

## COURSE SYLLABUS

**COURSE TITLE:** Electrical Fundamentals

**TERM & YEAR:**

**COURSE & SECTION NUMBER:**

**TIME & PLACE:** Online – Trine Virtual Campus

**NUMBER OF CREDIT HOURS:** 3

**INSTRUCTOR:**

**OFFICE LOCATION/HOURS:** By Appointment

**OFFICE PHONE:**

**EMAIL:**

**COURSE DESCRIPTION:** Electrical circuit principles. Basic circuit laws, motors, generators, controls, distribution systems and electrical codes are presented. Theory of electricity and magnetism; electrical phenomena and measurements. Circuits, power, AC phenomena, capacitance and conduction are studied.

**PREREQUISITES:** College Algebra, MA 113, College Physics, PH 154

**REQUIRED TEXT:** Gerrish, Howard H. and William E. Dugger Jr, Richard Roberts., Electricity and Electronics  
Publisher: Goodheart-Willcox Co; 10th edition (April 28, 2008)

ISBN-10: 1590708830

ISBN-13: 978-1590708835

**REFERENCES:** None Required

**OTHER MATERIALS:** Posted within the Moodle ETD 273 Course Room

**LEARNING OUTCOMES:** Upon completion of this course, the student should be able to:

1. Identify and examine the various basic circuit laws practiced in industry today.
2. Solve practical electrical circuit problems.
3. Apply knowledge of basic electrical circuits in a series of practical and progressive problems and solutions.
4. List circuit laws and formulae.

**COURSE REQUIREMENTS:**

**ATTENDANCE/PARTICIPATION:**

All students are expected to log in to their courses regularly throughout the week to receive instruction, materials, and updates from the instructor. It is your responsibility to check in and submit your assignments, complete your discussion board postings, and finish quizzes and exams by the due dates.

If you do not participate in the course, you will be counted absent. Simply logging in is not enough; you must submit/complete an assignment, post to a discussion board, or other similar assignment tasks to avoid being counted absent. Instructors are required to submit attendance the Monday following each week of class.

This attendance is reported to the Financial Aid Department and may result in the loss of any financial aid refund you are expecting if you have not been participating in your courses. In addition, you will be administratively dropped from the course if you are reported absent a total of three weeks.

## COURSE ACTIVITIES AND ASSIGNMENTS

Each week you are required to log into the course, download and read the weekly Learning Module and complete all activities and assignments. All activities and assignments are listed and described in the Learning Module. Each activity and assignment is posted and described separately in the weekly window of the Moodle course room. Click on the activity/assignment link and, where applicable, read all directions carefully and complete the activity by the deadline listed in your Course Schedule.

In the Moodle course room, resources and activities that have a check box next to them are required viewing/completion. In order to successfully complete the course, those check boxes must be checked.

### Guidelines for Discussion Forum Participation

The primary way we will interact with each other is through weekly discussion forums. Please be sure to make your first post by WEDNESDAY of each week and return to the course at least two more times during the week to add to the discussion, respond to your colleagues, and reflect on the weekly content. You will be awarded full points for weekly discussions only if you 1) make your first post of at least 100 words by Wednesday at midnight, 2) provide at least two substantive responses of at least 50 words to your colleagues, 3) ensure that your first and last posts are at least 36 hours apart (this prevents someone from jumping onto the discussion board on Sunday night and posting three times just to fulfill the requirement, rather than to authentically engaging with content and colleagues) and 4) incorporate concepts from texts and outside resources, extend the conversation, and/or ask substantive questions.

Tips for creating substantive posts:

- Explain why you agree or disagree and add some examples to support your belief.
- Relate your personal or work experiences to the topic at hand
- Ask additional questions of your classmates
- Make connections between the topics at hand and the readings in the text or other resources (be sure to cite if you use outside resources)
- Add ways you can apply the lessons from class into your work and educational life.
- As a rule of thumb, your posts that you want to count toward your substantive participation grade should be between 50-100 words.

## GRADING/EVALUATION

Course grading components will be weighted as follows:

Participation in Weekly Discussion Forums	50 points each, 8 Forums	400 Points
Weekly Assignments	100 points each, 7 Assign	700 Points
Midterm Examination	200 points	200 Points
Final Examination	200 points	200 Points
Total Points Possible		1500 Points

Grades will be determined based on the following percentages:

A	90% to 100%
B+	86% to 89%
B	80% to 85%
C+	76% to 79%
C	70% to 75%
D+	66% to 69%
D	60% to 65%
F	0 to 59%

Graded assignments will normally be returned within 72 hours of submission due date.

## **ASSIGNMENT DUE DATES**

All weekly assignments are due by 11:59 P.M. on the due date. Late assignments are NOT accepted for any reason. Please plan ahead if you cannot participate in class in a timely manner or complete an assignment on time. If a documentable personal or professional emergency arises, please contact the instructor IMMEDIATELY via phone, text or email to make alternative submission arrangements.

## **OTHER POLICIES:**

### **ACADEMIC MISCONDUCT**

The University prohibits all forms of academic misconduct. Academic misconduct refers to dishonesty in examinations (cheating), presenting the ideas or the writing of someone else as one's own (plagiarism) or knowingly furnishing false information to the University by forgery, alteration, or misuse of University documents, records, or identification. Academic dishonesty includes, but is not limited to, the following examples: permitting another student to plagiarize or cheat from one's own work, submitting an academic exercise (written work, printing, design, computer program) that has been prepared totally or in part by another, acquiring improper knowledge of the contents of an exam, using unauthorized material during an exam, submitting the same paper in two different courses without knowledge and consent of professors, or submitting a forged grade change slip or computer tampering. The faculty member has the authority to grant a failing grade in cases of academic misconduct as well as referring the case to Student Life.

### **PLAGIARISM**

You are expected to submit your own work and to identify any portion of work that has been borrowed from others in any form. An ignorant act of plagiarism on final versions and minor projects, such as attributing or citing inadequately, will be considered a failure to master an essential course skill and will result in an F for that assignment. A deliberate act of plagiarism, such as having someone else do your work, or submitting someone else's work as your own (e.g., from the Internet, fraternity file, etc., including homework and in-class exercises), will at least result in an F for that assignment and could result in an F for the course.

### **COURSE CALENDAR/SCHEDULE:**

The course outline is subject to change by the instructor(s). Changes will be announced. All due dates are included on the submission schedule which is located in course Information.

### **STUDENTS WITH DISABILITIES:**

A student with a disability who plans to request academic adjustments needs to provide Trine University with documentation of his or her disability. This documentation goes to Kathie L. Wentworth, M.Ed., Director, Academic Support Services.

Documentation needs to be current and from a professional source such as a school psychologist, educational diagnostician, a licensed private psychologist, or a medical doctor. If the condition being documented is not stable, the documentation should be less than three years old.

The provision of documentation does not guarantee that the requested academic adjustments will be provided. Trine University reserves the right to select among equally effective and appropriate adjustments that will provide the student with a disability equal access to its programs.

Documentation typically includes a diagnosis of the disability—including the instruments and scores used to determine the disability and the credentials of the person providing the diagnosis, an explanation of how the condition affects the student's ability to function in an academic setting, examples of academic adjustments that are recommended, and an explanation of how the disability relates to these adjustments. In addition to providing documentation of a disability, the student needs to request academic adjustments.

Academic adjustments implemented depend on the disability of the student. Each circumstance is considered on an individual basis. It is important for the student with a disability to understand that academic adjustments will in no way lower or waive essential requirements of an academic program.

### **Seven Steps to Complete to Receive Academic Adjustments for a Disability**

- *Indicate the need for academic adjustments by notifying Academic Support Services.*
- *Complete the Trine University Disability Support Services Application form.\**
- *Sign Authorization for Release of Information on the back of the application form.\**
- *Provide adequate documentation from a professional source.*
- *Qualify for academic adjustments.*
- *Complete a conference with Academic Support Services.*
- *Schedule appointments with all professors during the first two weeks of the semester.*

### **ADDITIONAL INFORMATION FOR ONLINE COURSES:**

#### **A. Technology Tools:**

1. **Web Access:** this course is taught in asynchronous mode, using Moodle. Students will need daily access to a web-accessible computer with a minimum of 56.6k modem speed. Weekly participation, via Discussion Board postings, is required.
2. **Software:** Microsoft Word, PowerPoint and Adobe Reader.
3. **Hardware:** a headset with microphone can be purchased at the college bookstore, or it may be built in to your laptop.

#### **B. Instructor Expectations:**

1. The instructor reserves the right to require proctoring or validation of student's academic work at the instructor's discretion.
2. The instructor reserves the right to change or modify course materials or deadlines in response to student feedback or unforeseen circumstances.
3. The instructor requests that students allow **48** hours to respond to student emails or other forms of contact.
4. The instructor will attempt to be available during weekdays; however, as balance between family and work is important in everyone's lives, the instructor reserves the right to be unavailable on weekends.
5. The instructor requests that the students allow the instructor one week from the date of submission, to post a grade, or provide feedback, on any assignment. (Note: the instructor will make every effort to provide faster turnaround time; however, sometimes faster turnaround time is not possible.)

#### **C. Student Guidelines (Expectations):**

1. Refer early in the week to the assignment schedule, under course information, in Moodle for all due dates.
2. Turn in all work on time - late assignments could lose 25 percent of their potential grade.
3. Must know how to access their Trine University email account and will use this account for this course unless other arrangements have been made. Check your Trine University email periodically.
4. Keep a copy of all assignments until the end of the course. Check your grade book regularly for grades on assignments.
5. Review and refer to this syllabus, assignment schedule, and the course announcements for all pertinent information.
6. Participate on a weekly basis in this course via discussion board (threaded discussion area) postings.
7. Log in on a regular access via Internet accessible capabilities for this course.
8. Assume more responsibility (than in a regular face-to-face course) for your learning.
9. Understand that there are not any "lectures" in this course and students are responsible to read ALL course materials, including emails and announcements from the instructor.

#### **D. Participation Policy:**

1. Students will make engaged posts to the discussion boards and follow up with replies to peers.
2. The threaded discussion group activities are seen as an appropriate means to foster peer to peer development of knowledge.

# TRINE ONLINE

## Course Mapping

### ETD 273 – Electrical Fundamentals

**Course Description:** Electrical circuit principles. Basic circuit laws, motors, generators, controls, distribution systems and electrical codes are presented. Theory of electricity and magnetism; electrical phenomena and measurements. Circuits, power, AC phenomena, capacitance and conduction are studied.

**Learning Outcomes:**

1. Identify and examine the various basic circuit laws practiced in industry today. **(LO1)**
2. Solve practical electrical circuit problems. **(LO2)**
3. Apply knowledge of basic electrical circuits in a series of practical and progressive problems and solutions. **(LO3)**
4. List circuit laws and formulae. **(LO4)**

<b>Week One: Introduction (LO1-4)</b>	
<b>Learning Activities and Materials</b>	<b>Assessments</b>

**Read:**

1. Read Chapter #1 (LO1)
2. Read Chapter #2 (LO1)(LO2)(LO3)(LO4)

**Review:**

1. Chapter #1 PowerPoint Slides in Moodle (LO1)
2. Chapter #2 PowerPoint Slides in Moodle (LO1)(LO2)(LO3)(LO4)

**Watch:**

YouTube video Multimeters  
<https://youtu.be/bF3OyQ3HwfU> (LO3)

**Discussion Forum 1:**

- Using information from the video, and pertinent information from Chapter 2 of your textbook, post the following in the Discussion Forum using complete sentences:
- Should you use a digital or analog multimeter? Explain your reasoning
- Explain how to measure the amps in a circuit
- Determine and describe one possible use for a multimeter in an industrial setting
- Do you personally own a multimeter? If so, what brand is it?
- Respond to at least two classmates. (LO3)

**Week #1 Review Activity:**

Complete the 50 question quiz over the material covered this week:

**(LO1)(LO2)(LO3)(LO4)**

- You will have only one attempt for this review activity. Once you have submitted the activity your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to reselect an answer. That is how you can obtain partial credit for all of the questions.

You must read the chapter and review the power point slides prior to attempting this activity or you will not achieve the level of success that is necessary to maintain an acceptable grade in the course.

<b>Week Two: Basic Circuit Materials (LO1-4)</b>	
<b>Learning Activities and Materials</b>	<b>Assessments</b>

**Read:**

1. Read Chapter #3 **(LO1)(LO2)(LO3)(LO4)**
2. Read Chapter #4 **(LO1)(LO2)(LO3)(LO4)**

**Review:**

1. Chapter #3 PowerPoint Slides in Moodle **(LO1)(LO2)(LO3)(LO4)**
2. Chapter #4 PowerPoint Slides in Moodle **(LO1)(LO2)(LO3)(LO4)**

**Watch:**

Review the YouTube video on windmills to invoke thought about the impacts a design engineer could have on the environment .

<https://youtu.be/1hmQhsDbVG4>

**Discussion Forum 2:**

- Using information from the video, post the following in the Discussion Forum using complete sentences:
- Does a design engineer ultimately impact the environment with the choices made during the design process? Explain
- What are your thoughts on the use of windmills for energy generation? Should they be allowed to be placed anywhere? Why or Why not?

**Week #2 Review Activity:**

Complete the 50 question quiz over the material covered this week:

**(LO1)(LO2)(LO3)(LO4)**

- You will have only one attempt for this review activity. Once you have submitted the activity your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to reselect an answer. That is how you can obtain partial credit for all of the questions.

You must read the chapter and review the power point slides prior to attempting this activity or you will not achieve the level of success that is necessary to maintain an acceptable grade in the course.

<b>Week Three: Sources of Electricity (LO1-4)</b>	
<b>Learning Activities and Materials</b>	<b>Assessments</b>

**Read:**

- 1. Read Chapter #5 (LO1)(LO2)(LO3)(LO4)
- 2. Read Chapter #6 (LO1)(LO2)(LO3)(LO4)

**Review:**

- 1. Chapter #5 PowerPoint Slides in Moodle (LO1)(LO2)(LO3)(LO4)
- 2. Chapter #6 PowerPoint Slides in Moodle (LO1)(LO2)(LO3)(LO4)

**Watch:**

Review the YouTube video on fuel cell technology to invoke thought about this technology being a viable future power source to fuel vehicles. <https://youtu.be/QFQGXei47c0> (LO2)

**Discussion Forum 3:**

- Using information from the video, post the following in the Discussion Forum using complete sentences:
- Is fuel cell technology the future of automotive power?
- If 1 million people in a major city are using fuel cell vehicles and the power plants for home are also fuel cell, since the technology uses oxygen in order to operate, how do you think that could impact the oxygen levels in the atmosphere of the city? What about a country with very little green space generating oxygen? Is this something that design engineers are discounting too much? Explain your thoughts. (LO2)

**Week #3 Review Activity:**

- Complete the 50 question quiz over the material covered this week: (LO1)(LO2)(LO3)(LO4)
- You will have only one attempt for this review activity. Once you have submitted the activity your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to reselect an answer. That is how you can obtain partial credit for all of the questions.

You must read the chapter and review the power point slides prior to attempting this activity or you will not achieve the level of success that is necessary to maintain an acceptable grade in the course.

<b>Week Four: Parallel and combination circuits (LO1-4)</b>	
<b>Learning Activities and Materials</b>	<b>Assessments</b>



**Read:**

1. Read Chapter #7 **(LO1)(LO2)(LO3)(LO4)**
2. Read Chapter #8 **(LO1)(LO2)(LO3)(LO4)**

**Review:**

1. Chapter #7 PowerPoint Slides in Moodle **(LO1)(LO2)(LO3)(LO4)**
2. Chapter #8 PowerPoint Slides in Moodle **(LO1)(LO2)(LO3)(LO4)**

All previous materials presented in preparation for the cumulative midterm exam.

**(LO1)(LO2)(LO3)(LO4)**

**Discussion Forum 4:**

- Circuit Choices
- Using information online and the lecture notes included in week 4 of your course, post the following in the Discussion Forum using complete sentences:
  - Should you wire boat batteries together in series or parallel when adding a second battery? Why?
  - What circuit is a typical 3 cell (D) flashlight wired with? Why? **(LO1)**

**Week #4 Review Activity:**

- Complete the 50 question quiz over the material covered this week: **(LO1)(LO2)(LO3)(LO4)**
- You will have only one attempt for this review activity. Once you have submitted the activity your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to reselect an answer. That is how you can obtain partial credit for all of the questions.

You must read the chapter and review the power point slides prior to attempting this activity or you will not achieve the level of success that is necessary to maintain an acceptable grade in the course.

**Midterm Exam:**

- You will have 2 hours to complete this and you will have only one attempt for this Midterm Exam. Once you have submitted the exam your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to re-select an answer. That is how you can obtain partial credit for all of the questions.

	<ul style="list-style-type: none"> <li>You must review all of the chapters, the previous quizzes, and review the power point slides prior to attempting this exam to be successful</li> </ul> <p>Access the exam from the link provided and answer the questions.</p>
<b>Week Five: Magnetism and Generators (LO1-4)</b>	
<b>Learning Activities and Materials</b>	<b>Assessments</b>

**Read:**

1. Read Chapter #9 **(LO1)(LO2)(LO3)(LO4)**
2. Read Chapter #10 **(LO1)(LO2)(LO3)(LO4)**

**Review:**

1. Chapter #9 PowerPoint Slides in Moodle **(LO1)(LO2)(LO3)(LO4)**
2. Chapter #10 PowerPoint Slides in Moodle **(LO1)(LO2)(LO3)(LO4)**

**Discussion Forum 5:**

- Using online sources and search engines research the difference between an alternator and a generator and answer the following questions:
- What is the common term for the type used in vehicles today? Why?
- What was originally used in vehicles? Why did it change to what is used today? How has the terminology changed to blur the difference between the two? (The difference as noted in vehicle use only)
- Add citations (at least the web links) for your sources in your posts so that others can look more at them if they choose to.
- **(LO1)(LO3)**

**Week #5 Review Activity:**

- Complete the 50 question quiz over the material covered this week: **(LO1)(LO2)(LO3)(LO4)**
- You will have only one attempt for this review activity. Once you have submitted the activity your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to reselect an answer. That is how you can obtain partial credit for all of the questions.

You must read the chapter and review the power point slides prior to attempting this activity or you will not achieve the level of success that is necessary to maintain an acceptable grade in the course.

**Week Six: DC Motors and Transformers (LO1-4)**

**Learning Activities and Materials**

**Assessments**

**Read:**

1. Read Chapter #11 (LO1)(LO2)(LO3)(LO4)
2. Read Chapter #12 (LO1)(LO2)(LO3)(LO4)

**Review:**

1. Chapter #11 PowerPoint Slides in Moodle (LO1)(LO2)(LO3)(LO4)
2. Chapter #12 PowerPoint Slides in Moodle (LO1)(LO2)(LO3)(LO4)

**Watch:**

Review the YouTube video on transformers and answer the discussion forum questions.

<https://youtu.be/ZiwzpoCiF8A> (LO1)

**Discussion Forum 6:**

- Review the video and answer the questions in the discussion forum using complete sentences:
- What type of current is necessary for use in a transformer for it to work properly? Why?
- What type of transformer is used for a home, a step up, or Step down? Why?

**Week #6 Review Activity:**

- Complete the 5 question quiz over the material covered this week: (LO1)(LO2)(LO3)(LO4)
- You will have only one attempt for this review activity. Once you have submitted the activity your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to reselect an answer. That is how you can obtain partial credit for all of the questions.

You must read the chapter and review the power point slides prior to attempting this activity or you will not achieve the level of success that is necessary to maintain an acceptable grade in the course.

**Week Seven: AC motors and fiberoptics (LO1-4)**

**Learning Activities and Materials**

**Assessments**

<p><b>Read:</b></p> <ol style="list-style-type: none"> <li>1. Read Chapter #13 <b>(LO1)(LO2)(LO3)(LO4)</b></li> <li>2. Read Chapter #24 <b>(LO1)(LO2)(LO3)(LO4)</b></li> </ol> <p><b>Review:</b></p> <ol style="list-style-type: none"> <li>1. Chapter #13 PowerPoint Slides in Moodle <b>(LO1)(LO2)(LO3)(LO4)</b></li> <li>2. Chapter #24 PowerPoint Slides in Moodle <b>(LO1)(LO2)(LO3)(LO4)</b></li> </ol> <p><b>Watch:</b></p> <p>Review the YouTube video on transformers and answer the discussion forum questions.  <a href="https://youtu.be/ZjwzpoCiF8A">https://youtu.be/ZjwzpoCiF8A</a> <b>(LO1)</b></p> <p>Review the YouTube video on copper –vs- fiber and answer the discussion forum questions.  <a href="https://youtu.be/VrQsUdudo-U">https://youtu.be/VrQsUdudo-U</a> <b>(LO1)</b></p>	<p><b>Discussion Forum 7:</b></p> <ul style="list-style-type: none"> <li>• Using information from the video, the information presented in week 7 from your book, and other internet research-- Post the following in the Discussion Forum using complete sentences:</li> <li>• List two benefits to using fiber over copper wire</li> <li>• What is a benefit of copper over fiber?</li> <li>• Consider the recycling aspects of copper vs fiber, do you feel the eventual change to 100% fiber could impact the environment? Why or why not?</li> </ul> <p><b>Week #7a and 7b Review Activities:</b></p> <ul style="list-style-type: none"> <li>• Complete two review activities: 26 questions over Chapter 13 and 28 questions over Chapter 24 question quiz over the material covered this week: <b>(LO1)(LO2)(LO3)(LO4)</b></li> <li>• You will have only one attempt for this review activity. Once you have submitted the activity your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to reselect an answer. That is how you can obtain partial credit for all of the questions.</li> </ul> <p>You must read the chapter and review the power point slides prior to attempting this activity or you will not achieve the level of success that is necessary to maintain an acceptable grade in the course.</p>
<b>Week Eight: Final (LO1-4)</b>	
<b>Learning Activities and Materials</b>	<b>Assessments</b>
<p><b>Review:</b></p> <ol style="list-style-type: none"> <li>1. Read all previously assigned chapters as needed to adequately prepare for the</li> </ol>	<p><b>Discussion Forum 8:</b></p> <ul style="list-style-type: none"> <li>• Using information from the video and the information presented in</li> </ul>

cumulative final exam  
**(LO1)(LO2)(LO3)(LO4)**

2. Read all previously assigned power point slides as needed to adequately prepare for the cumulative final exam  
**(LO1)(LO2)(LO3)(LO4)**

**Watch:**

Review the YouTube video on oscilloscopes and answer the discussion forum questions.

<https://youtu.be/8VEq6L2QG5o> **(LO1)**

week 8 from your book and in your Post the following in the Discussion Forum using complete sentences:

- Based on its function, how could the o-scope serve better at diagnosing an intermittent problem with electronics than just using a simple multi-meter? Explain?  
**(LO1)**

**Final Exam:**

- You will have 2 hours to complete this and you will have only one attempt for this Final Exam. Once you have submitted the exam your point values are final. After you select your answer you need to choose the "check" button, if your answer is not correct you are assessed a penalty but allowed to re-select an answer. That is how you can obtain partial credit for all of the questions.

You must review all of the chapters, the previous quizzes, and review the power point slides prior to attempting this exam to be successful