Course Specification of Advanced Modern Control

I.Course Identification and General Information:

.1	Course Title:	Advanced Modern Control.				
.2	Course Code & Number:	.404MT				
.3	Credit hours:	C.H				Total Cr. Hrs.
		Th.	Seminar	Pr.	Tu.	
		2	-	2	-	3
.4	Study level/ semester at which this course is offered:	Fifth Year- First Semester.				
.5	Pre –requisite (if any):	Analog Control System and Digital Control System.				
.6	Co –requisite (if any):	None.				
.7	Program (s) in which the course is offered:	Mechatronics Engineering Program.				
.8	Language of teaching the course:	English Language.				
.9	Location of teaching the course:	Mechatronics Engineering Department.				
10.	Prepared By:	Asst. Prof. Dr. Mohammed Abdullah Al-Olofi.				
11.	Date of Approval:					

II.Course Description:

This course covers design and applications of advanced modern control systems. Students will be assumed to have a working knowledge of fundamentals of digital control systems, Matlab and Simulink. This course will provide a solid theoretical background and practical examples of design, simulation and implementation of digital controllers for electromechanical systems, analysis of discrete-time/digital systems: solution properties, poles/eigenvalues, eigenvectors, stability, structural decomposition, controllability/observability, stabilizability/detectability, control design of discrete-time/digital systems: pole assignment methods, optimal control method (LQR), LQG/Kalman filtering optional, model predictive control, non-linear control system, novel digital control design methods: fuzzy logic, neural network based controllers and evolutionary methods for designing control strategies, genetic algorithms, Adaptive control: Self-tuning model-based control of an experimental system in real-time.

Head of the Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Assoc. Prof. Dr. Abdul-Malik Momin	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

III.Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a1.	Characterize the concepts and the mathematical modeling of advance modern control systems.	A1
a2.	Explain basic principles, components of advance modern control systems, and application of advance control systems in mechatronic systems.	A2
b1.	Analyze the mechatronic engineering systems using the advance modern control engineering tools.	B1
b2.	Design the modern controllers and the others components of the mechatronics products by using the advance modern control system design methods.	B5
c1.	Apply the advance modern control system tools to measure and evaluate the mechatronics systems performance.	C1
c2.	Choose the information technology tools to solve the advance modern control systems problems in the field of mechatronics.	C2
c3.	Implement the modern digital controllers of digital feedback control systems by using the software and hardware realization methods.	C3
d1.	Co-operate productively as an individual and as a member of a team / multi-disciplinary team.	D1
d2.	Evaluate effective technical reports and presentations.	D2
d3.	Assess to project tasks, time and resources.	D3
d4.	Defend in independent lifelong learning.	D5

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
a1. Characterize the concepts and the mathematical modeling of advance modern control systems.	• Active Lectures. • Tutorials.	• Written Assessment. • Short Essays. • Written Exams.
a2. Explain basic principles, components of advance modern control systems, and application of advance control systems in mechatronic systems.	• Hands on Laboratory Work.	• Practical Assessment. • Simulation. • Written Exams.

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
Analyze the mechatronic engineering systems using the advance modern control engineering tools. **b1.**	• Design Work and Project. • Case Studies.	• Practical Assessment. • Reports. • Written Exams.
Design the modern controllers and the others components of the mechatronics products by using the advance modern control system design methods. **b2.**	• Hands-on Laboratory Work. • Case Studies.	• Written Assessment. • Project Reports. • Written Exams.

© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
Apply the advance modern control system tools to measure and evaluate the mechatronics systems performance. **c1.**	• Hands-on Laboratory work. • Design Work.	• Practical Assessment. • Laboratory Reports. • Written Exams
Choose the information technology tools to solve the advance modern control systems problems in the field of mechatronics. **c2.**	• The Use of Communication and Information Technology.	• Simulations such as Computer Based Learning. • Written Exams.
Implement the modern digital controllers of digital feedback control systems by using the software and hardware realization methods. **c3.**	• Active Lectures.	• Written Assessment. • Written Exams.

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
Co-operate productively as an team / individual and as a member of a multi-disciplinary team. **d1.**	• Group Learning.	• Project Reports.
Evaluate effective technical reports and presentations.. **d2.**	• Active Lectures.	• Presentations.
Assess to project tasks, time and resources. **d3.**	• Active Lectures.	• Presentations.

Head of the Department	Quality Assurance Unit	Dean of the Faculty	Academic Development Center & Quality Assurance	Rector of Sana'a University
Assoc. Prof. Dr. Abdul-Malik Momin	Assoc. Prof. Dr. Mohammad Algorafi	Prof. Dr. Mohammed AL-Bukhaiti	Assoc. Prof. Dr. Huda Al-Emad	Prof. Dr. Al-Qassim Mohammed Abbas

Defend in independent lifelong learning. **d4.**	• Active Lectures.	• Presentations. • Written Assessments.

IV.Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact Hours
1.	Introduction to Advance Modern Control Systems.	a1, a2	Introduction of digital control systems, types of digital control systems, modern control systems.	1	2
2.	Pole Placement and Observer Design (Modern Design Methods).	a1, a2, b1, b2, c1,c2, c3, d2, d4	Controllability, observability, Pole placement design method, observer design method, example problems and solutions.	1	2
3.	Pole Placement and Observer Design (Modern Design Methods).	a1, a2, b1, b2, c1,c2, c3, d2, d4	Servo design, state feedback with integral control, dead feedback control with state feedback and dead observer, example problems and solutions.	1	2
4.	Introduction to System Identification. and Adaptive Control System.	a1, a2, b1, c1	System identification and adaptive control system, example problems and solutions.	1	2
5.	Lyapunov Stability Analysis.	a1, a2, b1, b2, c1, d4	Basic stability concepts, definitions, theorems, lyapunov function for linear and non-linear systems, model reference adaptive control systems, example problems and solutions.	1	2

6.	Optimal Control Systems.	a1, a2, b1, b2, c1, d4	Parameters optimization and optimal control problems, quadratic performance index, control configurations, state regulator design through lyapunov equations, example problems and solutions.	1	2
7.	Optimal Control Systems.	a1, a2, b1, b2, c1, d4	Quadratic optimal control, steady- state quadratic optimal control, quadratic optimal control of servo controller, example problems and solutions.	1	2
8.	Mid-Term Exam.	a1, a2, b1, b2, c1, c2, c3	The First 7 Chapters.	1	2
9.	Nonlinear Control Systems.	a1, a2, b1, b2, c1,c2, c3, d2, d4	Introduction to nonlinear control systems, class of nonlinear systems, filtered nonlinear systems, example problems and solutions.	1	2
10.	Nonlinear Control Systems.	a1, a2, b1, b2, c1,c2, c3, d2, d4	Describing functions for nonlinear systems, stability analysis by the describing functions methods, nonlinear sampled data systems, example problems and solutions.	1	2
11.	Neural Networks for Control.	a1, a2, b1, b2, c1,c2, c3, d2, d4	Introduction, neuron model, networks architectures, learning in neural networks, training the neural networks, design example problems and solutions.	1	2
12.	Neural Networks for Control.	a1, a2, b1, b2, c1,c2, c3, d2, d4	Function approximation with neural networks, systems identification with neural networks, control with neural networks,	1	2

			design example problems and solutions.		
13.	Fuzzy Control.	a1, a2, b1, b2, c1,c2, c3, d2, d4	Introduction, fuzzy quantification of knowledge, fuzzy inference, design example problems and solutions.	1	2
14.	Fuzzy Control.	a1, a2, b1, b2, c1,c2, c3, d2, d4	Designing of fuzzy control systems, design example problems and solutions.	1	2
15.	Genetic Algorithms.	a1, a2, b1, b2, c1,c2, c3, d2, d4	Introduction, genetic algorithms for control system, example problems and solutions.	1	2
16.	Final Exam.	a1, a2, b1, b2, c1, c2, c3	All the Chapters.	1	2
Number of Weeks /and Units Per Semester				**16**	**32**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes
1.	Introduction of digital control systems with matlab software.	1	2	a1, a2, d4
2.	Discrete-time control systems simulation and Simulink.	2	4	a2, c2, d2, d4
3.	Time-domain digital controller emulation.	1	2	a2, c1, c2, b2, d2, d4
4.	Discrete-time plant modeling.	1	2	a2, c1, c2, b2, d2, d4
5.	Pole placement and observer digital controller emulation.	2	4	a2, c1, c2, b2, d2, d4
6.	Lyapunov stability emulation.	1	2	a2, c1, c2, b2, d1, d2, d3, d4
7.	Quadratic optimal control emulation.	1	2	a2, c1, c2, b2, d1, d2, d3, d4
8.	Nonlinear control systems emulation.	1	2	a2, c1, c2, b2, d1, d2, d3, d4
9.	Neural Networks for control systems emulation.	2	4	a2, c1, c2, b2, d1, d2, d3, d4

10.	Fuzzy control systems emulation.	2	4	a2, c1, c2, b2, d1, d2, d3, d4
Number of Weeks /and Units Per Semester		**14**	**28**	

V.Teaching strategies of the course:

In general, teaching and learning in undergraduate engineering education programs should use a variety of teaching methods, such as:

- Active Lectures (supported with discussions).
- Hands-on Laboratory Work.
- Independent Learning and Work.
- Group Learning and Problem-Based Learning.
- Field Classes.
- Independent Applications of Engineering Analysis.
- Seminars, Journal Clubs and Workshops.
- The Use of Communication and Information Technology.
- Computer and Web-Based Learning.
- Case Studies.

VI.Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Problems of the Chapter 7.	a1, a2, b1, c1, c2, d2, d4	2	3
2.	Problems of the Chapter 8.	a1, a2, b1, c1, c2, d2, d4	5	4.5
3.	Problems of the Chapter 9.	a1, a2, b1, c1, c2, d2, d4	8	6
4.	Problems of the Chapter 10.	a1, a2, b1, c1, c2, d2, d4	12	3
5.	Problems of the Chapters 11, 12.	a1, a2, b1, c1, c2, d2, d4	14	6
Total				**22.5**

VII.Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Quizzes.	Every 3 weeks	7.5	5%	a1, a2, b1, b2, c1,c2, c3, d2, d4
2.	Assignments & Homework, Tasks, Practical Projects & Presentation.	2,5,8,12,14	22.5	15%	a1, a2, b1, b2, c1,c2, c3, d2, d4
3.	Mid-Term Exam.	8	15	10%	a1, a2, b1,b2, c1, c2, c3
4.	Final Exam Practical.	15	15	10%	a1, a2, b1, b2, c1,c2, c3, d2, d4
5.	Final Exam.	16	90	60%	a1, a2, b1, b2, c1, c2, c3
Total			**150**	**100%**	

VIII.Learning Resources:

- Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1. M Gopal, , 2006, Digital Control Systems and State Variable Methods: Conventiona Neuro-Fuzzy Control Systems, 2nd Edition, McGraw Hill.
2. Katsuhiko Ogata, 2010, Discrete-Time Control Systems, 2nd Edition, Prentice Hall.

2- Essential References.

1. M. Sam Fadali, 2009, Digital Control Systems Analysis and Design, 1st Edition, Elsevier Inc.

3- Electronic Materials and Web Sites *etc*.

1. http://www.sciencedirect.com/
2. http://dl.acm.org/dl.cfm
3. http://ieeexplore.ieee.org/Xplore/guesthome.jsp
4. http://www.emeraldinsight.com
5. http://www.scopus.com/home.url
6. http://link.springer.com/

II. Course Policies:

1.	**Class Attendance:**

	The student should be attending not less than 75% of total contact hours of the subject, otherwise he will not able to take exam and considered as an exam failure. If the student is absent due to illness, he/she should bring the approved statement from university Clinic.
2.	**Tardy:** For late in attending the class, the student will be initially notified. If he comes late in attending class again, he will consider as absent.
3.	**Exam Attendance/Punctuality:** The student should attend the exam on time. He is Permitted to attend the exam half one hour from exam beginning, after that he/she will not be permitted to take exam and he/she is considered absent in exam.
4.	**Assignments & Projects:** In general, one assignment is given after each chapter of a course. The student should submit the assignment on time, mostly one week after giving the assignment.
5.	**Cheating**: For cheating in exam, the student considered as failure. Case the cheating repeated three times during study the student will disengage from the Faculty
6.	**Plagiarism**: Plagiarism is the attending of the student the exam of a course instead of other student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Affair Council of the university.
7.	**Other Policies:** - The mobile phone is not allowed to be used during class lecture. It must be closed, otherwise the student will ask to leave the lecture room - The mobile phone is not allowed to be taken with in class during the examination. - Lecture notes and assignments may be given directly to students using soft or hard copy.

Reviewed By	Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat. President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi. Head of Mechatronics Engineering Department: Assoc. Prof. Dr. Abdul-Malik Momin.
	Deputy Rector for Academic Affairs Assoc. Prof. Dr. Ibrahim AlMutaa. Assoc. Prof. Dr. Ahmed Mujahed. Asst. Prof. Dr. Munaser Alsubari.

Head of the Department Assoc. Prof. Dr. Abdul-Malik Momin	Quality Assurance Unit Assoc. Prof. Dr. Mohammad Algorafi	Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti	Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad	Rector of Sana'a University Prof. Dr. Al-Qassim Mohammed Abbas

Elective Course (2)
Course Plan of Advanced Modern Control

I.Information about Faculty Member Responsible for the Course:

Name of Faculty Member	Asst. Prof. Dr. Mohammed Abdullah Al-Olofi.	**Office Hours**					
Location& Telephone No.	00967-773703712.	**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**
E-mail	Al_olfe2001@yahoo.com.						

II.Course Identification and General Information:

1.	Course Title:	Advance Modern Control .				
2.	Course Number & Code:	MT404.				
3.	Credit hours:	C.H				Total Cr. Hrs.
		Th.	Seminar	Pr.	Tu.	
		2	-	2	-	3
4.	Study level/year at which this course is offered:	Fifth Year- First Semester.				
5.	Pre –requisite (if any):	Analog Control System and Digital Control System.				
6.	Co –requisite (if any):	None.				
7.	Program (s) in which the course is offered	Mechatronics Engineering Program.				
8.	Language of teaching the course:	English Language.				
9.	System of Study:	Semesters.				
10.	Mode of delivery:	Lectures and Labs.				
11.	Location of teaching the course:	Mechatronics Engineering Department.				

III.Course Description:

This course covers design and applications of advanced modern control systems. Students will be assumed to have a working knowledge of fundamentals of digital control systems, Matlab and Simulink. This course will provide a solid theoretical background and practical examples of design, simulation and implementation of digital controllers for electromechanical systems, analysis of discrete-time/digital systems: solution properties, poles/eigenvalues, eigenvectors, stability, structural decomposition, controllability/observability, stabilizability/detectability, control design of discrete-time/digital systems: pole assignment methods, optimal control method (LQR), LQG/Kalman filtering optional, model predictive control, non-linear control

system, novel digital control design methods: fuzzy logic, neural network based controllers and evolutionary methods for designing control strategies, genetic algorithms, Adaptive control: Self-tuning model-based control of an experimental system in real-time.

IV.Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a1.	Characterize the concepts and the mathematical modeling of advance modern control systems.	A1
a2.	Explain basic principles, components of advance modern control systems, and application of advance control systems in mechatronic systems.	A2
b1.	Analyze the mechatronic engineering systems using the advance modern control engineering tools.	B1
b2.	Design the modern controllers and the others components of the mechatronics products by using the advance modern control system design methods.	B5
c1.	Apply the advance modern control system tools to measure and evaluate the mechatronics systems performance.	C1
c2.	Choose the information technology tools to solve the advance modern control systems problems in the field of mechatronics.	C2
c3.	Implement the modern digital controllers of digital feedback control systems by using the software and hardware realization methods.	C3
d1.	Co-operate productively as an individual and as a member of a team / multi-disciplinary team.	D1
d2.	Evaluate effective technical reports and presentations.	D2
d3.	Assess to project tasks, time and resources.	D3
d4.	Defend in independent lifelong learning.	D5

V.Course Content:

- Distribution of Semester Weekly Plan of Course Topics/Items and Activities.

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours

1.	Introduction to Advance Modern Control Systems.	Introduction of digital control systems, types of digital control systems, modern control systems.	1	2
2.	Pole Placement and Observer Design (Modern Design Methods).	Controllability, observability, Pole placement design method, observer design method, example problems and solutions.	2	2
3.	Pole Placement and Observer Design (Modern Design Methods).	Servo design, state feedback with integral control, dead feedback control with state feedback and dead observer, example problems and solutions.	3	2
4.	Introduction to System Identification and Adaptive Control System.	System identification and adaptive control system, example problems and solutions.	4	2
5.	Lyapunov Stability Analysis.	Basic stability concepts, definitions, theorems, lyapunov function for linear and non-linear systems, model reference adaptive control systems, example problems and solutions.	5	2
6.	Optimal Control Systems.	Parameters optimization and optimal control problems, quadratic performance index, control configurations, state regulator design through lyapunov equations, example problems and solutions.	6	2
7.	Optimal Control Systems.	Quadratic optimal control, steady-state quadratic optimal control, quadratic optimal control of servo controller, example problems and solutions.	7	2
8.	Mid-Term Exam.	The First 7 Chapters.	8	2
9.	Nonlinear Control Systems.	Introduction to nonlinear control systems, class of nonlinear systems, filtered nonlinear systems, example problems and solutions.	9	2

10.	Nonlinear Control Systems.	Describing functions for nonlinear systems, stability analysis by the describing functions methods, nonlinear sampled data systems, example problems and solutions.	10	2
11.	Neural Networks for Control.	Introduction, neuron model, networks architectures, learning in neural networks, training the neural networks, design example problems and solutions.	11	2
12.	Neural Networks for Control.	Function approximation with neural networks, systems identification with neural networks, control with neural networks, design example problems and solutions.	12	2
13.	Fuzzy Control.	Introduction, fuzzy quantification of knowledge, fuzzy inference, design example problems and solutions.	13	2
14.	Fuzzy Control.	Designing of fuzzy control systems, design example problems and solutions.	14	2
15.	Genetic Algorithms.	Introduction, genetic algorithms for control system, example problems and solutions.	15	2
16.	Final Exam.	All the Chapters.	16	2
Number of Weeks /and Units Per Semester			**16**	**32**

B - Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes
1.	Introduction of digital control systems with matlab software.	1	2	a1, a2, d4
2.	Discrete-time control systems simulation and Simulink.	2,3	4	a2, c2, d2, d4
3.	Time-domain digital controller emulation.	4	2	a2, c1, c2, b2, d2, d4

Head of the Department
Assoc. Prof. Dr. Abdul-Malik Momin

Quality Assurance Unit
Assoc. Prof. Dr. Mohammad Algorafi

Dean of the Faculty
Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance
Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University
Prof. Dr. Al-Qassim Mohammed Abbas

4.	Discrete-time plant modeling.	5	2	a2, c1, c2, b2, d2, d4
5.	Pole placement and observer digital controller emulation.	6,7	4	a2, c1, c2, b2, d2, d4
6.	Lyapunov stability emulation.	8	2	a2, c1, c2, b2, d1, d2, d3, d4
7.	Quadratic optimal control emulation.	9	2	a2, c1, c2, b2, d1, d2, d3, d4
8.	Nonlinear control systems emulation.	10	2	a2, c1, c2, b2, d1, d2, d3, d4
9.	Neural Networks for control systems emulation.	11,12	4	a2, c1, c2, b2, d1, d2, d3, d4
10.	Fuzzy control systems emulation.	13,14	4	a2, c1, c2, b2, d1, d2, d3, d4
Number of Weeks /and Units Per Semester: 14			**28**	

VI.Teaching strategies of the course:

In general, teaching and learning in undergraduate engineering education programs should use a variety of teaching methods, such as:

- Active Lectures (supported with discussions).
- Hands-on Laboratory Work.
- Independent Learning and Work.
- Group Learning and Problem-Based Learning.
- Field Classes.
- Independent Applications of Engineering Analysis.
- Seminars, Journal Clubs and Workshops.
- The Use of Communication and Information Technology.
- Computer and Web-Based Learning.
- Case Studies.

VII.Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Problems of the Chapter 7.	a1, a2, b1, c1	2	3
2.	Problems of the Chapter 8.	a1, a2, b1,b2, c1, c2, d2, d4	5	4.5
3.	Problems of the Chapter 9.	a1, a2, b1,b2, c1, c2, d2, d4	8	6
4.	Problems of the Chapter 10.	a1, a2, b1,b2, c1, c2 c3, d2, d4	12	3

5.	Problems of the Chapters 11, 12.	a1, a2,b1,b2, c1, c2 c3, d2, d4	14	6
Total				**22.5**

VIII.Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Quizzes.	Every 3 weeks	7.5	5%	a1, a2, b1, b2, c1,c2, c3, d2, d4
2.	Assignments & Homework, Tasks, Practical Projects & Presentation.	2,5,8,12,14	22.5	15%	a1, a2, b1, b2, c1,c2, c3, d2, d4
3.	Mid-Term Exam.	8	15	10%	a1, a2, b1,b2, c1, c2, c3
4.	Final Exam Practical.	15	15	10%	a1, a2, b1, b2, c1,c2, c3, d2, d4
5.	Final Exam.	16	90	60%	a1, a2, b1, b2, c1, c2, c3
Total			**150**	**100%**	

IX.Learning Resources:

- Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1. M Gopal, , 2006, Digital Control Systems and State Variable Methods: Convention and Neuro-Fuzzy Control Systems, 2nd Edition, McGraw Hill.
2. Katsuhiko Ogata, 2010, Discrete-Time Control Systems, 2nd Edition, Prentice Hall.

2- Essential References.

1. M. Sam Fadali, 2009, Digital Control Systems Analysis and Design, 1st Edition, Elsevier Inc.

3- Electronic Materials and Web Sites *etc*.

1. http://www.sciencedirect.com/
2. http://dl.acm.org/dl.cfm
3. http://ieeexplore.ieee.org/Xplore/guesthome.jsp
4. http://www.emeraldinsight.com
5. http://www.scopus.com/home.url
6. http://link.springer.com/

X.Course Policies:	
1.	Class Attendance: **A student should attend not less than 75 % of total hours of the subject; otherwise he/she will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic. If the absent is more than 25% of a course total contact hours, student will be required to retake the entire course again.**
2.	Tardy: **For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent.**
3.	Exam Attendance/Punctuality: **A student should attend the exam on time. He/she is permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam**
4.	Assignments & Projects: **In general one assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time, mostly one week after given the assignment.**
5.	Cheating: **For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.**
6.	Plagiarism: **Plagiarism is the attending of a student the exam of a course instead of another student.** **If the examination committee proved a plagiarism of a student, he/she will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university or according to the university roles.**
7.	**Other Policies:** **-Mobile phones are not allowed to use during a class lecture. It must be closed; otherwise the student will be asked to leave the lecture room.** **-Mobile phones are not allowed in class during the examination.** **-Lecture notes and assignments might be given directly to students using soft or hard copy.**

Head of the Department Assoc. Prof. Dr. Abdul-Malik Momin	Quality Assurance Unit Assoc. Prof. Dr. Mohammad Algorafi	Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti	Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad	Rector of Sana'a University Prof. Dr. Al-Qassim Mohammed Abbas