

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE
ACADEMIC AFFAIRS

Course Number: ELE-120 Class/Lect. Hours: 3 Lab Hours: 0 Credits: 3 Dept.: Electronics
 Course Title: Printed Circuit Board Design Semester: 1 Year: 2016

Course Description, Prerequisite, Corequisite:

In this course students will form teams to learn and perform electronics industry practice regarding the design, fabrication, assembly, and testing of printed circuit boards (PCBs). Student teams will capture, read, and edit schematics, design PCB physical layout, order and receive PCBs, and assemble (including soldering) and test the finished design. Throughout the course student teams will participate in design reviews and regularly report progress and problems to a project manager (instructor). Some aspects of the course will parallel ELE-130, Introduction to Project Management. This course is recommended for students interested in creating their own circuit boards to implement electronic maker projects. No prior experience with electronics is required but general experience with personal computers is helpful.

Course Objectives	Competencies
<p>Project Team Practice Work in a team setting to understand and execute the fundamental tasks and deliverables of an electronic printed circuit board based design project.</p> <p>Schematics Read an electronic schematic diagram. Create a schematic diagram using CAD software. Read a Bill-of-Materials (BoM) for an electronic assembly. Create a Bill-of-Materials (BoM) for an electronic assembly. Demonstrate familiarity with industry standard electronic component package types</p>	<p>Contribute to team effort under schedule deadlines Participate in regular team project status meetings</p> <p>Recognize and name the features of a schematic Recognize common schematic symbols. Create and edit schematics using electronic computer aided design (eCAD) software including: Add and annotate component symbols. Add and edit connecting wires ("nets"). Add and edit schematic annotation.</p>

Course Objectives	Competencies
<p>Create new component schematic symbols for parts not previously included in schematic symbol libraries and learn the library concept for capturing reusable design elements</p> <p>Capture schematics for an actual electronic project,</p> <p>Learn the design review process.</p> <p>PCB Design and Fabrication Fundamentals Using PCB layout software to design and route a PCB for an actual electronic project.</p> <p>Create new component PCB layout symbols for parts not previously included in PCB layout symbol libraries</p> <p>With design project team "go-ahead", procure unpopulated PCBs.</p> <p>Learn about unpopulated PCB "E-test".</p>	<p>Create and edit symbols used in schematics including the organization and maintenance of collections of symbols in libraries.</p> <p>Prepare for and participate in a schematic design review. Understand component symbol and wiring naming. Understand the term "Design-For-Test" (DFT) Understand the special nature of power nets in a schematic.</p> <p>Name and identify common electronic components based on their package type: leaded through-hole type, and surface mount devices (SMD).</p> <p>Name and identify layers and elements of a PCB layout. Create and edit a printed circuit board layout using electronic computer aided design (eCAD) software including: Add and annotate component footprint symbols. Add and edit connecting wires ("nets"). Add and edit schematic annotation.</p> <p>Create and edit symbols used in PCB layout including the organization and maintenance of collections of symbols in libraries. Understand the term "Design-For-Manufacturing" (DFM)</p> <p>Prepare for and participate in a PCB layout design review.</p> <p>Specify and purchase an unpopulated PCB</p> <p>Electrically test an unpopulated PCB.</p>

Course Number:

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Course Objectives	Competencies
Learn about PCB assembly.	Perform simple soldering of components (and finish assembly of PCB based electronic project)
Learn about PCB based electronic project initial "bringup"	Test finished assembled PCB-based electronic assembly including proper initial bring-up.
Use and demonstrate finished PCB based electronic project hardware	