EEC 315: Electronics Laboratory


Coordinator: Dr. Murad Hizlan, Associate Professor
Department of Electrical Engineering and Computer Science

Course Objectives: Introduce students to electronics instruments and methods of measuring and testing electronic circuits. To provide students with practical experience with the electronic circuits learned in EEC313 and 314. To enhance the theoretical knowledge of those circuits.

Expected Outcomes: Upon completion of this course the student should be able to
1. Use the basic electronic instruments, such as oscilloscopes and signal generators,
2. Construct and test basis electronic circuits of diode rectifiers, zener diode voltage regulators, transistors amplifiers, push-pull emitter-follower power amplifier, operational amplifiers and active filters built with operational amplifiers.

Fulfills The Following Electrical Engineering Program Objectives and Outcomes:

Objectives:
1) Practice electrical engineering in one or more of the following areas: communications computers, controls, power electronics, and power systems
2) Define and diagnose problems, and provide and implement electrical engineering solutions in an industrial environment
5) Collaborate with others as a member or as a leader in an engineering team

Outcomes:
(a) An ability to apply knowledge of mathematics, science, and engineering to general electrical engineering and, in particular, to one or more of the following areas: communications, computers, controls, power electronics, and power systems
(b) An ability to design and conduct electrical engineering experiments, as well as to analyze and interpret data.
(c) An ability to design a system, component, or process to meet desired needs
(g) Ability to communicate effectively
(k) An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.
Contribution of Course to Meeting the Professional Component:
Math & Basic Science: 0 credits;  
Engineering Topics: 2 credits;  
General Education: 0 credits

Prerequisites by topics:
1. Working principles and characteristics of diodes, Zener diodes, bipolar and field-effect transistors  
2. Transistor biasing circuits  
3. Working principles and characteristics of common-emitter and common-collector amplifiers  
4. Op-amp amplifiers, op-amp differentiators, integrators and op-amp active filters  
5. Characteristics of Butterworth low-pass, high-pass filters and band-pass filters

Topics:

Lab # refers to an experiment in the textbook unless otherwise indicated.

<table>
<thead>
<tr>
<th>Week</th>
<th>Experiment</th>
<th>Topic</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lab#1 Handout</td>
<td>Introduction to some important equipment used in the lab.</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Lab#2</td>
<td>Diode Rectifier Circuits.</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Lab#3 Handout</td>
<td>The Capacitor Input Rectifier Filter.</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Lab#7</td>
<td>The Zener Diode and Voltage Regulation.</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Lab#9 and #10</td>
<td>Transistor Base Biasing and Transistor Emitter Biasing.</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Lab#13</td>
<td>The Common-Emitter Amplifier.</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Lab#14</td>
<td>The Common-Collector Amplifier (Emitter-Follower).</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Lab#15</td>
<td>The Combination Common-Emitter Amplifier and Emitter-Follower</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Lab#18</td>
<td>The Class B Push-Pull Emitter-Follower Power Amplifier.</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Lab#27 and #28</td>
<td>Op-Amp Slew Rate and Op-Amp Common-Mode Rejection.</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Lab#29 and #30</td>
<td>Op-Amp Inverting and Non-inverting Amplifiers and Op-Amp Comparators.</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>Lab#31</td>
<td>Op-Amp Differentiator and Integrator.</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>Lab#32</td>
<td>The Butterworth 2nd-Order Low-Pass Active Filter.</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>Lab#33</td>
<td>The Butterworth 2nd-Order High-Pass Active Filter.</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>Lab#34</td>
<td>The Active Band-Pass Filter.</td>
<td>3</td>
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</table>

Total 45

Computer Usage: Students are expected to use word processing package for the preparation of their lab reports.

Design Projects: None.

Non-design Projects: None.

Prepared by: Dr. Fuqin Xiong  
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