Study Plan for the Master's degree in Computer Science (Thesis track)

A) Obligatory courses (15 credit hours)

Course no	Course Name	Credit	Weekly Hours		Pre – requisite
			Lect.	Lab.	
501001713	Theory of Algorithms	3	3	-	---
501001763	Artificial Intelligence And Expert Systems	3	3	-	-----
501001724	Data Base systems	3	3	-	----
501001782	Operating Systems	3	3	-	----
501001743	Computer Networks	3	3	-	----

B) Elective Courses (9 credit hours) to be chosen from the following:

Course no	Course Name	Credit	Weekly Hours		Pre – requisite
			Lect.	Lab.	
501001715	Programming Languages Design	3	3	-	----
501001752	Advanced Computer Architecture	3	3	-	-----
501001714	Software Design and Testing	3	3	-	---
501001788	Simulation Methods	3	3	-	---
501001767	Image Processing	3	3	-	----
501001744	Computer Protection and Security	3	3	-	----
501001789	Coding Theory	3	3	-	
501001771	Computer Graphics	3	3	-	----
501001717	Compiler Design	3	3	-	-----
501001794	Selected Topics In Computer Science*	3	3	-	----

* The Student can't study it more than once, even if the topics are different.

C) Master thesis (9 credit hours)

Course Description

501001713 Theory of Algorithms : 3 cr. (3 lect.)

Basics of Algorithms, Analysis of Algorithms, NP-complete problems. It includes: Models of computation, Merging, Sorting Searching, Generating permutation, Matrix Operation, Graph-Theory problems, Decision and Optimization problems. Selected applications are also covered, Case study.

501001763 Artificial Intelligence and Expert System: 3 cr. (3 lect.)

This course introduces the basics the basics Al such as knowledge representation, reasoning and search techniques. The course also covers advanced topics such as nonmonotonic reasoning, truth maintenance systems, Expert systems, machine learning and artificial neural networks.

501001724 Database: 3 cr. (3 lect.)

Advanced Database topics such as Database Models, Relational Data Models, Relational Database Design Theory, E-R Model, Object oriented Database, Temporal Database, Data mining and warehousing, Database Security, Concurrence Control in DBMS, Recovery and Distributed DBMS, Case study.

501001782 Operating Systems: 3 cr. (3 lect.)

Process Synchronization, Language Mechanism for concurrence, Deadlock, Virtual Memory, Distributed Systems (Distributed Concurrence Control, Deadlock and Recovery, Computer Security, Queuing Models of Computer Systems, Parallelism and Scheduling, Case Study.

501001743 Computer Networks: 3 cr. (3 lect.)

Layered Network Architecture, Data Links Control Communication Channels, Delay Model In Data Networks, Multi-access Communication, Routing In Data Networks and Flow Control, message passing, protocols, Case study.

501001715 Programming Languages Design: 3 cr. (3 lect.)

Syntax and Semantics, Comparison and Design of Programming Languages, Structure of Compiled and Interpretive Languages, Data typed and Abstract Data types, Control Structures, Language Features in Programming in Large Functional Programming, Logic Programming, Object-Oriented Programming, Syntax and Translation Semantics and properties for Real and Abstract Machines and Formal Semantics.

501001752 Advanced Computer Architecture: 3 cr. (3 lect.)

Pipeline systems and RISC machines. In addition, it discusses Computer Design Techniques such as: Share Memory Multiprocessor Systems, Multiprocessor Systems and Programming, Single bus Multiprocessor Systems, Interconnection Networks, Multiprocessor Systems Without Shared Memory, Message passing Multiprocessor Systems, and Multiprocessor Systems using the Data Flow Mechanism.

501001714 Software Design and Testing: 3 cr. (3 lect.)

Software Engineering, Problem Definition, Software lifecycle, Software requirements and specifications, Program Design Tools and Techniques, Complexity, Storage and Processing-time Analysis, Program Testing, Software Reliability, Management Techniques (Development Methodology Requirements, Specification and Initial Design, Cost Estimation Managing the Development process, Software Maintenance). Students also are required to present a case study in S.E.

501001788 Simulation Methods: 3 cr. (3 lect.)

Fundamentals of Modeling and Simulation Languages, Methods, Simulation of Practical Problems Using Finite Difference and Finite Element Methods, Digital Simulation of Environmental Problems, General Application of Simulation in Computer System, Stability and Convergence, Case study.

5010017667 Image Processing: 3 cr. (3 lect.)

Techniques of digital image processing. Processing in the image and spatial frequency domains; Fourier and other transforms, continuous and discrete convolution and filtering; Grey-level transforms, feature identification, image encoding, image enhancement; applications to models of human and machine vision, Case study.

501001744 Computer Protection and Security: 3 cr. (3 lect.)

Computer security and basic cryptography topics, introduction to the mathematical principles of data security, information security, Various developments in cryptography are discussed, including public-key encryption, digital signatures, the data encryption standard (DES), key-safeguarding schemes vulnerabilities, policy formation, control and protection methods, Access night, encryption, authentication technologies, host-based and network-based security issues, Internet security, personnel and physical security issues, Case study.

501001789 Coding Theory : 3 cr. (3 lect.)

Fundamentals of Coding theory and Encryption: essentials of error-detecting and error-correcting codes, the study of methods for efficient and accurate transfer of information, perfect and related codes, cyclic codes, and BCH codes, crypt and decrypt methods and analysis, cryptography: modes of operation, protocols and transactions, applications.

501001771 Computer Graphics: 3 cr. (3 lect.)

An overview of two dimensional concepts and methods, detailed treatment of three-dimensional topics: concepts, representations, and transformation, hidden-surface methods, shading and coloring models, modeling methods, Graphics standards (GKS and PHIGS) and related hardware, applications, Case study.

501001717 Compiler Design: 3 cr. (3 lect.)

Overview of Compilation Languages and Machines, Compiler Data structures, Formal Systems, Lexical Analysis, Parsing, Semantic Analysis, Code Generation, Assembly, Error Handling Optimization, Compiler Implementation, Case study.

501001794 Selected Topics in Computer Science: 3 cr. (3 lect.)

Lectures on and Study of Selected Topics in Current Research and Recent Developments in Computer Science.