University of Hawaii Maui College
ETRO 305 - Engineering Computing

1. **Course Alpha. Please click on the ? to the right for help.**

   ETRO

2. **Course Number. Please click on the ? to the right for help.**

   305

3. **Course Title/Catalog Title. Please click on the ? to the right for help.**

   Engineering Computing

4. **Number of Credits. Please click on the ? to the right for help.**

   4

5. **Contact Hours/Type. Please click on the ? to the right for help.**

   - Hour lecture/lab (6)

6. **Course Description. Please click on the ? to the right for help.**

   Studies computer programming to solve electronics and optical system problems. Uses software programming applications, technical databases, image processing, and other scientific and engineering software tools. Reinforces mathematical concepts useful in the study of engineering technology. Utilizes the capabilities of software such as MATLAB and its applications to visualize solutions to technical and engineering problems. Includes hands-on engineering computing examples to demonstrate programming skills.

7. **Pre-Requisites. Please click on the ? to the right for help.**

   ETRO 212   Etron Technology II ; OR consent
   ICS 111   Intro Computer Sci I ; OR consent

   ETRO 212 and ICS 111 both with grade C or better; or consent

8. **Co-requisites.**

   ETRO 310

9. **Recommended Preparation.**

   None

10. **Is this a cross-listed course? Please click on the ? to the right for help.**

    NO

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

    The program map is modified, and therefore the sequence of courses. As a consequence, the co-

requisites have to be modified. The number of credits and contact hours are changed to better reflect the content of the course.

12. **Effective Semester and Year. For new or modified courses, the effective year is one year from the semester proposed. For example, if proposed in Spring 2012, the effective semester is Spring 2013. Please click on the ? to the right for help.**

    Fall 2015

13. **Grading Method. What grading methods may be used for this course? Please click on the ? to the right for help.**

    - 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? Please click on the ? to the right for help.**

    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. Please click on the ? to the right for help.**

Course SLO/Competency	Identify variables of an appropriate type and write expressions to perform computation.	Apply a simple algorithm to solve a minor engineering problem.	Demonstrate image analysis tools such as IDL and perform matrix operations.	Design and analyze optical systems using Zemax.	Understand vector analysis using Matlab.	Utilize AutoCAD and SolidWorks for mechanical system analysis.	Utilize project management software.
Utilize software applications such as MATLAB to determine numerical solutions.	☑	☑	☑		☑		
Perform qualitative and graphical analysis of solutions.		☑				☑	☑
Develop the mathematical modeling of physical problems.				☑	☑		☑
Apply design patterns for analyzing electronic signals and systems.						☑	☑

Course SLO/PSLO		analyze, design, and implement electro-optic systems,	demonstrate critical engineering technology skills and experiences	utilize integral and differential calculus, or other	demonstrate the engineer's way of thinking,

	control systems, instrumentation systems, communication systems, computer systems, or power systems.	such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing.	appropriate mathematics above the level of algebra and trigonometry to solve technical problems.	analyzing technology as systems.
Utilize software applications such as MATLAB to determine numerical solutions.	☑	☑		
Perform qualitative and graphical analysis of solutions.	☑	☑		
Develop the mathematical modeling of physical problems.			☑	☑
Apply design patterns for analyzing electronic signals and systems.			☑	☑

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 variables of an appropriate type and write expressions to perform computation.
Apply a simple algorithm to solve a minor engineering problem.
Demonstrate image analysis tools such as IDL and perform matrix operations.
Design and analyze optical systems using Zemax.
Understand vector analysis using Matlab.
Utilize AutoCAD and SolidWorks for mechanical system analysis.
Utilize project management software.

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
Introduction to MATLAB (2 weeks)
Algorithms (2 weeks)
Matrix operations (2 weeks)
Image analysis (2 weeks)
Introduction to Zemax (2 weeks)
Vector analysis using MATLAB (2 weeks)

Mechanical system analysis with AutoCAD and SolidWorks (3 weeks)

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.**
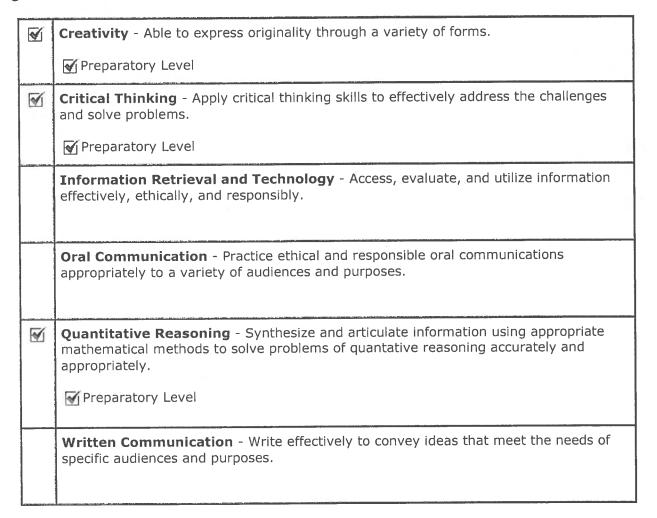
Program SLO
analyze, design, and implement electro-optic systems, control systems, instrumentation systems, communication systems, computer systems, or power systems.
demonstrate critical engineering technology skills and experiences such as: making existing technology operate, creating/selecting new technology, troubleshooting, calibrating, characterizing, and optimizing.
utilize integral and differential calculus, or other appropriate mathematics above the level of algebra and trigonometry to solve technical problems.
demonstrate the 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.**

☑	**Creativity** - Able to express originality through a variety of forms. ☑ Preparatory Level
☑	**Critical Thinking** - Apply critical thinking skills to effectively address the challenges and solve problems. ☑ 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.
☑	**Quantitative Reasoning** - Synthesize and articulate information using appropriate mathematical methods to solve problems of quantative reasoning accurately and appropriately. ☑ Preparatory Level
	Written Communication - Write effectively to convey ideas that meet the needs of specific audiences and purposes.

GenED SLO
Creativity - Able to express originality through a variety of forms.
Critical Thinking - Apply critical thinking skills to effectively address the challenges and solve problems.
Quantitative Reasoning - Synthesize and articulate information using appropriate mathematical methods to solve problems of quantative reasoning accurately and appropriately.

20. **Linking. CLICK ON CHAIN LINK ICON IN UPPER RIGHT HAND CORNER TO BEGIN LINKING. Please click on the ? to the right for help.**

21. **Method(s) of delivery appropriate for this course. Please click on the ? to the right for help.**

    - Classroom/Lab (0)

22. **Text and Materials, Reference Materials, and Auxiliary Materials. Please click on the ? to the right for help.**

    Textbook: David M. Smith, Engineering Computation with MATLAB, 3/E, ISBN-13: 9780132568708
    Software: MATLAB
    Accompaying practice exerise
    Articles, handouts and /or exercieprepared by the instructor
    On-line matrials

23. **Maximum enrollment. Please click on the ? to the right for help.**

    24

24. **Particular room type requirement. Is this course restricted to particular room type? Please click on the ? to the right for help.**

    YES
    Room with computers.

25. **Special scheduling considerations. Are there special scheduling considerations for this course? Please click on the ? to the right for help.**

    YES
    Must fit the BAS ENGT course scheduling.

26. **Are special or additional resources needed for this course? Please click on the ? to the right for help.**

    No

27. **Does this course require special fees to be paid for by students? Please click on the ? to the right for help.**

    NO

28. Does this course change the number of required credit hours in a degree or certificate? Please click on the ? to the right for help.

No

29. Course designation(s) for the Liberal Arts A.A. degree and/or for the college's other associate degrees. Please click on the ? to the right for help.

Degree	Program	Category
Associate in Arts:		LE - Elective LE - Elective
AS:		PE - Program Elective
AAS:		
BAS:	ET	CR - Core Course/Requirement - 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.

General catalog 2014-2015 page 15 and 113

32. College-wide Academic Student Learner Outcomes (CASLOs). Please click on the HELP icon for more information.

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.		1
Outcome 1.4 - Gather information and document sources appropriately.		2
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		0

grammar, spelling, and mechanics.

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 quantative 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.	1
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.	3
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.	1
Outcome 3.2 - Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology.	2
Outcome 3.3 - Recognize, identify, and define an information need.	2
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
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.	1
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	1

coherent questions as needed.		
Outcome 4.6 - Use competent oral expression to initiate and sustain discussions.		1
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.		2
Outcome 5.2 - Identify and analyze assumptions and underlying points of view relating to an issue or problem.		1
Outcome 5.3 - Formulate research questions that require descriptive and explanatory analyses.		1
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.		1
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.		3
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.		1
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.		1
Outcome 6.2: Explore diverse approaches to solving a problem or addressing a challenge.		3
Outcome 6.3: Sustain engagement in activities without a preconceived purpose.		0
Outcome 6.4: Apply creative principles to discover and express new ideas.		1
Outcome 6.5: Demonstrate the ability to trust and follow one's instincts in the absence of external direction		1
Outcome 6.6: Build upon or adapt the ideas of others to create novel expressions or new solutions.		2

33. Additional Information