



Faculty of  
Engineering at  
Shoubra

## Model No.12

# Course Specifications : Principles of Medical Engineering

**University :** Benha university

**Faculty :** Faculty of Engineering at Shoubra

**Department :** Electrical Engineering Department

### 1- Course Data

Course Code : ECE 442

Course Title : Principles of Medical Engineering

Study Year : Fourth Year

Specialization :

Teaching Hours:

Lecture : 3

Tutorial : 2

Practical :

### 2- Course Aim

For students undertaking this course, the aims are to:

2.1- understand the basic concepts of measuring instruments used in medical engineering. The tools and methodologies used in advanced medical systems. Be able to use sophisticated electronic equipment.

### 3- Intended Learning Outcomes of Course (ILOS)

#### a- Knowledge and Understanding

On completing this course, students will be able to:

a1. Apply Contemporary engineering topics.(a12)

a2. Apply Basics of design and analyzing electronic engineering systems, while considering the constraints of applying inappropriate technology and the needs of commercial risk evaluation.(a14)

#### b- Intellectual Skills

At the end of this course, the students will be able to:

B1 .Assess and evaluate the characteristics and performance of components, systems and processes.(b5)

B2. Investigate the failure of components, system, and processes.(b6)

B3. Solve engineering problems, often on the basis of limited and possibly contradicting information.(b7)

#### c- Professional Skills

On completing this course, the students are expected to be able to:

C1. Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.(c6)

C2. Apply quality assurance procedures and follow codes and standards.(c10)

C3. Prepare and present technical reports.(c12)

#### d- General Skills

At the end of this course, the students will be able to:

d1. Collaborate effectively within multidisciplinary team. (d1)

d2. Write technical reports and presentation. (d10)

#### 4- Course Contents

| No. | Topics  | No of hours |
|-----|---|-------------|
| 1   | Safety and Isolation in Medical Devices.      | 7           |
| 2   | Methods of Deleting Noises                    | 8           |
| 3   | Heart Assistant Devices                       | 8           |
| 4   | Measurements of Physiological and Bio-Sensors | 10          |
| 5   | Bio-Signal Processing                         | 6           |
| 6   | Scanning Methods                              | 8           |

#### 5- Teaching and Learning Methods

- 5.1- Modified Lectures
- 5.2- Class activity
- 5.3- Case study
- 5.4- Assignments / homework
- 5.5- Practical training / laboratory

#### 6- Teaching and Learning Methods of Disables

- 6.1- nothing

#### 7- Student Assessment

##### a- Student Assessment Methods

|   |   |
|---|---|
| 1 | Assignments to assess knowledge, intellectual skills.           |
| 2 | Quiz to assess knowledge, intellectual and professional skills. |
| 3 | Mid-term exam to assess knowledge, intellectual skills .        |
| 4 | Final exam to assess knowledge, intellectual skills .           |

##### b- Assessment Schedule

| No. | Assessment       | Week     |
|-----|------------------|----------|
| 1   | Assignments on   | 2,4,6,12 |
| 2   | Quizzes on       | 1,5,7    |
| 3   | Mid-term exam on | 8        |
| 4   | Oral Exam        | 6-11     |
| 5   | Final exam on    | 15       |

##### c- Weighting of Assessments

| Assessment                | Weight |
|---------------------------|--------|
| Mid_Term Examination      | 20 %   |
| Final_Term Examination    | 60 %   |
| Oral Examination          | 10 %   |
| Practical Examination     | 0 %    |
| Semester work             | 0 %    |
| Other types of assessment | 10 %   |
| Total                     | 100 %  |

## **8- List of References**

### **a- Books**

1- Bioelectronic Measurements by: David Michaels, Dean A. DeMarre Publisher: Prentice Hall.

### **b- Recommended Books**

1-intelligent Sensor Systems by: Brignell,J.and White.

### **c- Web Sites:**

iEEE Instrumentation and Control

**- Course Coordinator : Associate Prof. Muhammad Tarek Hassan Elewa**

**- Head of Department : Prof. Dr. Sayed Aboo-Elsood Ward**



Faculty of  
Engineering at  
Shoubra

## Model No.11A

### Course Specifications : Principles of Medical Engineering

**University :** Benha university

**Faculty :** Faculty of Engineering at Shoubra

**Department :** Electrical Engineering Department

#### Matrix of Knowledge and Skills of the course

| N o. | Topics  | week   | Basic Knowledge | Intellectual Skills | Professional Skills | General Skills |
|------|---|--------|-----------------|---------------------|---------------------|----------------|
| 1    | Safety and Isolation in Medical Devices.      | 1,2    | a1,a2           | b1                  | c1                  | d2             |
| 2    | Methods of Deleting Noises                    | 3,4    | a1,a2           |                     | c1,c2               | d1,d2          |
| 3    | Heart Assistant Devices                       | 5,6    | a1,a2           | b1,b2               | c1,c3               | d1             |
| 4    | Measurements of Physiological and Bio-Sensors | 7,9,10 | a1,a2           | b1,b2,b3            |                     | d1,d2          |
| 5    | Mid term exam                                 | 8      | a1, a2          |                     |                     | d2,d1          |
| 6    | Bio-Signal Processing                         | 11,12  | a1,a2           | b1,b2               | c1,c2.c3            | d1             |
| 7    | Scanning Methods                              | 13,14  | a1              | b1,b2               | c2                  |                |
| 8    | Final Exam                                    | 15     | a1, a2          | b2, b1              |                     | d2,d1          |

**- Course Coordinator :** Associate Prof. Muhammad Tarek Hassan Elewa

**- Head of Department :** Prof. Dr. Sayed Aboo-Elsood Ward

## Matrix of course content and ILO's

**Course Title:** Principles of Medical Engineering

**Code:** ECE 442

**Lecture:** 3

**Tutorial:** 2

**Practical:** -

**Total:** 5

**Program on which the course is given:** B.Sc. Electrical Engineering (Communications)

**Major or minor element of program:** Major

**Department offering the program:** Electrical Engineering Department

**Department offering the course:** Electrical Engineering Department

**Academic year / level:** **Fourth** Year / **first** Semester 2014-2015

**Date of specifications approval:** 20/6/2010

| Course content                                | a1 | a2 | b1 | b2 | b3 | c1 | c2 | c3 | d1 | d2 |
|---|----|----|----|----|----|----|----|----|----|----|
| Safety and Isolation in Medical Devices.      | ✓  |    | ✓  |    |    | ✓  | ✓  | ✓  |    | ✓  |
| Methods of Deleting Noises                    | ✓  | ✓  |    |    | ✓  |    | ✓  |    | ✓  |    |
| Heart Assistant Devices                       | ✓  |    | ✓  |    | ✓  | ✓  |    | ✓  | ✓  | ✓  |
| Measurements of Physiological and Bio-Sensors |    |    |    | ✓  |    |    | ✓  |    |    |    |
| Bio-Signal Processing                         |    | ✓  |    |    | ✓  |    |    | ✓  |    | ✓  |
| Scanning Methods                              |    |    | ✓  | ✓  |    |    | ✓  |    |    |    |
| Safety and Isolation in Medical Devices.      |    | ✓  |    |    | ✓  | ✓  |    |    | ✓  | ✓  |

## Matrix of course aims and ILO's

**Course Title:** Principles of Medical Engineering

**Code:** ECE 442

**Lecture:** 3

**Tutorial:** 2

**Practical:** -

**Total:** 5

**Program on which the course is given:** B.Sc. Electrical Engineering (Communications)

**Major or minor element of program:** Major

**Department offering the program:** Electrical Engineering Department

**Department offering the course:** Electrical Engineering Department

**Academic year / level:** **Fourth** Year / **first** Semester 2014-2015

**Date of specifications approval:** 20/6/2010

| Course content  | a1 | a2 | b1 | b2 | b3 | c1 | c2 | c3 | d1 | d3 |
|---|----|----|----|----|----|----|----|----|----|----|
| understand the basic concepts of measuring instruments used in medical engineering. |    | ✓  |    | ✓  |    | ✓  | ✓  |    | ✓  |    |

**Course coordinator:** Associate Prof. Muhammad Tarek Hassan Elewa

**Head of department:** Prof. Dr. Sayed Abo-Elsood Ward