Kingdom of Saudi Arabia Ministry of Higher Education **Qassim University** College of Engineering		**المملكة العربية السعودية** وزارة التعليم العالي **جامعة القصيم** **كليه الهندسه**

Mechatronics Systems

College: Engineering

Department: Mechanical

First: Course Definition

1- Course Code ME 659

2- Units: 3 credit hrs

3 – Semester

4 -Prerequisite
-Knowledge of system dynamics and automatics are assumed
-Knowledge of measurements is assumed
-Knowledge of basics of electronics is assumed

5- Co-requisite ----------

6- Location (if not on main Campus):

Second: Course Objectives

1. To make students familiar with mechatronics and its applications
2. To give students an understanding of the role of sensors in mechatronic systems.
3. To ensure that students know signal conditioning required for mechatronic systems.
4. To give students an understanding of the role of actuators in mechatronic systems.
5. To give students an understanding of microprocessor based controllers of mechatronic systems.
6. To ensure that students are able to model and simulate mechatronic systems
7. To ensure that students are able to work effectively in team

Third: Course Specifications

1- Topics to be covered

Subject	No of Weeks	Units

Overview of mechatronics	**2**	**6**
Mechatronics sensors	**2**	**6**
Signal Conditioning	**3**	**9**
Mechatronics Actuators	**3**	**9**
Modeling of mechatronics systems	**2**	**6**
Mechatronics Controllers	**3**	**9**

2- Course components (Total hrs in the Semester)

Lecture	Exercise	Other
45	**------**	**----------**

3- Intended Learning Outcomes of the Course (ILO's)

a. *Knowledge*

i) Description of the knowledge to be acquired:

On successful completion of this course, students should be able to:
- **Describe what is mechatronics**
- **Identify the mechatronics applications in different areas**
- **Identify the main elements of a mechatronic system**
- **Describe the main factors need to be considered in selecting sensors, actuators and controllers for a mechatronic system**
- **Describe the basic structure of a microprocessor system**

ii) Teaching strategies to be used to develop that knowledge
- **Lectures**
- **Exercises**
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iii) Methods of assessment of knowledge acquired
- **Exams**

b- Cognitive (Intellectual) Skills

i) Cognitive skills to be developed

On successful completion of this course, students should be able to:

-Differentiate between mechatronics design approach and traditional design approach
- Evaluate sensors used in mechatronics systems
- Explain the requirements for signal conditioning
- Explain how operational amplifier can be used
- Explain the requirements for protection and filtering
- Explain the principle of operation of different electrical actuators
- Develop models of mechatronic systems from basic building blocks of different disciplines
- Develop programs using flow charts for different mechatronics applications

ii) Teaching strategies to be used to develop these cognitive skills
- Lectures
- Exercises
- Group projects
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iii) Methods of assessment of students cognitive skills
- Exams
-Evaluation of the Group Projects

c. Interpersonal Skills and Responsibility

i) Description of the interpersonal skills and capacity to carry responsibility to be developed
- Ability to play different team roles (leader, reporters, time keeper,….) during in class meetings
- Attend in-class and out-class team meetings
- Present his technical work products (reports, oral presentations,…) according to presentation of technical work rules
-Achieve his tasks on time

ii) Teaching strategies to be used to develop these skills
- Group Project
- Discussion group in class
- Out of Class meeting

iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

- Evaluating group meeting agendas and minutes
- Evaluating reports and presentations of the group work
- Record of attendance during meetings

d. Communication, Information Technology and Numerical Skills

i) Description of the skills to be developed in this domain

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ii) Teaching strategies to be used to develop these skills

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4- Student Assessment Schedule

Serial	*Assessment tool (test, group project, examination etc.)*	*Week due*	*Weight*
1	Group Project_1	4	10%
2	Mid-Term Exam	8	20%
3	Group Project_2	12	10%
4	Final Exam	16	60%

5- Student Support

-Office hours (2 hours weekly)

-Communication through the course website (Past exam papers and model answers will be provided for the students).

-Revision classes are scheduled towards the end of each part of the course

6- Learning Resources

i) Essential Books (References)

Rolf Isermann, Mechatronic Systems: Fundamentals, Springer; 1st Edition September 7, 2005

ii) Course Notes

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iii) Recommended Books

- Robert H. Bishop,Editor, *Mechatronics Handbook, Second Edition*, *December 14, 2007*

iv) Electronic Books & Web Sites:

- http://www.ac-knowledge.net/qassim/

v) Periodicals

- IEEE/ASME Transaction on Mechatronics

vi) Other Learning resources

- Lecture room equipped with multimedia projector, white board and round tables for group work
- Computers
- Licensed software package for modeling and simulation of mechatronics systems

7- Course Evaluation and Improvement Processes

i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching-

-Confidential completion of standard course evaluation questionnaire.
-Focus group discussion with small groups of students.

ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Observations and assistance from colleagues,
- Independent assessment of standards achieved by students,
- Independent advice on assignment tasks

iii) Processes for Improvement of Teaching

- Workshops on teaching methods,
-Review of recommended teaching strategies.

iv) Processes for verifying standards of student achievement

- Check marking by an independent faculty member of a sample of student work

v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Preparing standard semester course report comprises proposed improvement to be investigated by Master Program Committee and then to be discussed and approved by the ME department council.