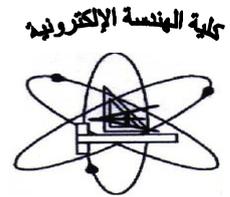


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Department offering the program: Electronics and Electrical Communications Engineering  
Department offering the course: Industrial electronics and Control Engineering

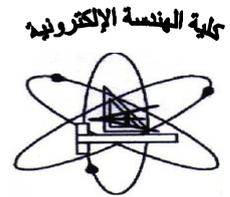
## Course Specification

1- Course basic information :		
Course Code: ACE 215	Course Title:	Academic year: 2015-2016
Department requirement	Control Engineering	Level (2) – Semester : 1 <sup>st</sup>
Field: Basic Eng. Science	Teaching hours: Lecture [2]	Tutorial [1] Lab [0]

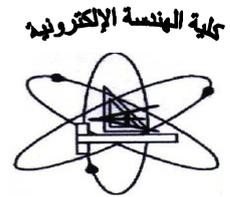
1. Course objectives	<ol style="list-style-type: none"> <li>1. To introduce students to Control Systems</li> <li>2. To enhance student ability to demonstrate Mathematical Modeling of Dynamic Systems</li> <li>3. To enhance student ability to understand Reduction of Multiple subsystems.</li> <li>4. To teach students Time Response Analysis</li> <li>5. To teach students Stability Analysis.</li> <li>6. To provide students with Steady-State Errors</li> <li>7. To introduce students to PID Controller.</li> </ol>	
	2. Intended Learning Outcomes: ARS	Course ILOs
A- Knowledge and Understanding:	A.1 Explain Concepts and theories of mathematics and sciences appropriate to control engineering.	A1.1 Explain Concepts of <b>Control Systems</b> . A1.2 Explain concepts and theories of mathematics for <b>Modeling of Dynamic Systems</b> . A1.3 Explain concepts and theories of mathematics and sciences appropriate to <b>Time Response Analysis</b> . A1.4 Explain concepts and theories of mathematics and sciences appropriate to <b>Stability Analysis</b> . A1.5 Explain concepts and theories of mathematics and sciences appropriate to <b>Steady State Errors</b> . A1.6 Explain concepts and theories of mathematics and sciences appropriate to <b>PID Controller</b> .
	A.5 Demonstrate Methodologies of solving control engineering problems.	A5.1 Demonstrate <b>Mathematical Modeling</b> for solving <b>Dynamic Systems</b> problems. A5.2 Demonstrate the use of <b>Block Diagram and Signal Flow Graph</b> for doing <b>Reduction of Multiple subsystems</b> . A5.3 Demonstrate <b>Time Response Analysis</b> for solving control engineering problems. A5.4 Demonstrate <b>Stability Analysis</b> for solving control engineering problems. A5.5 Demonstrate <b>Steady-State Errors</b> for solving control engineering problems.
	A.8 Describe Current engineering technologies as related to control engineering.	A8.1 Describe current engineering technologies as related to <b>PID Controller</b> .



	<p>A.16 <b>Interpret</b> principles of analyzing and design of control systems with performance evaluation.</p>	<p>A16.1 <b>Interpret</b> principles of analyzing and design of <b>PID Controller</b> systems with performance evaluation.</p>
<p><b>B- Intellectual Skills</b></p>	<p>B.1 Select appropriate mathematical and computer-based methods for modeling and analyzing problems.</p> <p>B.2 Select appropriate solutions for control engineering problems based on analytical thinking.</p> <p>B.5 Assess and evaluate the characteristics and performance of components, systems and processes.</p>	<p>B1.1 Select appropriate mathematical methods for <b>Modeling of Dynamic Systems</b>.</p> <p>B1.2 Select appropriate mathematical methods for <b>Time Response Analysis</b>.</p> <p>B1.3 Select appropriate mathematical methods for <b>Stability Analysis</b>.</p> <p>B2.1 Select appropriate solutions for <b>Dynamic Systems</b> problems based on <b>Mathematical Modeling</b>.</p> <p>B2.2 Select appropriate solutions for <b>Reduction of Multiple subsystems</b> problems based on <b>using Block Diagram and Signal Flow Graph</b>.</p> <p>B2.3 Select appropriate solutions for control engineering problems based on <b>Time Response Analysis</b>.</p> <p>B2.4 Select appropriate solutions for control engineering problems based on <b>Stability Analysis</b>.</p> <p>B5.1 Assess and evaluate the characteristics and performance of <b>Mathematical Models of Dynamic Systems</b>.</p> <p>B5.2 Assess and evaluate the characteristics and performance of <b>Reduction of Multiple subsystems</b>.</p> <p>B5.3 Assess and evaluate the characteristics and performance of <b>Time Response Analysis</b>.</p> <p>B5.4 Assess and evaluate the characteristics and performance of <b>Stability Analysis</b>.</p> <p>B5.5 Assess and evaluate the characteristics and performance of <b>PID Controller</b>.</p>
	<p>C.1 Apply knowledge of mathematics, science, design and engineering practice integrally to solve control engineering problems.</p>	<p>C1.1 Apply knowledge of mathematics, science and engineering practice integrally to solve <b>Dynamic Systems</b> problems.</p> <p>C1.2 Apply knowledge of mathematics, science and engineering practice integrally to solve <b>Time Response Analysis</b> problems.</p> <p>C1.3 Apply knowledge of mathematics, science and engineering practice integrally to solve <b>Stability Analysis</b> problems.</p> <p>C1.4 Apply knowledge of mathematics, science and engineering practice integrally to solve <b>Steady-State Errors</b> problems.</p> <p>C1.5 Apply knowledge of mathematics, science and engineering practice integrally to solve <b>PID Controller</b> problems.</p>



<b>C- Professional Skills</b>	C.6 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to Control Engineering and develop required computer programs.	C6.1 Use a wide range of analytical tools and techniques pertaining to <b>Mathematical Modeling of Dynamic Systems</b> . C6.2 Use a wide range of analytical tools and techniques pertaining to <b>Time Response Analysis</b> . C6.3 Use a wide range of analytical tools and techniques pertaining to <b>Stability Analysis</b> .
	C.12 Prepare and present technical reports.	C12.1 Prepare and present technical reports relevant to Control Engineering topics.
<b>D- General Skills</b>	D3) Communicate effectively.	D3.1) Communicate effectively with colleagues and demonstrator in tutorial times.
	D6) Effectively manage tasks, time, and resources.	D6.1) Effectively manage tasks, time, and resources in solving problems, writing reports, doing exams in topics related to control engineering.
	D7) Search for information and engage in life-long self-learning in Electromagnetic wave Theory.	D7.1) Search for information and engage in life-long self-learning in topics related to control engineering.
<b>3. Course Contents</b>	<b>Introduction to Control Systems - Mathematical Modeling of Dynamic Systems - Reduction of Multiple subsystems (using Block Diagram and Signal Flow Graph)- Time Response Analysis - Stability Analysis – Steady-State Errors - PID Controller.</b>	
<b>4. Teaching and Learning Methods</b>	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Tutorials</li> <li>• Reports</li> </ul>	
<b>5. Teaching and Learning Methods for disable students</b>	<ul style="list-style-type: none"> <li>• Official low cost special classes for developing student skills, arranged by the faculty administration.</li> <li>• Arrange meetings for more discussion and declaration.</li> <li>• Give them specific tasks.</li> <li>• Repeat the explanation of some of the material at lectures and tutorials.</li> <li>• Assign a teaching assistance to follow up the performance of this group of students.</li> </ul>	
<b>6. Student Assessment</b>		
<b>a- Assessment Methods</b>	<ul style="list-style-type: none"> <li>- Weekly sheet exercises at class room and reports</li> <li>- Quizzes</li> <li>- Midterm, and final exams</li> </ul>	
<b>b- Assessment Schedule</b>	<ul style="list-style-type: none"> <li>- Exercise sheet assignment : Weekly</li> <li>- Quizz-1: Week <u>no</u> 5</li> <li>- Mid-Term exam: Week <u>no</u> 8</li> <li>- Quizz-2: Week <u>no</u> 12</li> <li>- Final – term examination: Week <u>no</u> 16 to 18</li> </ul>	
<b>c- Weighting of</b>	<b>- Class work and quizzes : 15 %</b>	



Assessment	- Mid-term examination:	15 %
	- Final – term examination:	<u>70 %</u>
	<b>Total</b>	<b>100 %</b>

#### 7. List of Text Books and References:

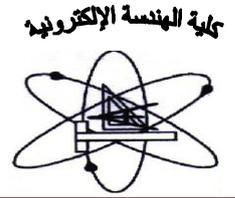
a- Course notes	There are lectures notes prepared in the form of a book authorized by the department
b- Text books	Katsuhiko Ogata "Modern Control Engineering " (5th Edition) <i>Prentice-Hall, Inc, Upper Saddle River</i> , Sep 4, 2009.
c- Recommended books	[1] Norman S. Nise "Control Systems Engineering", Taylor and Francis Group, <i>Dec 14, 2010</i> [2] Joseph Distefano III and Allen R. Stubberud " Schaum's Outline of Feedback and Control Systems", 2nd Edition Brown Walker press, 2013.
d- Periodicals, Web sites, etc.	<a href="http://www.eeecb.com/vb/forum">http://www.eeecb.com/vb/forum</a>

#### Course contents - ILOs Matrix

Content Topics	Week	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Introduction to Control Systems	1-2	A1.1	B1.1		D3.1
Mathematical Modeling of Dynamic Systems	3-5	A1.2, A5.1	B2.1, B5.1	C1.1, C6.1, C12.1	D3.1, D6.1, D7.1
Reduction of Multiple subsystems (using Block Diagram and Signal Flow Graph)	6-7	A5.2	B2.2, B5.2	C12.1	D3.1, D6.1, D7.1
Time Response Analysis	9-10	A1.3, A5.3	B1.2, B2.3, B5.3	C1.2, C6.2, C12.1	D3.1, D6.1, D7.1
Stability Analysis	11-12	A1.4, A5.4	B1.3, B2.4, B5.4	C1.3, C6.3, C12.1	D3.1, D6.1, D7.1
Steady-State Errors	13	A1.5, A5.5		C1.4, C12.1	D3.1, D6.1, D7.1
PID Controller.	14-15	A1.6 , A8.1, A16.1	B5.5	C1.5, C12.1	D3.1, D6.1, D7.1

#### Teaching and Learning Methods - ILOs Matrix

Teaching and Learning Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional and practical skills	D- General and transferable skills
Lectures	A1, A5, A8, A16	B1, B2, B5	C1, C6	D3
Tutorials.	A1, A5, A8, A16	B1, B2, B5	C1, C6	D3, D6



Reports	A1, A5, A8, A16	B1, B2, B5	C1, C6, C12	D3, D6, D7
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#### Assessment Methods - ILOs Matrix

Assessment Methods	A- Knowledge & Understanding	B- Intellectual skills	C- Professional & practical skills	D- General and transferable skills
Weekly sheet exercises	A1, A5, A8, A16	B1, B2, B5	C1, C6	D3, D6
Reports	A1, A5, A8, A16	B1, B2, B5	C1, C6, C12	D3, D6, D7
Quizzes	A1, A5, A8, A16	B1, B2, B5	C1, C6	D3, D6
Midterm, and Final Written exams	A1, A5, A8, A16	B1, B2, B5	C1, C6	D3, D6

Authorized from department board at 15/05/2016

Authorized from college board at 05/06/2016

#### Course coordinator:

Prof. Dr. Abdelazim S. Ibrahim

#### Head of Department:

Prof. Fathi El-Sayed Abd El-Samie