Software Engineering Course Specifications

Faculty: Computer and Informatics

Department: Scientific Computing

Program(s) on which the course is given	**:**	Bachelor in Computer and Informatics
Major or Minor element of programs	:	All majors
Department offering the program	:	Scientific Computing
Department offering the course	**:**	Information System
Academic year / Level	**:**	3rd Year / B.Sc.
Date of specification approval	**:**	15/10/2009

A. Basic Information

Title: Software Engineering **Code:** CSW 354

Lectures: 3 hrs/week **Tutorial:** 2 hrs/week **Practical:** ---

Credit Hours: --- **Total:** 5 hrs/week

B. Professional Information

1. Overall Aims of Course:

Define the principles of software engineering

Explain the principles of software quality and quality attributes

Differentiate between the phases of software project.

Describe and apply the principles of software modeling and modeling techniques

Explain the concept and the principles of software specifications

Describe and perform the principles of software design techniques

Illustrate the principles of software implementation issues

Apply and perform Software verification

Describe and write Software documentation

Explain the rules of software project management

Describe and perform Software maintenance.

2. Intended Learning Outcomes of Course (ILOs):

a. Knowledge and Understanding:

a1 Students will know the essential core content of the discipline of Information technology, and demonstrate the ability to apply content-knowledge in the specification, analysis, design, implementation and testing of a software solution.

a2 Students will demonstrate the ability to effectively analyze Information technology concepts both orally and in writing or as members of a creative thinking team.

a3 The student will understand and differentiate methods of data analysis, parameters estimation, and testing.

a4 Students will specify the fields of computer networks, security basic, virtual reality, Multimedia, and computer processing.

a5 Students will state the operation theory of electronic peripherals used in the IT technology.

a6 The student will know and understand the basic definitions and components of computer networks, network evaluation, and security.

a7 The student will be able to explain the fundamentals of digital networks,network security and telecommunications systems.

a8 Understanding the principles of network, multimedia, signal and image processing and applications.

a10 The student will be able to distinguish between data and information, data analysis and retrieval and the principles of knowledge discovery and mining, The student will demonstrate a clear understanding of Artificial Intelligence

b. Intellectual skills

b2 Analyze different information technology problems and be able to implement algorithms to solve the problems.

b3 Be able to implement computer networks solutions, analyze the network traffic, explain different protocols used in the network, capable of describing the network services, and analysis of computer security problems

b5 develop the components of signal and image processing, multimedia system, multimedia applications, computer animation and graphics.

b8 Understanding Artificial Intelligence concepts ,intelligent network and applications

c. Professional and practical skills:

c2 Promote new uses of information technology within the institution through the support for exploratory and innovative applications.

c3 Analyze and interpret statistical data, Apply methods of parameter estimation and implement method o hypothesis testing, design and implement practical programs to estimate statistical parameters and apply different analysis techniques.

c4 Provide effective technology support for audio/visual, computer, multimedia, voice, video, graphics, animation,network security and web based applications and services to all areas.

c6 Facilitate the collection, storage, security and integrity of electronic; apply a data mining methodology to real data, ability to retrieve and presenting information, programming Intelligence Searching techniques.

c8 Programming Intelligence Searching techniques, Design and building Intelligent Agent applications, Analysis Neural, fuzzy and Genetic systems as a new intelligent paradigms.

d. General and transferable skills:

d1 Explain the IT problems and their solutions, and effective skills in management of IT projects. Demonstrate a range of basic skills required to work effectively in communications and IT industry, understand the need for continuing professional development and lifelong learning in order to cope with rapidly changing communications technology

d2 Provide effective technology explanations for audio/visual, computer, multimedia, voice, video, and web based applications and services to all areas of the college,

d3 Explain the use of mathematical modeling to predict the behavior of a physical system, develop an analytical approach to understanding complex systems

d8 Describe and explain how parameters of statistical data are calculated and tested, the methods of statistical data analysis, solving problems associated with statistical data.

d9 Group working to discuss data mining techniques for simple and complex problems.

d10 Explain the concepts of Artificial Intelligence, analysis of searching techniques, basic knowledge of genetic algorithms and neural networks basic idea.

e. Attitude:

e1. A knowledge and respect of ethics and ethical standards in relation to a major area of study.

e2. Demonstrate an ethical behaviour toward software copyrights

e3. Learn how to make relation with other, and the limit of this relation.

e4. Know the culture of other peoples.

3. Contents:

Topic	No. of Hours	Lecture	Tutorial/ Practical
Introduction • The emergence of software engineering • The term software engineering • Quality attributes of software products • Software quality attributes • The importance of quality criteria • The effects of quality criteria on each other • Quality assurance measures • The phases of a software project • The classical sequential software life-cycle model • The waterfall model • The prototyping-oriented life-cycle model • The spiral model • The object-oriented life-cycle model • The object-and prototyping-oriented life- cycle model	12	6	6
Software Specification • Structure and contents of the requirements definition • Quality criteria for requirements definition • Fundamental problems in defining requirements • Algebraic specification • Model-based specification • References and selected reading	12	6	6
Software Design • Design techniques • Top-down design • Bottom-up design • Systems design • Design decomposition • User interface design • Function-oriented design • Object-oriented design • The Abbott Method • Design of class hierarchies • Generalization • References and selected reading	12	6	6
Implementation • Programming environments • Programming style • Portability and reuse • Software portability			

• Machine Architecture dependencies • Operating system dependencies • Software reuse • Computer-aided software engineering • CASE workbenches • Text editing systems • Language processing systems • Incremental implementation • References and selected reading	12	6	6
Software Verification • Test methods • Verification of algorithms • Static program analysis • Dynamic testing • Black-box and white-box testing • Top-down and bottom-up testing • Mathematical program verification • Debugging • References and selected reading	12	6	6
Documentation • User documentation • System documentation • Document quality • Document maintenance • Document portability • References and selected reading	12	6	6
Project Management • The goal and tasks of project management • Difficulties in project management • Cost estimation • Project organization • Hierarchical organizational model • The chief programmer team • Software maintenance • Maintenance costs • System restructuring • Program evolution dynamics • References and selected reading	12	6	6
Total number of Hours for the course	**84**	**42**	**42**