COURSE TITLE: DC/AC I  COURSE NO: 605-113  CREDITS: 3 (Lec:2, Lab:2)

COURSE DESCRIPTION: The study of the voltage, current, resistance, and power in various circuits. Analyze network theorems as they apply to dc circuits. Explore the use of basic test equipment such as ohmmeter, amp meter, and Voltmeter. Introduction to ac waveforms, impedance, inductance and capacitance.


LABORATORY: Laboratory Packets, Gateway Technical College, 2004

PROJECT: Each student will hand in a course notebook at the end of the 15th week. See detailed information in Appendix A

REFERENCE: Hardware Data Manuals and Handouts

SECTION: 605-113

STARTING DATE: August 25, 2004

MEETING TIME: M,T,W,Th,F 8:00am - 1:00pm or M,T,W,Th 5:00pm - 10:00pm

LOCATION: T415

ENDING DATE: December 21, 2004

ASSIGNMENT & TEST: See the Course Plan in Appendix B

INSTRUCTORS: Patrick E. Hoppe 262.619.6462 hoppep@gtc.edu
Matthew Treu 262.619.6808 treum@gtc.edu
Randy Reusser 262.619.6898 reusserr@gtc.edu

OFFICE: ROOM: T414, FAX: 262.7169

OFFICE HOURS: Will be posted outside the office door at the start of class. If our office hours do not fit into your schedule, please contact us and we will find a mutually convenient time to meet.
SPECIAL NEEDS STUDENT

If you have any special education needs or concerns, please contact your classroom instructor or Special Needs Instructor on campus (Linda Mahoney, or Peggy Jude @ 262-619-6228).

ATTENDANCE

This course is offered in a modified self-paced format. There is a mandatory lecture each week. The day(s) & time(s) of the lecture(s) are picked on the first day of class. If more than one lecture is required to meet the needs of the students, then the student will choose which lecture they wish to attend. The student may attend more than one lecture per week, if they so chose. The Labvolt and lab experiments are to be completed during the open lab session. It is the responsibility of the student to schedule their time accordingly. The course must be finished by the end of the semester.

LAB REPORT

The lab packet must be completed and turned in to the instructor, before the next packet is started. The LabVolt Unit grade and the Lab packet grade will be entered on the cover sheet of the Lab packet. Refer to Appendix D.

GRADING

All assignments, laboratory reports, quizzes, tests must show all work leading to the answer(s). They are graded from 0 to 100 points each.

Each student must turn in his or her own work.

LabVolt Unit exams can only be taken up to three (3) times, the highest score will be used. If the exam is taken more than three times, the lowest score will be used. Upon completion of the LabVolt exam, show the instructor your grade, so that it might be recorded.

Point Value

<p>| | |</p>
<table>
<thead>
<tr>
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<tr>
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<td>LABS</td>
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<tr>
<td>CLASS PARTICIPATION</td>
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<td>COURSE-BOOK</td>
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Letter Grade

<table>
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<tr>
<th>Grade</th>
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<tr>
<td>A</td>
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<td>91% to 92%</td>
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<tr>
<td>B+</td>
<td>89% to 90%</td>
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<td>B</td>
<td>85% to 88%</td>
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<tr>
<td>B-</td>
<td>83% to 84%</td>
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<td>C+</td>
<td>81% to 82%</td>
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<tr>
<td>C</td>
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<tr>
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<td>D</td>
<td>70% to 72%</td>
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<tr>
<td>D-</td>
<td>68% to 69%</td>
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<tr>
<td>F</td>
<td>below 68%</td>
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SUPPLIES

- A Texas Instruments Engineering calculator (TI-86).
BROAD COMPETENCY

1. Follow national, state, and local industry established safety procedures.
2. Use established symbols, standards, conventions, and terminology.
3. Explain basic atomic theory as it applies to electronics.
4. Explain the elements and properties of a basic electrical circuit.
5. Describe DC voltage and the characteristics of DC voltage and current sources.
6. Describe electrical resistance, resistor types, and resistor characteristics.
7. Measure electrical quantities.
8. Analyze voltage, current, resistance, and power relationships using Ohm’s and Watt’s Laws.
10. Analyze combination series and parallel circuits.
11. Explain the principles of magnetism and electromagnetism.
12. Analyze capacitance and capacitors in DC circuits.
13. Analyze inductance and inductors in DC circuits.
14. Describe AC voltage and the characteristics of AC voltage sources.
15. Describe types of transformers and the principles of their operation.
16. Analyze AC circuits containing reactive components.

CORE ABILITIES

Gateway believes students need both technical knowledge and skills and core abilities in order to succeed in a career and in life. The following nine core abilities are the general attitudes and skills promoted and assessed in all Gateway programs; those followed by an asterisk are promoted and assessed in this course.

1. Act responsibly *
2. Communicate clearly and effectively *
3. Demonstrate essential computer skills *
4. Demonstrate essential mathematical skills *
5. Develop job-seeking skills
6. Respect self and others as members of a diverse society *
7. Think critically and creatively *
8. Work cooperatively *
9. Value learning *
Appendix A - Course-Book

The course-book will contain ALL handouts, class notes, quizzes, tests, and lab reports. The information will be divided into appropriate chapters of your book. Upon completion of this class, you will have a complete guide from which you may study from for future courses.

The course-book will contain a cover sheet with the following information:
- Course Name
- Course Number
- Your Name
- Date

The course-book will contain a Table of Contents with the following headings:
- Class Notes
- Tests
- LabVolt Exam Grades
- Lab Data
- Class Handouts

The course-book will be graded on its completeness and organization. Remember, you are creating this book for use as a reference for other classes, so you will benefit far beyond just the grade you receive for it. A three ring binder is recommended, 2" - 3" variety. Please put your name & course name on the spline of the binder.

Learning Objects

Learning Objects are included in the assignment schedule. It is your responsibility to complete them. They are not graded, nor does the instructor know if you viewed them. However, successful completion of the Learning Objects will most certainly improve your exam scores and more importantly, your overall understanding of the material. The Learning Objects were developed solely to aid you in your understanding of the material, please take advantage of them.

Learning Object Web Site:

http://cws.gtc.edu/programs/objects/electronics.htm
<table>
<thead>
<tr>
<th>Unit</th>
<th>TOPIC</th>
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| **1.** | Introduction to Basic Concepts of Electricity  
- Structure of an Atom, and Electron Theory  
- Conductors, Semi-Conductors, and Insulators  
- Basic Electrical Quantities |
| **2.** | Electrical Quantities and Components  
- Units and Abbreviations  
- Conductor Characteristics  
- Resistor Color Code  
- Measuring Voltage, Current, and Resistance  
- Schematic Symbols |
| **3.** | Ohm’s Law  
- Relationship between Electrical Quantities  
- Scientific Notation, Engineering Notation, Metric Conversion  
- Current Flow  
- Polarity and Voltage  
- Work, Energy, and Power |
| **4.** | Series Circuits, and Parallel Circuits  
- Resistance in Series Circuits  
- Resistance in Parallel Circuits  
- Voltage in Series Circuits  
- Voltage in Parallel Circuits  
- Kirchoff’s Voltage Law, Kirchoff’s Current Law  
- Power in Series and Parallel Circuits  
- Troubleshooting Series and Parallel Circuits |
| **Exam 1** | Series-Parallel Circuits  
- Total Resistance in Series-Parallel Circuits  
- Voltage in Series-Parallel Circuits  
- Current in Series-Parallel Circuits  
- Power in Series-Parallel Circuits  
- Wheatstone Bridge  
- Delta and Wye Conversions |
| **5.** | Network Theorems  
- Maximum Power Transfer Theorem  
- Superposition Theorem  
- Thevenin’s Theorem  
- Norton’s Theorem |
| **Exam 2** | Cells and Batteries  
- Dry Cells  
- Rechargeable Batteries  
- Lead-acid Batteries  
- Battery Charging Methods |
8 Magnetism and Electromagnetism
- Fundamental Laws
- Units, Terms, Symbols
- Core Materials
- B-H Curve, Hysteresis Curve
- Induction
- Faraday’s Law & Lenz’s Law

9 Inductance and Inductors in a DC circuits
- Inductors in Series
- Inductors in Parallel
- RL time constant

10 Capacitance and Capacitors in a DC circuits
- Capacitors in Series
- Capacitors in Parallel
- RC time constant

Exam 3

11 AC voltage
- Radians of angular measure
- Period & Frequency
- Phase Relationships
- Current & Voltage characteristics

12 Transformers
- Mutual Inductance
- Turns, Current, and Impedance Ratio’s
- Loses
- Types
- Color Coding

13 Reactive components
- Capacitance, and Inductive Reactance
- Phase Relationships
- Impedance for RC & RL series circuits
- RC & RL series, parallel, and combinational circuits
- RLC series and parallel
- Power Triangle
- Rectangular and Polar vector analysis

14 Series & Parallel Resonance
- Resonance
- Q
- Bandwidth, Bandpass, and Selectivity

Exam 4
## Appendix C - Assignment Schedule

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Reading</th>
<th>LabVolt</th>
<th>Lab Projects</th>
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<tbody>
<tr>
<td>1</td>
<td>Basic Concepts</td>
<td>Ch. 1</td>
<td>Trainer Fam. &amp; Safety</td>
<td>Packet 1</td>
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<td>2</td>
<td>Elec. Quantities</td>
<td>Ch. 2</td>
<td>Elec. Quantities</td>
<td>Packet 2</td>
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<td>3</td>
<td>Ohm’s Law</td>
<td>Ch 3</td>
<td>Ohm’s Law</td>
<td>Packet 3</td>
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<tr>
<td>4</td>
<td>Series &amp; Parallel</td>
<td>Ch 4 &amp; 5</td>
<td>Series Res Crts.</td>
<td>Packet 4</td>
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<td></td>
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<td>Parallel Res Crts.</td>
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<td>5</td>
<td>Series-Parallel</td>
<td>Ch 6,7, 9.1, 9.2</td>
<td>Series/Parallel Crts</td>
<td>Packet 5</td>
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<tr>
<td>6</td>
<td>Network Theorems</td>
<td>Ch 10</td>
<td>Power in DC Crts</td>
<td>Packet 6</td>
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<td>DC Network Theorems</td>
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<td>Thevenin Crts</td>
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<td>Cells and Batteries</td>
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<td>DC Power Sources</td>
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<td>8</td>
<td>Magnetism</td>
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<td>Ch 16</td>
<td>AC Waveform Gen.</td>
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<td>Ch 15</td>
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<td>Packet 10</td>
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<td>Ch 18,21, 23</td>
<td>Inductive Reactance</td>
<td>Packet 11</td>
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<td>14</td>
<td>Resonance</td>
<td>Ch 26</td>
<td>RLC Circuits</td>
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**Homework:**
You have purchased a workbook as part of this course. Your success in this course is based on your ability to understand the material. You will not be successful if you don’t do the homework problems associated with each chapter. Your homework will not be graded directly, but time has shown than students that do all of the homework questions do very well on the exams.
Appendix D - Lab Packet Grading Rubric

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<td>Pre-Lab - Calculations</td>
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<td>Lab Data - Recorded - legible - organized - done in black ink</td>
<td>All Present Correct form</td>
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<td>Less than half done</td>
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<td>Questions Answered</td>
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<td>LabVolt Grade</td>
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The lab packet must be turned in to your instructor before the next one is started. The lab packet will be graded and returned within one week.