Track III: Individual Track

Course Number	Course Title	Credits Hours	Weekly Hours		Prerequisite
			Lecture	Lab	
CSI 441	Machine Learning	3	2	2	CSI 411
CSI 442	Introduction to Robotics	3	2	2	CSI 411
CSI 443	Expert Systems	3	2	2	CSI 411
CSI 444	Computational Methods	3	2	2	Math 310
CSI 445	Operational Research	3	2	2	STAT 320, MATH 310
CSI 446	Information System Management	3	2	2	CSI 314
CSI 447	Information Security	3	2	2	CSI 423
CSI 448	Project Management	3	2	2	CSI 422
CSI 449	Geographic Information Systems (GIS)	3	2	2	CSI 324

- **CSI 441 Machine learning**

Machine learning is the science of getting computers to act without being explicitly programmed. This course provides a broad introduction to machine learning. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI)..

- **CSI 442 Introduction to Robotics**

Introductory historical development of robotics, robot arm kinematics, inverse kinematics, dynamics and control, trajectory planning, use of software packages, sensors, image acquisition and processing, control architectures, applications of mobile robots, autonomous mobile robots (navigation and localization), computer vision, vision-based control. Topics will include how to interface a computer with the real world, different types of sensors and their use, different types of actuators and their use, and forward and inverse kinematics of simple two link robotic manipulators.

- **CSI 443   Expert Systems**

This course introduces students to expert systems in general and to rule-based systems in specific. Students learn how to build a rule-based expert system in a variety of application areas. They also learn advanced programming techniques which include topics of inexact reasoning, intelligent database management methods, and how to develop a community of expert systems which cooperate over a blackboard structure. Students are also given the opportunity to demonstrate their understanding of the technology by building a rule-based expert system that addresses a real-world problem. The course prepares students for graduate research in the area of expert systems.

- **CSI 444 Computational Methods**

The current course provides powerful understanding and manipulation of what is called approximate/numerical solutions. The exact solution, in many practical cases, is not only difficult to be reached, but it may be impossible to find it. Therefore it was the need to look for effective algorithms to establish these stable, and convergent approximate solutions. These algorithms will handle important several topics concerned with: Numerical Differentiation, Root location (Bracketing Methods, Opened Methods), Numerical Integrations, Numerical Solution of Linear Systems of Equations, Curve Fitting, Interpolation, Numerical Solution of Ordinary and Partial Differential Equations.

- **CSI 445 Operational Research**

The current course introduces the basic concepts of Optimization and its tools and how can this be applied to problems of the real life. This objective can be successfully achieved through the conduction of the following topics: Basic concepts of Optimization, Operations Research and the art of Problem Solving, Linear Programming: Convexity, Extreme Points, Formulation and Graphical Solution, Analytical Solution of Linear Programming: the Simplex-Tableau, Theorem of Duality

- **CSI 446 Information Systems Management**

This course aims to develop the students' ability to plan, analyze, design, implement, validate, and maintain computerized information systems using software processes. Specifically, the course will: Develop the students' skills of selecting a suitable process model (for better project management and better quality software) for a specific software project, introduce frameworks and quality standards for software development and management, highlight and integrate new process models for new environments (e. g. the WWW), introduce software metrics for better quality management.

- **CSI 447 Information Security**

This course is to make students familiar with the basic concepts of information systems security. The course aims to the security goals, security functions, and security mechanisms. The content is: Introduction to information Security, Information security and risk management, Access control, Security architecture and design, Physical environmental security, Telecommunications and network security, Business continuity and disaster recovery, Application security and Operation security.

- **CSI 448 Project Management**

The course introduces the students to the various concepts and methodologies of Project Management. The course describes the actual procedures and techniques used in planning, monitoring and controlling projects. The course introduces a number of exercises and case studies (Workshops) within the learning scope of the course to help students to acquire basic and advanced concepts of project management fundamentals. This course enriches the students' understanding of best practices and the advantages of using project management skills to increase their productivity and enable them reach higher returns from investments in

Information Technology (IT). As such, after completing this course the student should be able to: Understand the basic familiarity (literacy) of Project Management. Demonstrate an understanding of the basic concepts of Project Management, thus, enabling him/her to functionally utilize these skills in his/her future practices.