

**University of Hawaii Maui College**  
**ETRO 105 - Circuit Analysis I**

**1. Course Alpha.**

ETRO

**2. Course Number.**

105

**3. Course Title/Catalog Title.**

Circuit Analysis I

**4. Number of Credits.**

4

**5. Contact Hours/Type.**

- Hour lecture/lab (6)

**6. Course Description.**

Develops step-by-step problem solving methods and hands-on laboratory applications. Utilizes electronics measurement instrumentation and software for data analysis. Studies fundamental topics including resistance, networks with DC voltage sources, and circuit analysis. Demonstrates Ohm's law, Kirchoff's laws, Thevenin's theorem, and maximum power theorems.

**7. Pre-Requisites.**

ENG 22 with grade C or better or placement at ENG 100, and MATH 103 with grade C or better or placement at MATH 135; or consent.

**8. Co-requisites.**

None

**9. Recommended Preparation.**

None

**10. Is this a cross-listed course?**

NO

**11. Reason for Proposal. Why is this course being proposed or modified? This question requires specific information as part of the explanation.**

The math pre-requisites have changed:

- Math 103 is now a program and course pre-requisite. MATH 103 replaces MATH 82 to ensure that students are better prepared to succeed in the ECET AS degree program.
- MATH 119 replaces MATH 107 to better prepare ECET students for math in the BAS ENGT degree program.

12. Effective Semester and Year.

Fall 2015

13. Grading Method. What grading methods may be used for this course?

- Standard (Letter,Cr/NCr,Audit) (0)

14. Is this course repeatable for credit? How often can this course be counted toward a degree or certificate?

NO

15. Course Student Learning Outcomes (SLOs). DO NOT ENTER TEXT IN THE TEXT BOX BELOW. Click on the yellow button "COURSE LEARNING OUTCOMES" and enter in that screen.

Course SLO/Competency	Apply the general rules of safety in the electronics lab.	Identify and describe the basic properties and units of electricity	Analyze and measure DC circuits	Apply network theorems to electric circuits
Identify safety hazards associated with electronic equipment	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Apply safety rules associated with electronic equipment	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Identify the power requirements, controls, switches, and indicators of training equipment	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Convert between decimal and metric prefixes		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
describe an atom and its structure		<input checked="" type="checkbox"/>		
Describe the law of electrostatic forces		<input checked="" type="checkbox"/>		
Define voltage and current			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Identify six methods of producing voltage		<input checked="" type="checkbox"/>		
Describe the behavior of electrons in a conductor and an insulator		<input checked="" type="checkbox"/>		
Identify resistor units, types, and schematic symbols		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Use multimeters and testers			<input checked="" type="checkbox"/>	
Measure electrical quantities such as voltage, current, and resistance	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Use Ohm's law to analyze circuits		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Use Watt's law to calculate power in circuits		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Identify, analyze, and measure series and parallel circuits			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Identify, analyze, and measure series/parallel circuits			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Troubleshoot electric circuits			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Apply Kirchoff's laws to electric circuits			<input checked="" type="checkbox"/>	
Apply network theorems to analyze circuits				<input checked="" type="checkbox"/>

Course SLO/PSLO	Analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems	Utilize appropriate mathematics at the level of algebra and trigonometry to solve technical problems	Demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing	Demonstrate engineer's way of thinking, analyzing technology as systems
Apply the general rules of safety in the electronics lab.			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Identify and describe the basic properties and units of electricity		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Analyze and measure DC circuits	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Apply network theorems to electric circuits	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

**16. Course Competencies. DO NOT ENTER TEXT IN THE TEXT BOX BELOW. Click on the yellow button "COURSE COMPETENCIES/ISSUES/SKILLS" and enter text in that screen. Course competencies are smaller, simpler tasks that connect to and facilitate the SLOs.**

Competency
Identify safety hazards associated with electronic equipment
Apply safety rules associated with electronic equipment
Identify the power requirements, controls, switches, and indicators of training equipment
Convert between decimal and metric prefixes
describe an atom and its structure
Describe the law of electrostatic forces
Define voltage and current
Identify six methods of producing voltage
Describe the behavior of electrons in a conductor and an insulator
Identify resistor units, types, and schematic symbols
Use multimeters and testers
Measure electrical quantities such as voltage, current, and resistance
Use Ohm's law to analyze circuits
Use Watt's law to calculate power in circuits
Identify, analyze, and measure series and parallel circuits
Identify, analyze, and measure series/parallel circuits
Troubleshoot electric circuits
Apply Kirchoff's laws to electric circuits
Apply network theorems to analyze circuits

**17. Recommended Course Content and Timeline. The course content facilitates the course competencies. Course content may be organized by weeks, units, topics or the like.**

Content
1-2 weeks: Introduction to electricity, safety, and use of equipment. Basic units of electricity
1-2 weeks: Working with numbers. Electrical components and circuits.
1-2 weeks: Ohm's law, Kirchoff's voltage law, voltage divider rule and applications of series circuits
1-2 weeks: Parallel circuits, Kirchoff's current law, series-parallel circuits
1-2 weeks: Network analysis, voltage and current sources
1-2 weeks: Thevenin's theorem, Norton's theorem, and maximum power transfer theorem
1-2 weeks: Multisource circuit analysis, source conversion
1-2 weeks: Superposition theorem

**18. Program Learning Outcomes. DO NOT ENTER TEXT IN THE TEXT BOX BELOW. Click on the yellow button "PLOs" and enter text in that screen. Program Student Learning Outcomes (PLOs) supported by this course. If you are not a "program" use the Liberal Arts PLOs, view them by clicking on ? icon to the right.**

Program SLO
Analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems
Utilize appropriate mathematics at the level of algebra and trigonometry to solve technical problems
Demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing
Demonstrate engineer's way of thinking, analyzing technology as systems

19. College-wide Academic Student Learning Outcomes (CASLOs). FIRST, fill out the CASLO grid located in the UHMC tab above. Click on the HELP icon for tips on determining support for the CASLOs and indicate your choices below by clicking on the box in front of each supported CASLO. NOTE: Our campus does not use the Preparatory Level, Level 1 and Level 2 designations in the chart below.

<input checked="" type="checkbox"/>	<b>Creativity</b> - Able to express originality through a variety of forms. <input checked="" type="checkbox"/> Preparatory Level
<input checked="" type="checkbox"/>	<b>Critical Thinking</b> - Apply critical thinking skills to effectively address the challenges and solve problems. <input checked="" type="checkbox"/> Preparatory Level
	<b>Information Retrieval and Technology</b> - Access, evaluate, and utilize information effectively, ethically, and responsibly.
	<b>Oral Communication</b> - Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes.
<input checked="" type="checkbox"/>	<b>Quantitative Reasoning</b> - Synthesize and articulate information using appropriate mathematical methods to solve problems of quantitative reasoning accurately and appropriately. <input checked="" type="checkbox"/> Preparatory Level
	<b>Written Communication</b> - Write effectively to convey ideas that meet the needs of specific audiences and purposes.

20. **Linking.** CLICK ON CHAIN LINK ICON IN UPPER RIGHT HAND CORNER TO BEGIN LINKING.

21. **Method(s) of delivery appropriate for this course.**

- Classroom/Lab (0)

22. **Text and Materials, Reference Materials, and Auxiliary Materials.**

Thomas L. Floyd and David M. Bucha. Electronics Fundamentals: Circuits, Devices, and Applications. 8th E. Prentice Hall, 2010, 978-0-13-507295-0.

Text(s) may be supplemented by:

- C.A.I NIDA 130DAAD courseware
- Electronics labs
- Accompanying practice exercises prepared by the instructor
- Magazine or newspaper articles
- On-line materials

Other:

- Scientific calculator
- Engineering notebook

**23. Maximum enrollment.**

24

**24. Particular room type requirement. Is this course restricted to particular room type?**

YES

This course needs a lab with electronics equipment and computers to carry out the labs.

**25. Special scheduling considerations. Are there special scheduling considerations for this course?**

YES

This course must fit the AS ECET course scheduling.

**26. Are special or additional resources needed for this course?**

Electronics equipment: Power supplies, function generators, oscilloscopes, computers and electronic components. Ohmmeters, ammeters, and voltmeters. Solder stations. Breadboards. Software packages: Multisim, LabView. Ultiboard.

**27. Does this course require special fees to be paid for by students?**

NO

**28. Does this course change the number of required credit hours in a degree or certificate?**

No

**29. Course designation(s) for the Liberal Arts A.A. degree and/or for the college's other associate degrees.**

Degree	Program	Category
Associate in Arts:	Liberal Arts	LE - Elective
		LE - Elective
AS:	ECET - All	PR - Program Requirement
AAS:		
BAS:		
Developmental/ Remedial		

**30. Course designation(s) for other colleges in the UH system.**

The course transfers as an elective.

**31. Indicate the year and page # of UHMC catalog referred to. For new or modified courses, please indicate the catalog pages that need to be modified and provide a sheet outlining those changes.**

Referred catalog and modifications: pages 45 and 112 in UHMC's 2014-2015 general catalog.

### 32. College-wide Academic Student Learner Outcomes (CASLOs).

<b>Standard 1 - Written Communication</b>	
<b>Write effectively to convey ideas that meet the needs of specific audiences and purposes.</b>	
Outcome 1.1 - Use writing to discover and articulate ideas.	1
Outcome 1.2 - Identify and analyze the audience and purpose for any intended communication.	0
Outcome 1.3 - Choose language, style, and organization appropriate to particular purposes and audiences.	0
Outcome 1.4 - Gather information and document sources appropriately.	1
Outcome 1.5 - Express a main idea as a thesis, hypothesis, or other appropriate statement.	1
Outcome 1.6 - Develop a main idea clearly and concisely with appropriate content.	1
Outcome 1.7 - Demonstrate a mastery of the conventions of writing, including grammar, spelling, and mechanics.	0
Outcome 1.8 - Demonstrate proficiency in revision and editing.	0
Outcome 1.9 - Develop a personal voice in written communication.	0
<b>Standard 2 - Quantitative Reasoning</b>	
<b>Synthesize and articulate information using appropriate mathematical methods to solve problems of quantitative reasoning accurately and appropriately.</b>	
Outcome 2.1 - Apply numeric, graphic, and symbolic skills and other forms of quantitative reasoning accurately and appropriately.	3
Outcome 2.2 - Demonstrate mastery of mathematical concepts, skills, and applications, using technology when appropriate.	3
Outcome 2.3 - Communicate clearly and concisely the methods and results of quantitative problem solving.	2
Outcome 2.4 - Formulate and test hypotheses using numerical experimentation.	3
Outcome 2.5 - Define quantitative issues and problems, gather relevant information, analyze that information, and present results.	2
Outcome 2.6 - Assess the validity of statistical conclusions.	2
<b>Standard 3 - Information Retrieval and Technology.</b>	
<b>Access, evaluate, and utilize information effectively, ethically, and responsibly.</b>	
Outcome 3.1 - Use print and electronic information technology ethically and responsibly.	1
Outcome 3.2 - Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology.	1
Outcome 3.3 - Recognize, identify, and define an information need.	1
Outcome 3.4 - Access and retrieve information through print and electronic media, evaluating the accuracy and authenticity of that information.	1
Outcome 3.5 - Create, manage, organize, and communicate information through electronic media.	1
Outcome 3.6 - Recognize changing technologies and make informed choices about their appropriateness and use.	1
<b>Standard 4 - Oral Communication</b>	
<b>Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes.</b>	
Outcome 4.1 - Identify and analyze the audience and purpose of any intended communication.	0
Outcome 4.2 - Gather, evaluate, select, and organize information for the communication.	1
Outcome 4.3 - Use language, techniques, and strategies appropriate to the audience and occasion.	0
Outcome 4.4 - Speak clearly and confidently, using the voice, volume, tone, and articulation appropriate to the audience and occasion.	0
Outcome 4.5 - Summarize, analyze, and evaluate oral communications and ask coherent questions as needed.	1
Outcome 4.6 - Use competent oral expression to initiate and sustain discussions.	1
<b>Standard 5 - Critical Thinking</b>	
<b>Apply critical thinking skills to effectively address the challenges and solve problems.</b>	
Outcome 5.1 - Identify and state problems, issues, arguments, and questions contained in a body of information.	3
Outcome 5.2 - Identify and analyze assumptions and underlying points of view relating to an issue or problem.	3

<b>Outcome 5.3 - Formulate research questions that require descriptive and explanatory analyses.</b>	2
<b>Outcome 5.4 - Recognize and understand multiple modes of inquiry, including investigative methods based on observation and analysis.</b>	2
<b>Outcome 5.5 - Evaluate a problem, distinguishing between relevant and irrelevant facts, opinions, assumptions, issues, values, and biases through the use of appropriate evidence.</b>	3
<b>Outcome 5.6 - Apply problem-solving techniques and skills, including the rules of logic and logical sequence.</b>	3
<b>Outcome 5.7 - Synthesize information from various sources, drawing appropriate conclusions.</b>	2
<b>Outcome 5.8 - Communicate clearly and concisely the methods and results of logical reasoning.</b>	2
<b>Outcome 5.9 - Reflect upon and evaluate their thought processes, value system, and world views in comparison to those of others.</b>	2
<b>Standard 6 - Creativity</b> <b>Able to express originality through a variety of forms.</b>	
<b>Outcome 6.1: Generate responses to problems and challenges through intuition and non-linear thinking.</b>	2
<b>Outcome 6.2: Explore diverse approaches to solving a problem or addressing a challenge.</b>	2
<b>Outcome 6.3: Sustain engagement in activities without a preconceived purpose.</b>	2
<b>Outcome 6.4: Apply creative principles to discover and express new ideas.</b>	2
<b>Outcome 6.5: Demonstrate the ability to trust and follow one's instincts in the absence of external direction</b>	2
<b>Outcome 6.6: Build upon or adapt the ideas of others to create novel expressions or new solutions.</b>	2

### 33. Additional Information