge Marques is an Assistant Professor in the Department of Computer Science and Engineering at Florida Atlantic University in Boca Raton, Florida. He received his B.S. degree in Electrical Engineering from Centro Federal de Educação Tecnológica do Paraná (CEFET-PR) in Curitiba, Brazil, and a Master's degree in Electronic Engineering from Philips International Institute of Technological Studies in Eindhoven, The Netherlands, and a Ph.D. degree in Computer Engineering from Florida Atlantic University.

Dr. Marques has several recent publications in the fields of Image and Video Processing, Video Databases, and Visual Information Retrieval, including the books "The Handbook of Video Databases" (CRC Press, Boca Raton, FL, 2004) and "Content-Based Image and Video Retrieval" (Kluwer Academic Publishers, Boston, MA, 2002). His current fields of interest include Visual Information Retrieval, Digital Image Processing, Video Processing and Communications, and Web-based applications.

CEN 5505 - Computer Communication Networks

Instructor: Dr. Abhijit Pandya, Professor

Course Implementation:

- One weekend (17 hours) of live courses
- Additional material will be covered in CD-ROM-based lectures (28 hours)
- Blackboard software or myFAU (via Web) will be used for assignments, papers, discussions, and exams

Textbook: Forouzan, B.A., "Data Communications and Networking", Third Edition, McGraw Hill, 2004.

Course material:

- History and evolution of computer networks
- Applications of computer networks
- Computer communication switching techniques
- Routing in computer communication networks
- Multiple-access communication networks
- Local and metropolitan area communication networks
- Flow control and congestion avoidance
- Narrowband and broadband integrated services digital networks (ISDNs)
- Wireless networks
- Network interconnection
- Modeling and analysis
- Future directions

Bibliography

- Kurose, J.F., and Ross, K.W., "Computer Networking – A Top-Down Approach Featuring the Internet", Second Edition, Addison-Wesley, 2003

- Tanenbaum, A.S., "Computer Networks", Fourth Edition, Prentice Hall, 2003.

- Leon-Garcia, A., and Widjaja, I., "Communication Networks – Fundamental Concepts and Key Architectures", McGraw Hill, 2000.

COT 5930 - Web Project Development

Course Description:
Students will learn concepts and tools for web project development with applications to commercial, industrial and other fields.

Textbook:
TBD

Instructor: Dr. Oge Marques, Assistant Professor
Dr. Roy Levow, Professor

Course objectives:
This course will introduce concepts and tools for web project development. It will present students with effective means to construct multi-tier data-driven web sites that retrieve and deliver multi-media contents on the Internet for applications to various fields. Students will be expected to complete and demonstrate virtual web sites as their term projects.

Course Implementation:
- One weekend (17 hours) of live classes
- Pre-taped lectures on CD-ROMs (18 hours)
- Online group discussions through Blackboard (10 hours)
- Blackboard software (via Web) will be used for assignments, papers, discussions, and exams

Prerequisites: Internet Application Programming (ISM 4052) or permission of instructor

Topics:
1. Introduction
2. Web servers
3. Web project models
4. Tools for presentation tier
5. Tools for business logic tier
6. Tools for data tier
7. Integration of web technologies
8. Performance and Security
9. Project demonstration

COT 5930 Network Programming

Course objective:

To develop an understanding of the various aspects of computer network programming. Topics include: networking basics, protocol basics, Internet protocols, socket programming, and remote procedure call. This is a project-oriented course. Students will be required to design and implement a layered protocol stack.

Instructor: Dr. Sam Hsu, S&E 404; Tel: 561/297-3728; Fax: 561/297-2800
Email: sam@cse.fau.edu; WWW: http://www.cse.fau.edu/~sam

Prerequisites:

1. C programming background
2. Knowledge of UNIX systems

Course outline:

1. Basic networking concepts
2. Layered protocol architecture
3. Internet protocols
4. Network programming essentials
5. Socket programming
6. Protocol design and implementation
7. Current networking issues

Course Implementation:

1. One weekend (17 hours) of face-to-face lectures.
2. Pre-taped lecture (15 hours) will be provided.
3. Online group discussion and projects (13 hours) through distance learning on Blackboard.

Grading:

There will be several homework assignments, one exam, and a term project. They will be worth:

Homework assignments: 40%
One exam: 40%
Term project 20%

COT 6930 Concurrency Modeling

Catalog Description: Prerequisite: COP 3530, Data Structures and Algorithms Analysis, or consent of instructor. This course makes it practical and accessible to learn about concurrency and concurrent programming, and to combine theory and practice in one common environment. The course will allow students to verify and resolve concurrency issues at a high level of abstraction in a productive and efficient way.

Textbook: Concurrency, State Models and Java Programs, by Jeff Magee and Jeff Kramer, Wiley, 2000. ISBN: 0-471-98710-7

Instructor: Dr. R. Shankar, Professor of Computer Science and Engineering

Email: ravi@cse.fau.edu

Telephone: (561) 297-3470

Schedule: Two Weekend Days, 8.30 AM to 5 PM.

Goals: Concurrent programming is needed today, not only for programmers involved in operating systems and embedded real-time applications, but also in other domains such as Internet, Games, Animation, etc. Concurrency is useful in a wide range of applications where responsiveness and throughput are issues. Ths course will provide a systematic treatment of the concepts and issues in concurrency; a rigorous technique to specify and model concurrent behavior, with analysis tools for animation and verification; and a wide range of design examples.

Prerequisite by Topics: Programming and introduction to Object Oritented design. Knowledge of Java or C++ is not a prerequisite.

Topics: (Lectures and Hands-On Java Applet-based Demos)

1. Object Oriented Design;
2. Concurrency programming with Java (introduction);
3. Processes and Threads; FSP (Finite State Processes) for concurrency notation
4. Concurrent Execution;
5. Shared Objects and Mutual Exclusion;
6. Monitors and Condition Synchronization;
7. Deadlock;

CIS 6370 - Data and Internet Security

Description: Overview of technical aspects of data security with emphasis on the Internet and the design of secure systems.

Prerequisites: General concepts of operating systems, computer systems architecture, and languages. Some knowledge of object-oriented concepts, in particular UML modeling.

Outline :

1. Introduction to Internet and Intranet. Structure, growth, possibilities. Related subjects, overview of course
2. The Internet and its threats: Structure of the Internet, web services. Viruses, worms, denial of service, and other types of attacks
3. Security policies and models: Basic policies. Access matrix, multilevel, mandatory, discretionary models. Role-Based Access Control
4. The design of secure systems: Secure system design methodology
5. Cryptography : Symmetric and public key systems, PKI, protocols
6. Network Security: SSL, Kerberos, VPNs, Wireless systems. Firewalls
7. Operating systems security: Unix, Windows XP and 2000. Hardened operating systems, types of attacks. Authentication. Effect of hardware on security
8. Database security: Authorization systems in Oracle and similar systems.
9. Application and language security: Language problems, buffer overflow, Java security. Application/content firewalls.
10. Distributed systems: Security in .NET and Sun ONE, WebSphere and other application servers. Security in XML and Web Services

Objectives of the course

Understanding of the security problems that arise in the combination of the Internet with Intranets. Need to protect all architectural levels to achieve security. Understanding of how to coordinate hardware and software to provide data security against internal and external attacks. Modeling of the systems involved through the use of object-oriented patterns.

Implementation aspects

- One weekend (17 hours) of live lectures.
- Specialized material will be covered in several CD ROMs (20 hours)
- Online group discussion and projects through distance learning using Blackboard (8 hours)

MAP 6264 – Queueing Theory and Networks

Overview: This course is designed to explain queueing theory, which is a mathematical theory that underlies the performance analysis of computer and telecommunication networks, and to illustrate how the theory is applied. The basic model is that of a system of fixed resources that is designed to handle demands for service (messages, packets, phone calls, etc.) that are characterized by random arrival times and random bandwidth requirements. (Sometimes demands are blocked and forced to wait in a queue; hence, "queueing theory.") The tools used in the course are elementary probability theory (which will be reviewed) and computer simulation. Theory and simulation complement each other; a typical homework assignment is to calculate some performance measure (theory) and compare it with the output of a computer simulation program (experiment). This presumes of the student a mathematical level consistent with an undergraduate engineering education, and an ability to write simple computer programs. All background material will be reviewed and explained as necessary.

Objectives: The goals are to enable the student to understand in general the essential aspects of probability modeling and, in particular, to apply queueing theory to the analysis of communication networks. In passing, we hope to show that the interplay between intuition and mathematical analysis is surprisingly interesting.

Structure of the Course: The first few lectures (5 hours) will be delivered via CD-ROM (or videotape). These will include reading assignments and illustrative homework assignments. This will be followed by a weekend of lectures (17 hours), during which questions raised by the previous lectures and assignments will be addressed; and additional homeworks will be assigned. The remaining lectures will be covered in CD-ROM-based lectures (23 hours). All homework assignments will graded and returned promptly. Throughout the course, the instructor will be available via e-mail, telephone, and fax to answer questions. Grades will be based on the homework assignments and (maybe) a final exam.

Technical Topics:

1. Intuitive analysis (rate up = rate down), applications, subleties
2. Review of probability, simulation via inverse transform
3. One-dimensional birth-and-death process, related queueing model
4. PASTA, Little's theorem, Erlang B and Erlang C models, finite-source models
5. Multidimensional birth-and-death process, networks of queues and related models

COT 6930 Wireless Networks

Course Description
In this course we will discuss basic concepts and recent advances in the field of wireless communication networks. The course begins with an introduction of the fundamentals of wireless communication technology and continues with a discussion of selected topics for the following representative network types: cellular wireless networks, WLANs, ad hoc wireless networks and wireless sensor networks.

Textbook
"*Wireless Communication and Networks*", by William Stallings, Prentice Hall Publishing Company, 2002.

Instructor
Dr. Mihaela Cardei, Assistant Professor of Computer Science & Eng.
Email: mihaela@cse.fau.edu, Phone: (561) 297-3459
Office: Science & Engineering Building, SE 424

Goals
Understanding the basic fundamentals in wireless communication technology as well as basic features and recent advances in various wireless networks.

Prerequisites
Basic knowledge of computer communication networks.

Topics
1. Introduction
2. Technical Background: Transmission Fundamentals, Communication Networks, Protocols and the TCP/IP Suite
3. Wireless Communication Technology: Signal Encoding Techniques, Spread Spectrum, Coding and Error Control
4. Cellular Wireless Networks
5. WLANs
6. Ad Hoc Wireless Networks
7. TCP for Wireless Links
8. Mobile IP
9. Wireless Sensor Networks
10. Wireless Security

Coursework and Tentative Evaluation

Four Written Assignments	60%
One exam	40%

CIS 6302 – Mobile Computing

Course Implementation: The course consists of one weekend (17 hours) of face-to-face lectures plus 25 hours of CD-ROM lectures. Material not covered in the face-to-face lectures will be covered in the CD-ROM lectures. FAU Blackboard distance learning environment will be used, which will include online group discussions (5 hours)

Textbook: Handbook of Mobile Computing
Eds. I. Mahgoub and M. Ilyas, CRC Press 2004,
plus instructor's notes, selected articles and papers

Reference: *Mobile Computing*
Tomasz Imielinski and Henry Korth, Kluwer Academic, 1996.

Instructor: Dr. Imad Mahgoub, Professor of Computer Science & Engineering
Sci & Eng. Bldg., Rm 406

E-Mail: imad@cse.fau.edu

Telephone: 561-297-3458

Objectives: The course offers detailed discussion of the important and challenging issues in mobile computing and examines the different approaches that address these issues.

Prerequisites By Topics:

1. Basic knowledge of computer architecture
2. Basic knowledge of data communications and networking

Topics:

1. Introduction to mobile computing
2. Bandwidth and disconnected operation issues
3. Location management
4. Location-Based services
5. Caching strategies
6. Mobile ad hoc wireless networks
7. Power consumption issues
8. Security issues
9. Applications

CAP 6010 - Multimedia Systems and Internet

Prerequisites: Programming skills (in C, C++, or Java)

Course Description: Multimedia systems concepts and characteristics. Multimedia compression techniques. Systems architectures for multimedia. Multimedia networking, communications, and synchronization. Multimedia operating systems. Video partitioning and retrieval. Multimedia and the Internet. Wireless multimedia. Multimedia applications. Student projects.

Textbook:
B. Furht, *Handbook of Multimedia Computing*, CRC Press, 1999.

Instructor: Dr. Borko Furht,
Professor of Computer Science and Engineering

Course Implementation:

- One weekend (17 hours) of live lectures
- Pre-taped lectures on CD-ROMs (18 hours)
- Online group discussions through Blackboard (10 hours)
- Blackboard software (via Web) will be used for assignments, papers, discussions, and exams

Topics:

1. Introduction to multimedia systems
2. Image compression techniques and standards
3. Video compression techniques and standards
4. Motion estimation algorithms
5. Multimedia processor architectures
6. Image and video indexing and retrieval
7. Multimedia networks and communications
8. Multimedia operating systems
9. Multimedia and the Internet
10. Wireless Internet and multimedia
11. Multimedia applications
12. Case studies

COT 6930 – Video Communications

Course Description: This is a graduate level course on digital video communications. The course will introduce video compression and issues in video transmission over wired and wireless networks. The course will cover video technologies widely used in the industry such as MPEG-2, MPEG-4, H.264, and transport protocols such as RTP and MPEG-2 TS.

Learning Outcomes: Upon successful completion of the course students will be able to analyze and design systems for video communications. The knowledge of the fundamental concepts will allow students to implement video delivery over networks as well as objectively evaluate video communications products. The comprehensive coverage of commercially used MPEG technologies will provide students with background in industry-relevant standards and technology. The students will acquire enough knowledge to independently develop and lead video-oriented projects.

Textbook: Multimedia Communication Systems: Techniques, Standards, and Networks by K.R. Rao, Z.S. Bojkovic, and D.A. Milovanovic. Prentice Hall, 2002, ISBN 0-13-031398-X

References: A number of seminal research papers in the area will be made available

Goals: This course is intended to provide a background and experience in the area of video communications relevant to the industry needs today as well as the challenges and future developments in the field.

Topics:

1. Introduction to digital video compression
2. Video compression – MPEG-2, MPEG-4, H.264
3. Multimedia content representation (MPEG-4 Systems and SMIL)
4. MPEG-2 Transport
5. Error resilience
6. Video delivery over IP networks
7. Video delivery over wireless networks
8. RTP (Realtime Transport Protocol)
9. Video servers
10. Video adaptation and transcoding

Course Management:

- One weekend of live lectures (17 hours)
- Pre-taped lectures on CD-ROMs (20 hours)
- Online group discussions through Blackboard (8 hours)

COP 6930 – Advanced Internet Engineering

Prerequisites: Basic knowledge of Internet and Web systems and programming.

Course Description: Students will get familiar with current Internet and Web technologies and application trends. Topics include computer networks and Internet architectures, wireless Internet, Internet and application service providers, multimedia transmission over the Internet, and advanced applications. Student projects: programming and research projects.

Textbook:

- *Handbook of Internet Multimedia Systems and Applications, CRC Press, 1999.*
  (selected chapters)

Reference Material:

- J.F. Kurose and K.W. Ross, "*Computer Networking: A Top-Down Approach Featuring the Internet,*" Addison-Wesley, 2001.
- B. Furht, "*Handbook of Internet Computing,*" CRC Press, 2000.
- *Selected papers*

Instructor:

Dr. Borko Furht, Professor of Computer Science and Engineering

Course Implementation:

- One weekend (17 hours) of live courses
- Pre-taped lectures on CD-ROMs (18 hours)
- Online group discussions through Blackboard (10 hours)
- Blackboard software (via Web) will be used for assignments, papers, discussions, and exams

Topics:

1. Introduction to Internet and World Wide Web
2. Design of Web Sites
3. Computer Networks and the Internet
4. Wireless Internet
5. Multimedia Networking
6. Internet Service Providers and Application Service Providers
7. Content-Based Multimedia Search and Retrieval on the Internet
8. Real-Time Video Over the Internet
9. Internet-Based Unified Messaging Systems

CAP 6673 – Data and Web Mining

Coordinator: Dr. Taghi M. Khoshgoftaar
Professor of Computer Science and Engineering

Phone: (561) 297-3994
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Email: taghi@cse.fau.edu
URL: http://www.cse.fau.edu/~taghi

Goals: To enable students to understand basic concept of data mining algorithms with an emphasis on real world applications.

Catalog Description: This course deals with the principles of data mining. Topics covered include machine learning methods, knowledge discovery and representation, classification and prediction models.

Prerequisites: STA 4821 or equivalent. Scientific programming in a high level language (C, C++, or JAVA)

Textbook: Data Mining: Practical Tools and Techniques with JAVA Implementations, by I.H. Witten and E. Frank Morgan Kaufmann Publishers 2000
Selected articles and papers

Topics:

1. What's all about?
2. Input: Concepts, instances, attributes
3. Output: Knowledge representation
4. Algorithms: The basic methods
5. Divide and conquer: Constructing decision trees
6. Credibility: Evaluating what's been learned
7. Implementations: Real machine learning schemes
8. Moving on: Engineering the input and output
9. Nuts and bolts: Machine learning algorithms in JAVA

CDA 6508 Ad Hoc Networks

? Course Description

A comprehensive approach to fundamentals of ad hoc networks including media access protocols, routing protocols, implementation and communication performance.

? Textbook:

I. Stojmenovic, Handbook of Wireless Networks and Mobile Computing, John Wiley & Sons, 2002

? Reference:

- C.-K. Toh, Ad Hoc Mobile Wireless Networks: Protocols and Systems, Prentice Hall PTR, 2002.
- C.E.Perkins, Ad Hoc Networking, Addison Wesley, 2001.
- D.P.Agrawal and Q.-A. Zeng, Introduction to Wireless and Mobile Systems, Thomson Brooks/Cole, 2003.

? Instructor:

Jie Wu, Professor of Computer Science and Engineering, Florida Atlantic University. Room 401, Science and Engineering Building, × 73941, jie@cse.fau.edu

? Goals:

An understanding of basic of the ad hoc wireless networking. Covers media access, routing, data management, power optimization, transport protocol, and much more. Current and future developments in the field.

? Prerequisites by Topic:

1. Basic graph theory
2. Fundamentals of computer networks

? Topics:

1. Introduction to Wireless Networks
2. Ad Hoc Wireless Networks and Their Origins
3. Topics in Infrastructured Networks (cellular architecture)
   - Handoffs
   - Location Management (Mobile IP)
   - Channel Assignment
4. Topics in Infrastructurless Networks (MANETs)
   - Wireless Media Access Protocols

COT 6617 – Distributed Systems Design

? **Course Description:**

Prerequisite: A high-level programming language, basic knowledge of architecture and operating systems, elementary discrete mathematics, or permission of the instructor.
We consider a distributed computer system that consists of multiple autonomous processors that do not share primary memory but cooperate by sending messages over a communication network. Discussion of special problems related to distributed control such as election and mutual exclusion, routing, data management Byzantine agreement, and deadlock handling.

? **Textbook:**

1. Distributed System Design
   Jie Wu, CRC Press, 1999.

? **References:**

1. Distributed Algorithms
   Nancy A. Lynch, Morgan Kaufmann Publishers, Inc., 1996
2. Distributed Systems: Principle and Paradigms
   Andrew S. Tanenbaum and Maarten Van Steen, Prentice Hall, 2002.

? **Instructor:**

Dr. Jie Wu, Professor of Computer Science and Engineering
jie@cse.fau.edu, http://www.cse.fau.edu/~jie

? **Goals:**

The student will get exposed to fundamental issues in distributed system design, recent development, and research trends in this area.

? **Prerequisite by topic:**

- Basic concepts of computer architecture and operating systems
- Knowledge of a high level programming language
- Elementary discrete mathematics

? **Topics:**

1. Introduction and motivation
2. Program languages and clock synchronization
3. Event ordering and clock synchronization
4. Election and mutual exclusion

COP 6731 – Theory and Implementation of Database Systems

Instructor: Dr. M. K. Solomon, Professor
Office: SE 358
Phone: (561) 297-3228
E-mail: marty@cse.fau.edu

Dr. Solomon's major areas of research include the design, implementation and theory of database systems, computational complexity theory, and the philosophical aspects of computability. Dr. Solomon has published articles on these topics in such journals as *ACM Transactions on Database Systems, Communications of the ACM, Computer Journal, Journal of Symbolic Logic, Mathematical Logic Quarterly,* and *British Journal for the Philosophy of Science.* He has a strong professional interest in all aspects of the Oracle RDBMS and has recently co-authored three books in the Osborne/McGraw-Hill Oracle Press Series.

Description: Investigation of the fundamental principles and practices of relational database processing and design. Oracle will be used intensively in these investigations.

Goal: Understand the structure, intelligent use, and implementation of relational database systems, especially as relates to Internet databases.

Blackboard Usage: The Blackboard system will be used to supply lecture notes, for assignment submission, and for enhanced student/instructor interaction.

Textbook: An Introduction to Database Systems, Eighth Edition, by C. J. Date, Addison-Wesley, 2004.

Prerequisite: The ability to program in C or C++, and some exposure to a database system.

Grading: The student's grade will be based on performance in five assignments.