Computer Engineering Master: Non-Thesis Option

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPE 580</td>
<td>Term Project</td>
<td>Non-Credit</td>
</tr>
<tr>
<td>CPE 501</td>
<td>Programming Languages</td>
<td>(3,0) 3</td>
</tr>
<tr>
<td>CPE 555</td>
<td>Advanced Topics in Software Engineering</td>
<td>(3,0) 3</td>
</tr>
<tr>
<td>CPE 590</td>
<td>Elective Course</td>
<td>(3,0) 3</td>
</tr>
<tr>
<td>CPE XXX</td>
<td>Elective Course</td>
<td>(3,0) 3</td>
</tr>
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<td>CPE XXX</td>
<td>Elective Course</td>
<td>(3,0) 3</td>
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<tr>
<td>CPE XXX</td>
<td>Elective Course</td>
<td>(3,0) 3</td>
</tr>
</tbody>
</table>

Course Definitions

CPE 580 Term Project  Non-Credit
Within the scope of the compulsory project study of the graduate program without thesis, the student is expected to prepare a project within the topics of the major discipline under the supervision of a supervisor, within the framework dictated by the Institute of Sciences. Upon the evaluation of the project by a jury to be designated by the major discipline, it is evaluated as successful/unsuccessful. Upon failure, the study is renewed.

CPE 501 Programming Languages  (3,0) 3
Brief historical perspective. Understanding and using Integrated Development Environment (IDE). Java basics, introduction to graphical user interfaces (GUI) for Java, using Swing Components and Java Listeners, Swing dialog boxes, developing GUI applications, theory of Object Oriented Programming with Unified Modeling Language (UML). Object-Oriented (OO) problem solving, OO concepts (inheritance, composition, abstract classes etc.), object relations, developing OO applications with design patterns, Unit Testing, Project Presentations.

CPE 555 Advanced Topics in Software Engineering  (3,0) 3
The main topics discussed in this course are development methodologies and design patterns. Software life cycle phases like requirements, design, implementation, testing and deployment will be discussed with methodologies like Waterfall, prototyping and Extreme Programming. Also design patterns like creational, structural and behavioral patterns will be evaluated.
Elective Courses

CPE 510 Computer Graphics (3,0) 3
Overview of graphic applications, history, technologies. 2D primitive drawing, including scan conversion, polygon filling, clipping, and antialiasing. 2D and 3D geometric transformations including translation, scaling, rotation. Specification of view frusta and projections (parallel and perspective). Hidden-surface removal and z-buffering. Color models. Basic illumination (including flat, Gouraud, Phong) and shading. Texture mapping. Hierarchical 3D model specification. Curve and surface (geometric modeling) basics. Solid modeling basics. Ray-tracing basics. All applications are performed with OpenGL API with C#.

CPE 511 Computer Architecture (3,0) 3

CPE 513 Systems Programming and Applications (3,0) 3
Design and develop applications by using the benefits of operating system and computer architecture. Threads and concurrent programming. TCP/UDP, RPC/IPC, System calls, remote procedure calls (RPC) and web services, xml and xml parsing, socket communication, logging.

CPE 518 Computer Performance Evaluation (3,0) 3

CPE 520 Advanced Compiler Design (3,0) 3
Syntax directed translation schemes for the compilation of imperative, functional and logic languages into suitable abstract machine code. Definition of such abstract machines for each paradigm. Compilation of inheritance in object-oriented languages. Abstract interpretation based on operational semantics. Implementation of a compiler for a functional, logic or object oriented programming language.

CPE 522 Operating System Design (3,0) 3
An operating system has four major components: process management, input/output, memory management, and the file system. This course puts operating system principles into action. This course presents a practical approach to studying implementation aspects of operating systems. A series of projects is included, making it possible for students to acquire direct experience in the design and construction of operating system components. A student in this course must design and implement some components of an operating system and have each interact correctly with existing system software. At the end of this course, a student will be able to design and implement the basic components of operating systems.

CPE 523 Performance Evaluation of Computer Networks (3,0) 3

CPE 524 Computer Networks Design (3,0) 3

CPE 525 Advanced Network Programming (3,0) 3
The goal of this module is to introduce the students to advanced network programming concepts. They will study issues such as multitasking, multithreading, processes, inter-process communications and network communications. Client-server communications for long term (e.g. large file transfer, multimedia streaming) and short term sessions (e.g. Web traffic) will be presented. P2P, RMI, applet-servlet, e-mail and multimedia mail will be introduced. The course will also address issues related to the programming of network equipment, including router architecture, network signalling, firewalling and deep packet probes, network processors, network support for unicast, multicast and broadcast, and the use of techniques for dynamically changing router code, such as mobile agents and active networks.
CPE 526 Operating System and Network Security (3,0) 3

CPE 527 Broadband Switching Systems (3,0) 3

CPE 530 Computer Networks and Communications (3,0) 3

CPE 535 Artificial Intelligence (3,0) 3

CPE 537 Computer Vision (3,0) 3

CPE 540 Advanced Database Management Systems (3,0) 3
This course covers a number of advanced topics in database management systems and modern database applications. The specific topics include advanced concurrency control techniques, query processing and optimization strategies for relational database systems, advanced indexing methods, parallel and distributed database systems, next-generation data models, data mining on large databases, data on the web, and topics in data security and privacy.

CPE 542 Automated Theorem Proving (3,0) 3

CPE 544 Pattern Recognition (3,0) 3

CPE 545 Artificial Neural Networks (3,0) 3

CPE 550 Advanced Information System Design (3,0) 3
This course studies the theory, design, and implementation of text-based information retrieval systems. The Information Retrieval core components of the course include statistical characteristics of text, representation of information needs and documents, several important retrieval models (Boolean, vector space, probabilistic), clustering algorithms, automatic text categorization, and experimental evaluation. The software architecture components include design and implementation of high-capacity text retrieval and text filtering systems. A variety of current research topics are also covered, including cross-lingual retrieval and multi-media retrieval.
CPE 560 Qualitative Reasoning  (3,0) 3
Reasoning with incomplete information. The qualitative representation; arithmetic and algebraic issues. Qualitative differential equations. Qualitative modeling and simulation. Qualitative variants of reasoning tasks such as system identification, postdiction and comparative analysis.

CPE 561 Natural Language Processing  (3,0) 3

CPE 565 Autonomous Robots  (3,0) 3

CPE 567 E–Commerce  (3,0) 3
This course provides students a basic knowledge about fundamentals of online trading, the challenges posed by online trading to traditional companies and traditional forms of trading and to the institutional and procedural framework of the marketplace. The rules and procedures of online trading will be discussed with specific references to major companies currently active in this business. Cases will be studied online auction houses and online trading companies. Major issues regarding online trading such as credit cards, fraud and new technologies will be introduced. Legal issues regarding registration and governance will also be presented.