Course Specifications

Program(s) on which this course is given:	Electronics & Electrical Communications Engineering
Major or Minor element of programs:	Major
Department offering the program:	Electronics & Electrical Communications Engineering
Department offering the course:	Electronics & Electrical Communications Engineering
Academic year / Level:	Fourth
Date of original/modified specification approval:	2003
Semester of course offering:	Second Semester

A- Basic Information

1.a. Title:	Info technology Management (Nanoelectronics)				**1.b. Code:**	ELC 457		
2. Units/Credit hours per week:	2.a. Lectures	4	2.b. Tutorial	0	2.c. Practical	0	2.d. Total	4

B- Professional Information

1. Overall Aims of the Course:	Introduces the student into the new frontier of nanoelectronics emphasizing the challenges and need for innovating new devices with exposure to diverse areas of applications such as spintronics – quantum dots – SET- quantum computers.
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	1. Recognize the challenges facing miniaturization (1.7). 2. Recognize quantum effect and how to use them in electronics (1.7). 3. Recognize new types of devices and quantum systems (1.2, 1.7).
	b) Intellectual Skills
	1. Initiate creative thinking for resolving Moore's law dilemma (3.2). 2. Assess applicability of quantum effects in new electronic devices (3.4). 3. Asses research activities and state of the art of nanoelectronics.
	c) Professional and Practical Skills
	1. Design and build digital systems using nano devices (2.4). 2. Promote nanoelectronic awareness into engineering community and industry (2.5). 3. Follow new developments in the fast growing field of nanoelectronics.
	d) General and Transferable Skills
	1. Display professional ability to keep up with latest development in technology and file a technical report up to professional standard (4.7). 2. Promote group research and team work (4.7). 3. Make presentations in face of peer evaluation (4.9).

3. Contents

Topic	Total hours	Lectures	Tutorial/ Practical
Physical and quantum limitations	4	4	0
Localization and quantization	4	4	0
Angular momentum and magnetic moment	4	4	0
Spin and spintronics –MRI imaging	4	4	0
Magnetic materials	4	4	0
SET, GMR, TMR	4	4	0

Spin valve- MRAM	4	4	
Superconductivity	4	4	
Quantum logic	6	6	
Quantum dots - QCA	6	6	
DNA and quantum computers	6	6	
Quantum communication and encryption	6	6	

4. Teaching and Learning Methods	Lectures (Y)	Practical Training/ Laboratory (N)	Seminar/Workshop (Y)
	Class Activity (Y) Y	Case Study (Y)	Projects (Y)
	E-learning (Y)	Assignments /Homework (Y)	Other:

5. Student Assessment Methods	
5.a. Method	**To assess (with reference to the ILOs)**
- Assignment	a1,a2,a3,b1,b2,b3
- Seminar	b1,b2,b3,d1,d2,d3
- Project	c1, c2,c3
-Final exam.	a1,a2,a3,b1,b2,b3,c1,c2,c3
5.b. Assessment Schedule	**Week**
- Assignment	5
- Project	12
- Seminar	13
- Final exam	15
5.c. Weighting of Assessments	
Assignment	10%
-Project and Seminar	20%
-Final-term Examination	70%
-Total	100%

6. List of References

6.a. Course Notes

6.b. Essential Books (Text Books):

- Introduction to nanoelectronics, M. Sameh Said (In process)

6.c. Recommended Books:

- Quantum nanoelectronics, E. Wolf, 2009.
- Nanoelectronics and information technology, R. Waser, 2008.

6.d. Periodicals, Web Sites, … etc:

- Search in web sites

7. Facilities Required for Teaching and Learning

N/A

Course Coordinator:	**Prof. Dr. M. Sameh Said**
Head of Department:	**Prof. Dr. Mahmoud El-Hadidi**
Date:	**20-10-2011**