Date: Fall 2013
Credit Hours: 3.0
Prerequisite(s): None

Delivery Method:
- Lecture: 2 Contact Hours (1 contact = 1 credit hour)
- Lab: 2 Contact Hours (2 contact = 1 credit hour)
- Online: 0 Contact Hours (3 contact = 1 credit hour)
- Blended: 0 Contact Hours

Offered: Fall Spring Summer

IAI Equivalent – Only for Transfer Courses go to http://www.itransfer.org:

CATALOG DESCRIPTION:

Designed to cover the electrical knowledge necessary for students who have a background in basic mathematics but who need not have had any background in electricity and who wish to pursue an interest in electronics. The course covers fundamental concepts of electricity, Ohm’s Law, batteries, simple electrical circuits, DC compound and bridge circuits, electrical conductors, electromagnetism, alternating currents, inductance, reactance, basic electrical meters, and fundamental operation of electronic devices.
GENERAL EDUCATION GOALS ADDRESSED

[See the last page of this form for more information.]

Upon completion of the course, the student will be able:

[Choose those goals that apply to this course.]

☐ To apply analytical and problem solving skills to personal, social and professional issues and situations.
☐ To communicate orally and in writing, socially and interpersonally.
☐ To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
☐ To understand and use contemporary technology effectively and to understand its impact on the individual and society.
☐ To work and study effectively both individually and in collaboration with others.
☐ To understand what it means to act ethically and responsibly as an individual in one’s career and as a member of society.
☒ To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
☒ To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals.]

Upon completion of the course, the student will be able to:

1. Analyze and troubleshoot basic resistive DC circuits.
   Competency 1.1. Interpret resistor color codes.
   Competency 1.2. Explain relationships between voltage current and resistance using Ohms law.
   Competency 1.3. Correctly and safely use a DMM.
   Competency 1.4. Calculate and Safely measure volts, ohms, and amps in series and parallel circuits.
2. Analyze complex resistive DC circuits.
   Competency 2.1. Correctly use kirchhoff’s laws
   Competency 2.2. Correctly design equivalent circuits.
   Competency 2.3. Correctly use network theorems.
   Competency 2.4. Safely Build and measure a complex DC circuit.
3. Understand the characteristics of basic AC circuit elements.
   Competency 3.1. Correctly state the relationship of time and frequency.
   Competency 3.2. Calculate inductive reactance.
   Competency 3.3. Explain the use of and measurements of transformers.
   Competency 3.4. Calculate capacitive reactance.
   Competency 3.5. Calculate and measure impedance and phase angle.
4. Recognize semiconductor theory and how it relates to various solid state devices.
   Competency 4.1. Correctly state what a semiconductor is.
   Competency 4.2. Explain the basic uses of a diode.
   Competency 4.3. Explain the basic uses and types of Transistors.
5. Recognize Logic skills
   Competency 5.1 Correctly convert Numbers from Binary, Octal, Hexidicimal, BCD, and Digital.
   Competency 5.2 Explain Logic gates.
   Competency 5.3 Develop Truth Tables.
   Competency 5.4 Intreprete Boolean Algibra..

COURSE TOPICS AND CONTENT REQUIREMENTS:

I. The Atom
   A. Introduction
   B. Static Electricity
   C. Atomic Energy
II. Dynamic Electricity
   A. Electrons in Motion
III. Ohm’s Law in Direct Current Applications
   A. Ohm’s Law for Direct Current
   B. Applications of Ohm’s Law
IV. Electrical Circuits
   A. Series Circuits
   B. Parallel Circuits
   C. Series-Parallel Circuits
   D. More Advanced Circuit Types
V. Magnetism and Electromagnetism
   A. Magnetism
   B. Electromagnetism
VI. Simple Electrical Generators
   A. Introduction
   B. Primary Cells
   C. Secondary Cells
   D. Other Means of Generating Electricity
   E. Cells and Batteries in Circuits
VII. Direct Current Generators
   A. General Principles
   B. The Direct Current Armature
   C. Direct Current Field Structure
VIII. Alternating Current Principles
   A. Generation of Alternating Current
   B. Inductance in Alternating Current Circuits
   C. Capacitance in Alternating Current Circuits
IX. Electric Motors
   A. Principles of Operation
   B. Speed Characteristics of Direct Current Motors
   C. Alternating Current Motors
X. Transformers, Voltage Regulators, and Power Rectifiers
   A. Transformers
   B. Autotransformers and Regulators
   C. Regulators
   D. Power Rectifiers
XI. Electrical Measuring Instruments
   A. Direct Current Meters
   B. Alternating Current Meters
   C. Electronic Test Equipment

XII. Solid State Devices
   A. Introduction
   B. Semiconductor Science
   C. Semiconductor Devices
   D. Diode Circuits
   E. Transistor Circuits

XIII. TTL Logic
   A. Logic Gates
   B. Truth Tables
   C. Boolean Algebra

XIV. Electrical/Electronic Safety
   A. General
   B. Responsibility
   C. Electrical Shock
   D. Rapid Rescue Techniques for Electrical Exposure
   E. Sneaky Electrical Conductors
   F. Battery handling
   G. How to Control an Electrical Fire
   H. Good Soldering Habits

INSTRUCTIONAL METHODS:

1. Lecture - discussion sessions will be used to present related information.
2. Problem solving will be utilized as a means of understanding Ohm’s Law and series-parallel circuits.
3. Demonstrations will be given on proper operating procedure of electronic test equipment.
4. Video-tapes and movies will be used to reinforce or supplement related information.
5. Laboratory means of demonstrating circuit operation of electronic devices.

INSTRUCTIONAL MATERIALS:

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

1. Students will be required to solve problems and demonstrate their ability and understanding of simple electronic circuits.
2. Students will perform basic laboratory experiments in bread-boarding electronic circuits.
3. Students will demonstrate ability to utilize test equipment for basic test measurements.

A = 90-100  
B = 80-89  
C = 70-79  
D = 60-69  
F = 0-59

OTHER REFERENCES

Challenge Software
MultiSim
ELVIS
### Course Competency/Assessment Methods Matrix

#### ELT-1000; Introduction to Electronics

For each competency/outcome place an “X” below the method of assessment to be used.

| Competency 1.1. Interpret resistor color codes. | Direct | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Competency 1.2. Explain relationships between voltage current and resistance using Ohms law. | Direct | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Competency 1.3. Correctly and safely use a DMM. | Direct | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Competency 1.4. Calculate and Safely measure volts, ohms, and amps in series and parallel circuits. | Direct | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Competency 2.1. Correctly use kirchoff’s laws | Direct | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Competency 2.2. Correctly design equivalent circuits. | Direct | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Competency 2.3. Correctly use network theorems. | Direct | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Competency 2.4. Safely Build and measure a complex DC circuit. | Direct | X | X | X | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
## ELT-1000; Introduction to Electronics

For each competency/outcome place an “X” below the method of assessment to be used.

<table>
<thead>
<tr>
<th>Assessment of Student Learning</th>
<th>Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article Review</td>
<td>Direct/Indirect</td>
</tr>
<tr>
<td>Case Studies</td>
<td></td>
</tr>
<tr>
<td>Group Projects</td>
<td></td>
</tr>
<tr>
<td>Lab Work</td>
<td></td>
</tr>
<tr>
<td>Oral Presentations</td>
<td></td>
</tr>
<tr>
<td>Pre-Post Tests</td>
<td></td>
</tr>
<tr>
<td>Quizzes</td>
<td></td>
</tr>
<tr>
<td>Written Exams</td>
<td></td>
</tr>
<tr>
<td>Artifact Self Reflection of Growth</td>
<td></td>
</tr>
<tr>
<td>Comprehensive Written Exit Exam</td>
<td></td>
</tr>
<tr>
<td>Comprehensive Embedded Questions</td>
<td></td>
</tr>
<tr>
<td>Course Embedded Projects</td>
<td></td>
</tr>
<tr>
<td>Mutation Projects</td>
<td></td>
</tr>
<tr>
<td>Observation</td>
<td></td>
</tr>
<tr>
<td>Writing Samples</td>
<td></td>
</tr>
<tr>
<td>Portfolio Evaluation</td>
<td></td>
</tr>
<tr>
<td>Real World Projects</td>
<td></td>
</tr>
<tr>
<td>Reflective Journals</td>
<td></td>
</tr>
<tr>
<td>Applied Application (Skills)</td>
<td></td>
</tr>
<tr>
<td>Test</td>
<td></td>
</tr>
<tr>
<td>Oral Exit Interviews</td>
<td></td>
</tr>
<tr>
<td>Accreditation Reviews:Reports</td>
<td></td>
</tr>
<tr>
<td>Advisor Council</td>
<td></td>
</tr>
<tr>
<td>Surveys</td>
<td></td>
</tr>
<tr>
<td>Employer Surveys</td>
<td></td>
</tr>
<tr>
<td>Graduate Surveys</td>
<td></td>
</tr>
<tr>
<td>Internship/Practicum/Site</td>
<td></td>
</tr>
<tr>
<td>Supervisor Evaluation</td>
<td></td>
</tr>
<tr>
<td>Licensing Exam</td>
<td></td>
</tr>
<tr>
<td>In Class Feedback</td>
<td></td>
</tr>
<tr>
<td>Simulation Interview</td>
<td></td>
</tr>
<tr>
<td>Written Report</td>
<td></td>
</tr>
<tr>
<td>Assignment</td>
<td></td>
</tr>
</tbody>
</table>

### Competency 3.1. Correctly state the relationship of time and frequency.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 3.2. Calculate inductive reactance.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 3.3. Explain the use of and measurements of transformers.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 3.4. Calculate capacitive reactance.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 3.5. Calculate and measure impedance and phase angle.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 4.1. Correctly state what a semiconductor is.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 4.2. Explain the basic uses of a diode.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 4.3. Explain the basic uses and types of Transistors.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 5.1 Correctly convert Numbers from Binary, Octal, Hexidcimal, BCD, and Digital.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment

### Competency 5.2. Explain Logic gates.
- Article Review: X
- Case Studies: X
- Group Projects: X
- Lab Work: X
- Oral Presentations: X
- Pre-Post Tests: X
- Quizzes: X
- Written Exams: X
- Artifact Self Reflection of Growth: X
- Comprehensive Written Exit Exam: X
- Comprehensive Embedded Questions: X
- Course Embedded Projects: X
- Mutation Projects: X
- Observation: X
- Writing Samples: X
- Portfolio Evaluation: X
- Real World Projects: X
- Reflective Journals: X
- Applied Application (Skills): X
- Test: X
- Oral Exit Interviews: X
- Accreditation Reviews: Reports
- Advisor Council Feedback
- Employer Surveys
- Graduate Surveys
- Internship/PRACTICUM/Site Supervisor Evaluation
- Licensing Exam
- In Class Feedback
- Simulation Interview
- Written Report
- Assignment
ELT-1000; Introduction to Electronics

<table>
<thead>
<tr>
<th>Assessment of Student Learning</th>
<th>Assessment Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article Review</td>
<td></td>
</tr>
<tr>
<td>Case Studies</td>
<td></td>
</tr>
<tr>
<td>Group Projects</td>
<td></td>
</tr>
<tr>
<td>Lab Work</td>
<td></td>
</tr>
<tr>
<td>Oral Presentations</td>
<td></td>
</tr>
<tr>
<td>Pre-Post Tests</td>
<td></td>
</tr>
<tr>
<td>Quizzes</td>
<td></td>
</tr>
<tr>
<td>Written Exams</td>
<td></td>
</tr>
<tr>
<td>Articulate Self Reflection of Growth</td>
<td></td>
</tr>
<tr>
<td>Capstone Projects</td>
<td></td>
</tr>
<tr>
<td>Comprehensive Written Exit Exam</td>
<td></td>
</tr>
<tr>
<td>Embedded Questions</td>
<td></td>
</tr>
<tr>
<td>Course Embedded Questions</td>
<td></td>
</tr>
<tr>
<td>Multi-Media Projects</td>
<td></td>
</tr>
<tr>
<td>Observation</td>
<td></td>
</tr>
<tr>
<td>Writing Samples</td>
<td></td>
</tr>
<tr>
<td>Portfolio Evaluation</td>
<td></td>
</tr>
<tr>
<td>Real World Projects</td>
<td></td>
</tr>
<tr>
<td>Reflective Journals</td>
<td></td>
</tr>
<tr>
<td>Applied Application (skills) Test</td>
<td></td>
</tr>
<tr>
<td>Oral Exit Interviews</td>
<td></td>
</tr>
<tr>
<td>Accreditation Reviews/Reports</td>
<td></td>
</tr>
<tr>
<td>Advisory Council Feedback</td>
<td></td>
</tr>
<tr>
<td>Employer Surveys</td>
<td></td>
</tr>
<tr>
<td>Graduate Surveys</td>
<td></td>
</tr>
<tr>
<td>Internship/Practicum /Site Supervisor Evaluation</td>
<td></td>
</tr>
<tr>
<td>Licensing Exam</td>
<td></td>
</tr>
<tr>
<td>In Class Feedback</td>
<td></td>
</tr>
<tr>
<td>Simulation</td>
<td></td>
</tr>
<tr>
<td>Interview</td>
<td></td>
</tr>
<tr>
<td>Written Report</td>
<td></td>
</tr>
</tbody>
</table>

For each competency/outcome place an “X” below the method of assessment to be used.

Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.

<table>
<thead>
<tr>
<th>Direct/Indirect</th>
<th>D</th>
<th>D</th>
<th>D</th>
<th>D</th>
<th>D</th>
<th>D</th>
<th>D</th>
<th>D</th>
</tr>
</thead>
</table>

Competency 5.3 Develop Truth Tables.

Competency 5.4 Intreprete Boolean Algibra.