

<p>Kingdom of Saudi Arabia Ministry of Higher Education <b>Qassim University</b> College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
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## *Advanced Measurements and Instrumentations*

**College:** Engineering

**Department:** Mechanical

**First: Course Definition**

**1- Course Code:** ME 665

**2- Units:** 3 credit hrs

**3 – Semester:** 2<sup>nd</sup>

**4 -Prerequisite** Statistics Analysis

**5- Co-requisite**

**6- Location** (if not on main Campus):

**Second: Course Objectives**

1. To give students an understanding of the fundamentals of measurement at an advanced level, including the particular limitations and capabilities of a number of specific measuring devices
2. To make students familiar with the experimental process used in the laboratory.
3. To ensure that students know how to accurately design a measuring system, use it to collect necessary data, process and interpret the collected data and accurately present the results.

**Third: Course Specifications**

<b>1- Topics to be covered</b>		
Subject	No of Weeks	Units
Advanced instrumentation and measurement techniques	2	6
System level design, fabrication and evaluation	3	9
Use of a wide range of instruments/techniques	4	12
fabrication/machining methods	3	9

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Theory and practice of both linear and nonlinear system identification techniques	3	9
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## 2- Course components (Total hrs in the Semester)

Lecture	Exercise or lab	Other
45	----	--

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

### a. Knowledge

#### i) Description of the knowledge to be acquired:

- Recall the knowledge of statistics, probability, and uncertainty analysis.
- Describe and identify the mathematical model of a measurement system.
- Describe the different measuring techniques related to each instruments.
- Show the ability to use modern measuring tools and the relevant software.

#### ii) Teaching strategies to be used to develop that knowledge

- Class lectures
- Problems modeling
- Group Discussion
- Homework

#### iii) Methods of assessment of knowledge acquired

- Quizzes
- Written reports
- Exams

### b- Cognitive (Intellectual) Skills

#### i) Cognitive skills to be developed

- Ability to design measurement system.
- Ability to determine systematic error of measuring devices.
- Ability to interpret measured data.
- Ability to describe the mathematical model of the measuring system.

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**ii) Teaching strategies to be used to develop these cognitive skills**

- Class lectures and presentations
- Homework problems

**iii) Methods of assessment of students' cognitive skills**

- Quizzes and homework
- Term projects
- Exams

**c. Interpersonal Skills and Responsibility**

**i) Description of the interpersonal skills and capacity to carry responsibility to be developed**

- Ability to work in a team
- Ability to meet assigned deadlines

**ii) Teaching strategies to be used to develop these skills**

- Group discussions and projects
- Class attendance requirements, homework deadlines, and general class discipline

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

- Observation of student contribution in group discussions and group projects.
- Record of attendance, homework timeliness and class behavior.

**d. Communication, Information Technology and Numerical Skills**

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

- Ability to communicate the material learned
- Ability to use computer programs for calculations and visualization.
- Ability to search for information using the internet

**ii) Teaching strategies to be used to develop these skills**

- Student presentations

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- Home assignments involving use of computers and internet resources
- iii) Methods of assessment of students numerical and communication skills**
- Exams
  - Performance in homework and presentations

**e. Psychomotor (if applicable) & Other Non-cognitive Skills**  
Not applicable

**i) Description of the psychomotor or other skills to be developed and the level of performance required**

**ii) Teaching strategies to be used to develop these skills**

**iii) Methods of assessment of student's psychomotor skills**

#### 4- Student Assessment Schedule

Serial	Assessment tool (test, group project, examination etc.)	Week due	Weight
1	Homework & Quizzes	Every week	15%
2	Term project	15 <sup>th</sup>	10%
3	Midterm exam	7 <sup>th</sup>	25%
4	Final exam	16 <sup>th</sup>	50%

#### 5- Student Support

- Regular office hours
- Electronic copies of books and online resources
- Relevant software

#### 6- Learning Resources

- i) Essential Books (References)**
- Northrop; Robert B., Introduction to Instrumentation and Measurements, CRC-Press; 1 edition (1997)

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**ii) Course Notes**

**iii) Recommended Books**

- 1 - John G. Webster, The measurement, instrumentation, and sensors handbook, Springer, 1999
- 2 - Alan S. Morris, Measurement and Instrumentation Principles, Third Edition

**iv) Electronic Books & Web Sites :**

**v) Periodicals**

- 1-IEEE Instrumentation and Measurement Society
- 2-International Journal of Measurement Technologies&Instrumentation Engineering (IJMTIE)

**7- Course Evaluation and Improvement Processes**

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

- Informal discussion with students
- Student survey at the end of course

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

- Student performance on homework and quizzes

**iii) Processes for Improvement of Teaching**

- Self-assessment by the instructor
- Feedback from Department Chairman and Vice Dean Academics, as required

**iv) Processes for verifying standards of student achievement (e.g. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)**

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

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

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- Courses are reviewed by relevant subject committees and the department and college councils.