

University of Hawaii Maui College
ETRO 205 - Digital Cmptr Tech II

1. **Course Alpha.**

ETRO

2. **Course Number.**

205

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

Digital Cmptr Tech II

4. **Number of Credits.**

4

5. **Contact Hours/Type.**

- Hour lecture/lab (6)

6. **Course Description.**

Introduces microprocessor technology. Studies microprocessor architecture and programming. Investigates addressing modes, stack operations, subroutines, input and output operations, microcomputer subsystems and interfacing. Designs, builds, analyzes, and troubleshoots oscillators, counter circuits, decoders, display drivers, digital to analog and analog to digital convertors. Programs INTEL microprocessors using emulators and embedded systems. Calibrates and characterizes digital systems and specifications.

7. **Pre-Requisites.**

ETRO 201 and MATH 119 or 135(or higher), both with grade C or better; 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-requisite has changed: MATH 119 replaces MATH 107 to better prepare ECET students for math in the BAS ENGT degree program.

12. **Effective Semester and Year.**

Spring 2014

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	Analyze and test microprocessor circuits.	Program a microprocessor system.	Analyze computer building block circuits including MPU, I/O, Power, Data Buss, Address buss and Memory circuits.
Describe INPUT/OUTPUT conditions for a microprocessor			<input checked="" type="checkbox"/>
Identify the architecture of typical MPU			<input checked="" type="checkbox"/>
Describe the purpose the instruction set of the MPU			<input checked="" type="checkbox"/>
Identify Logic instructions			<input checked="" type="checkbox"/>
Describe the purpose of Opcodes and their operations		<input checked="" type="checkbox"/>	
Identify the voltage thresholds and signals produced by MPU	<input checked="" type="checkbox"/>		
Describe operations of Registers and the ALU		<input checked="" type="checkbox"/>	
Measure waveforms and logic levels of a MPU	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Plan and flowchart programs		<input checked="" type="checkbox"/>	
Write and run program		<input checked="" type="checkbox"/>	
Identify Move instructions		<input checked="" type="checkbox"/>	
Use Jump and Flag instructions		<input checked="" type="checkbox"/>	
Test Call and Returns		<input checked="" type="checkbox"/>	
Troubleshoot and debug programs		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Describe I/O instructions			<input checked="" type="checkbox"/>
Use Push and Pop commands		<input checked="" type="checkbox"/>	
Identify Control and Mask Interrupts	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Identify and test I/O devices			<input checked="" type="checkbox"/>
Measure outputs of MPU Busses	<input checked="" type="checkbox"/>		<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.
Analyze and test microprocessor circuits.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Program a microprocessor system.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Analyze computer building block circuits including MPU, I/O, Power, Data Buss, Address buss and Memory 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
Describe INPUT/OUTPUT conditions for a microprocessor
Identify the architecture of typical MPU
Describe the purpose the instruction set of the MPU
Identify Logic instructions
Describe the purpose of Opcodes and their operations
Identify the voltage thresholds and signals produced by MPU
Describe operations of Registers and the ALU
Measure waveforms and logic levels of a MPU
Plan and flowchart programs
Write and run program
Identify Move instructions
Use Jump and Flag instructions
Test Call and Returns
Troubleshoot and debug programs
Describe I/O instructions
Use Push and Pop commands
Identify Control and Mask Interrupts
Identify and test I/O devices
Measure outputs of MPU Busses

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 microprocessor fundamentals
1-2 weeks Introduction to instruction sets
1-2 weeks Microprocessor hardware
1-2 weeks Introduction to microprocessor programming
1-2 weeks Algorithms
1-2 weeks Microprocessor programming
1-2 weeks Sub Routine programming
1-2 weeks Input and output programming

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

Materials:

Text(s) may be supplemented with:

- Accompanying practice exercises if available
- Articles, handouts and/or exercises prepared by the instructor
- Magazine or newspaper articles
- On-line materials

Other:

- Engineering Notebook
- Ronald J. Tocci, Neal S. Widmer, and Gregory L. Moss. Digital Systems: Principles and Applications. 11th E. Pearson, Prentice Hall, 2011, 978-0135103821.

23. Maximum enrollment.

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

YES

Lab with all the equipment required to carry out the labs (like KAA 217).

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

YES

This course must fit the ECET AS degree course scheduling.

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

Electronics equipment: Power supplies, function generators, oscilloscopes, computers and electronic components. Logic analyzers, logic probes, digital electronic components, breadboards, LED displays, and passive electronic components.

Software package: Multisim, EMU 86, Hyperterminal, Hex Editor Neo.

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.

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

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

Standard 1 - Written Communication	
Write effectively to convey ideas that meet the needs of specific audiences and purposes.	
Outcome 1.1 - Use writing to discover and articulate ideas.	0
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
Standard 2 - Quantitative Reasoning	
Synthesize and articulate information using appropriate mathematical methods to solve problems of quantitative reasoning accurately and appropriately.	
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.	2
Outcome 2.5 - Define quantitative issues and problems, gather relevant information, analyze that information, and present results.	3
Outcome 2.6 - Assess the validity of statistical conclusions.	2
Standard 3 - Information Retrieval and Technology.	
Access, evaluate, and utilize information effectively, ethically, and responsibly.	
Outcome 3.1 - Use print and electronic information technology ethically and responsibly.	0
Outcome 3.2 - Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology.	0
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.	0
Outcome 3.6 - Recognize changing technologies and make informed choices about their appropriateness and use.	1
Standard 4 - Oral Communication	
Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes.	
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.	0
Standard 5 - Critical Thinking	
Apply critical thinking skills to effectively address the challenges and solve problems.	
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

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

33. Additional Information