Course Specifications

University: Benha University

Faculty: Benha Faculty of Engineering

Course specifications

Program(s) on which the course is given: Control and Measurements Dep.
Major or minor element of programs: Major
Department offering the program: Electrical Engineering technology Dep.
Department offering the course: Electrical Engineering technology Dep.
Academic year / Level: Forth year
Date of specification approval: 2009

A- Basic Information

Title: Hospital Instrumentation
Code: E472
Credit Hours: N.A.
Lecture: 3
Tutorial: 1
Practical: 2
Total: 6

B- Professional Information

1 - Overall aims of course

This is an introductory course in Hospital Instrumentation. It covers the Transducers, bioelectric signals and amplifiers, blood pressure and flow, intensive care monitoring, diathermy equipment, medical lasers, audiometer, electrical interference, display systems and data processing.

2- Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

On successful completion of the module the student should:

- Explain the principles of operation of the most important transducers, bioelectric signals and amplifiers used in biomedical instrumentation and measurement, and the technical specifications of commercially produced sensors that are used for this purpose;
- Be able to list the instrumentation and measurement systems that employ these sensors and which, as appropriate, enable them to interact with the human body safely;
- Illustrate the characteristics of the physiological signals being measured;
• Be able to list the realistic solutions to clinical measurement problems and to justify the choices;
• Illustrate ideas for new designs of biomedical sensors and instruments.
• Mention the blood pressure and flow, intensive care monitoring, diathermy equipment, medical lasers, audiometer, electrical interference, display systems and data processing.

b- Intellectual skills
By the end of this course, the student should be able to:
• Analyze the operation of the transducers.
• Measure the bioelectric signals.
• Measure the physiological signals.
• Suggest realistic solutions to clinical measurement problems and to justify the choices;
• Suggest ideas for new designs of biomedical sensors and instruments.
• Measure the blood pressure and flow.

c- Professional and practical skills
By the end of this course, the student should be able to:
• Perform different measurements on basic instruments.
• Perform simple Lab experiments.
• Collect information from collected data in the lab.

d- General and transferable skills
By the end of this course, the student should be able to:
• Work cooperatively and effectively in a group
• Present information independently

3- Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>No. of Hours</th>
<th>Lecture</th>
<th>Tutorial/Practical</th>
</tr>
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<tbody>
<tr>
<td>Introduction</td>
<td>6</td>
<td>3</td>
<td>1/2</td>
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<tr>
<td>A review on the transducers, bioelectric</td>
<td>6</td>
<td>3</td>
<td>1/2</td>
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<tr>
<td>signals and amplifiers</td>
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<tr>
<td>Course Specification, Hospital Instrumentation</td>
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<tr>
<td><strong>Measurement of blood pressure, blood flow and blood volume</strong></td>
<td>12</td>
<td>6</td>
<td>2/4</td>
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<tr>
<td><strong>Pulse oximetry and respiratory performance</strong></td>
<td>12</td>
<td>6</td>
<td>2/4</td>
</tr>
<tr>
<td><strong>Clinical laboratory instrumentation, and applications in patient monitoring</strong></td>
<td>12</td>
<td>6</td>
<td>2/4</td>
</tr>
<tr>
<td><strong>Ultrasound and x-ray imaging</strong></td>
<td>12</td>
<td>6</td>
<td>2/4</td>
</tr>
<tr>
<td><strong>Medical lasers, audiometer, electrical interference</strong></td>
<td>12</td>
<td>6</td>
<td>2/4</td>
</tr>
<tr>
<td><strong>Display systems and data processing</strong></td>
<td>12</td>
<td>6</td>
<td>2/4</td>
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<tr>
<td><strong>Total</strong></td>
<td>84</td>
<td>42</td>
<td>14/28</td>
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4– Teaching and learning methods

4.1- Lectures
4.2- Tutorials
4.3- Practice in Laboratories
4.4- Internet collected information and Self-study projects

5- Student assessment methods

5-1 Written exams (Final and Midterm), assignments and quizzes to assess knowledge and understanding, solving problems skills and interpretation capabilities of physical phenomena.
5-2 Oral exams to assess the abilities of discussing physical concepts
5-3 Practical exam to assess measuring and professional skills

Assessment schedule

Quiz 1  .....................Week No. 4
Midterm  .....................Week No. 8
Quiz 2  .....................Week No. 12
Oral and Practical exam...........Week No. 14
Final written exam ...............Week No. 15
Weighting of assessments

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<tr>
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<th>Weight</th>
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<tbody>
<tr>
<td>Final-term examination</td>
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<tr>
<td>Semester work</td>
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<td>Total</td>
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</table>

6- List of references

- Essential books
  1. *Introduction to Biomedical Equipment Technology*, by Joseph J. Carr, John M. Brown
  2. *Medical Instrumentation: Application and Design*, by John G. Webster

7- Facilities required for teaching and learning

Lecture rooms – Tutorial section rooms – Experimental Labs - computers – Virtual simulation programs

Course coordinator: Assoc. Prof. Ghada Amer

Head of Department: Assoc. Prof. Ghada Amer

Date: