**CHAMP Course Map**

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| **Course Name:** Solid State Devices I ELT 134 |
| **Instructor Name:** Scott Fambrough | **Date:** I June, 2015 |
| **Course Competencies:**1. Review the cause and effect of electrical shock and practice measures to prevent electrical shock.
2. List the procedures for treating victims of electrical shock.
3. List and observe special precautions necessary when dealing with capacitors, transformers, and AC line voltages.
4. Identify and explain the purpose of the diode elements and explain the operation.
5. Identify and draw the schematic symbols for various diodes.
6. Identify and analyze the diode’s operation with forward and reverse.
7. Recognize, draw, and label a balanced and ionized atom.
8. Name and utilize the effects of doping.
9. Name and define the role of the acceptor and the donor atom.
10. Identify and describe N-type and P-type materials.
11. Identify and define major and minor current carriers.
12. Trace the current flow in a solid state PN junction diode.
13. Recognize and label the schematic symbol of the PN junction diode.
14. Test and analyze the diode with forward and reverse bias conditions.
15. Recognize, test, analyze, and compare the diode for forward and reverse resistance.
16. List and apply the ratings and nomenclature of the diode.
17. Identify, test, and analyze the half wave rectifier circuit, conventional full-wave bridge rectifier, and the clipper or limiter circuit.
18. Identify, construct, test, and evaluate the simple cap lifter circuit, the “L” and “Pi” type filter circuits.
19. Identify, construct, test, analyze, and compare the characteristics and operation of the zener diode regulator circuit and the series regulator circuit.
20. Identify, construct, test, analyze, and compare the characteristics and operation of the shunt regulator circuit.
21. Recognize the types of transistors and identify the elements associated with transistors.
22. Apply the correct junction bias.
23. List the leg-current relationships in transistors.
24. Identify the symbols and subscripts associated with transistors.
25. Name the advantages and disadvantages of transistors.
26. Test transistors to determine if defective.
27. Interpret collector curves.
28. Identify and practice proficiency utilizing the basic configurations.
29. Recognize and use circuits utilizing the classes of bias.
30. Identify and explain the component functions of CE circuit.
31. Draw a load line on the collector curves using the parameters of the circuit.
32. Determine the major characteristics.
33. Demonstrate proficiency utilizing different methods of bias.
34. Calculate and use circuit analysis principles on CE circuits.
35. Analyze and test circuits with large circuit behavior
36. Analyze and demonstrate proficiency utilizing small signal parameters.
37. Analyze and measure the characteristics of the circuit.
38. Calculate and practice utilizing Q-point analysis.
39. Determine and demonstrate proficiency utilizing AC conditions.
40. Describe and list typical leakage currents in germanium and silicon transistors.
41. Explain how to stabilize CE, CB, and CC circuits.
42. Define stability factor.
43. Calculate the maximum power dissipated at the collector.
44. Derate a transistor.
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**Course Materials (Text, Edition and any other publisher items)**

**Textbooks and/or Resources: 1. Text, *Analog Fundamentals, A Systems Approach*, T. L. Floyd & D. M. Buchla, 1st ed., Pearson**

 **2. Laboratory Manual, Experiments in: *Analog Fundamentals, A Systems Approach*, D. M. Buchla, 1st ed., Pearson**

**Resources:**

**Rubrics:** Rubrics and specific grading criteria for EACH assessment should be included at the end of the course map.

| **Module # and Title** | **CCNS Competencies** | **Content, Activities or Challenges****(Learner Interaction** **& Engagement)**  | **Assessments, Rubrics (Feedback)** | **Publish to OER** |
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| Module 1:Electric Safety | I, II, III  | 1. PowerPoint Presentation *Electrica*l, by the Office of Education and Training, OSHA
2. Read OSHA Publications:
3. Controlling Electrical Hazards OSHA 3075

Pages 1 through 191. Hand & Power Tools OSHA 3080

Pages 1 through 121. Control of Hazardous Energy (Lockout/Tagout) OSHA 3120

Pages 1 through 201. Laboratory demonstration/s:
2. Test Equipment inspection
3. Power Cord inspection
4. Test Lead inspection
5. Lockout and Tagout procedures
 | 1. Written Exam, Electronics Laboratory Safety.
2. Practical Exam, Equipment Tagout Procedures Rubric
 | 1. Lecture Notes on Electrical Safety
2. PowerPoint Presentation on Electrical by the Office of Education and Training
3. OSHA Publication, Controlling Electrical Hazards (PDF)
4. OSHA Publication, Hand and Power Tools (PDF)
5. OSHA Publications, Control of Hazardous Energy (Lockout/Tagout (PDF)
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| Module 2: Diode Characteristics & Applications | IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII, XVIII, XIX, XX | 1. Reading
2. Basic Analog Concepts
3. Lecture on
4. Analog electronics signals
5. Signal sources and amplifiers
6. Laboratory Experiment /s
7. Signal Sources and Amplifiers
8. Reading
9. Diodes & Applications
10. Lecture on
11. Semiconductor Atomic Structure
12. PN junction
13. Biasing
14. Diode Characteristics
15. Rectifiers
16. Filters & Regulators
17. Limiting & Clamping Circuits
18. Special-Purpose Diodes
19. Data Sheet/s
20. Laboratory Experiment/s
21. Diode Characteristics
22. Rectifier Circuits
23. Limiting & Clamping Circuits
24. Special-Purpose Diodes
 | 1. End of Chapter Review Questions
2. Written Exam- Diode Applications
3. Diode Characteristics, Rubric
4. Rectifier Circuits, Rubric
5. Limiting & Clamping Circuits, Rubric
6. Special-Purpose Diodes, Rubric
 | 1. Lecture Notes on Diodes
2. Written Exam- Diode Applications
3. Laboratory Exercise Rubric
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| Module 3: Transistor Characteristics & Applications | XXI, XXII, XXIII, XXIV, XXV, XXVI, XXVII, XXVIII, XXIX, XXX, XXXI, XXXI, XXXII, XXXIII, XXXIV, XXXV,XXXVI,XXXVII, XXXVIII, XXXIX, XL, XLI, XLII, XLIII, XLIV | 1. Reading
2. Bipolar Junction (BJT) Transistors
3. Lecture/s on
4. Structure of BJT Transistors
5. BJT Data sheet Parameters
6. BJT Biasing
7. Common-Emitter (CE) Amplifiers
8. Common-Collector (CC) Amplifiers
9. Transistor Switch Applications
10. Component/Circuit Troubleshooting
11. Laboratory Experiment
12. BJT Transistor Characteristics
13. BJT Transistor Biasing
14. Common-Emitter (CE) Amplifier
15. Common-Collector (CC) Amplifier
16. Transistor Switch/s
 | 1. End of Chapter Questions
2. Written Exam- BJT Transistors
3. BJT Transistor Characteristics, Rubric
4. BJT Transistor Biasing, Rubric
5. Common-Emitter (CE) Amplifier, Rubric
6. Common-Collector (CC) Amplifier, Rubric
7. Transistor Switches, Rubric
 | 1. Lecture Notes on BJT Transistors
2. Lecture Notes on J-FET Transistors
3. Laboratory Exercise Rubric
4. Written Exam, BJT Transistors
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