University of Hawaii Maui College
SSM 422 - Sustainable Systems Thinking

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

   SSM

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

   422

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

   Sustainable Systems Thinking

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

   3

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

   - Hour lecture (3)

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

   Explores the theory and application of established systems thinking practices, models and programs, as applied historically and in a sustainability context. Examines complex, multi-discipline problems and proposed solutions in real world scenarios. Develops skills using modelling software for tracking, illustrating and verifying systems analysis.

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

   SSM 301, ENG 316 and MATH 135, all with grade C or better; or consent.

8. **Co-requisites.**

9. **Recommended Preparation.**

   MATH 203 or MATH 205.

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.**

    Systems Thinking is central to modern sustainability education and analysis. This course has been offered two times as a Topics course and pursuant to concurrent program modifications will be a required core course for the SSM program. This outline is submitted to make this a permanent 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 2014

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	Recognize components and behaviors of common systems.	Illustrate and articulate the structures and behaviors of systems, together with associated sub-systems and meta-systems.	Demonstrate skills in the use of modelling software to provide a means of organizing and providing basic simulations of historic and contemporary circumstances.	Apply existing systems thinking concepts to sustainability issues and examples in real world situations.
Course SLO 1: Analyze complex sustainability concepts using systems thinking theory, modelling software and real world scenarios.	☑	☑	☑	☑
Course SLO2: Apply systems thinking concepts to develop best available solutions to existing complex problems.	☑	☑	☑	☑
Course SLO3: Present logic based illustrations of complex issues and the means by which they may be addressed.	☑	☑	☑	☑

Course SLO/PSLO	PLO 1: Examine ways in which the features and functions of multiple systems are interconnected, and explain how one system can be optimized without degrading other systems or depleting natural resources.	PLO 4: Describe the unique sustainability challenges faced by island communities.	PLO 7: Propose and justify creative solutions to sustainability challenges that are scientifically sound.	PLO 8: Demonstrate skills related to managing sustainability projects including defining scope, selecting achievable goals, evaluating ethical implications, working with diverse teams, making presentations, and preparing

				reports.
Course SLO 1: Analyze complex sustainability concepts using systems thinking theory, modelling software and real world scenarios.	☑	☑	☑	☑
Course SLO2: Apply systems thinking concepts to develop best available solutions to existing complex problems.	☑	☑	☑	
Course SLO3: Present logic based illustrations of complex issues and the means by which they may be addressed.	☑	☑	☑	☑

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
Recognize components and behaviors of common systems.
Illustrate and articulate the structures and behaviors of systems, together with associated sub-systems and meta-systems.
Demonstrate skills in the use of modelling software to provide a means of organizing and providing basic simulations of historic and contemporary circumstances.
Apply existing systems thinking concepts to sustainability issues and examples in real world situations.

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.

I. Systems Thinking concepts - 2 weeks
II. Illustrating Systems Thinking - 3 weeks
III. Introducing Modeling software - 3 weeks
IV. Understanding Systems behaviors - 3 weeks
V. Complex Systems - 2 wweks
VI. Preparation of Case Studies - 2 weeks

Content
I. Systems Thinking concepts - 2 weeks II. Illustrating Systems Thinking - 3 weeks III. Introducing Modeling software - 3 weeks IV. Understanding Systems behaviors - 3 weeks V. Complex Systems - 2 weeks VI. Preparation of Case Studies - 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
PLO 1: Examine ways in which the features and functions of multiple systems are interconnected, and explain how one system can be optimized without degrading other systems or depleting natural resources.

PLO 4: Describe the unique sustainability challenges faced by island communities.
PLO 7: Propose and justify creative solutions to sustainability challenges that are scientifically sound.
PLO 8: Demonstrate skills related to managing sustainability projects including defining scope, selecting achievable goals, evaluating ethical implications, working with diverse teams, making presentations, and preparing reports.

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. ☑ Level 2
☑	**Critical Thinking** - Apply critical thinking skills to effectively address the challenges and solve problems. ☑ Level 2
☑	**Information Retrieval and Technology** - Access, evaluate, and utilize information effectively, ethically, and responsibly. ☑ Level 2
☑	**Oral Communication** - Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes. ☑ Level 1
☑	**Quantitative Reasoning** - Synthesize and articulate information using appropriate mathematical methods to solve problems of quantative reasoning accurately and appropriately. ☑ Level 2
☑	**Written Communication** - Write effectively to convey ideas that meet the needs of specific audiences and purposes. ☑ Level 1

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.
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.
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. 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)
- Hybrid (0)
- Online (0)

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

1) Systems Thinking Basics by Anderson, V. and Johnson, L. first ed. (1997); Pegasus Communications; ISBN 1-883823-12-9
2) Thinking in Systems by Meadows, D., Wright, D. ed. First ed. (2008); Chelsea Green Publishing; ISBN 978-1-60358-055-7

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

20

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

NO

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

NO

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

All students must have access to a laptop computer.

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 change.

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:	Liberal Arts	LE - Elective N/A
AS:	N/A	Other

AAS:	N/A	Other
BAS:	Other	CR - Core Course/Requirement - BAS
Developmental/ Remedial:	N/A	

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

None.

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.

From the 2013-14 UHMC catalog at page 141 this course should be inserted as:

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.		2
Outcome 1.2 - Identify and analyze the audience and purpose for any intended communication.		3
Outcome 1.3 - Choose language, style, and organization appropriate to particular purposes and audiences.		2
Outcome 1.4 - Gather information and document sources appropriately.		3
Outcome 1.5 - Express a main idea as a thesis, hypothesis, or other appropriate statement.		3
Outcome 1.6 - Develop a main idea clearly and concisely with appropriate content.		3
Outcome 1.7 - Demonstrate a mastery of the conventions of writing, including grammar, spelling, and mechanics.		2
Outcome 1.8 - Demonstrate proficiency in revision and editing.		2
Outcome 1.9 - Develop a personal voice in written communication.		2
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.		3
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.		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.		2
Outcome 3.2 - Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology.		3
Outcome 3.3 - Recognize, identify, and define an information need.		3
Outcome 3.4 - Access and retrieve information through print and electronic media, evaluating the accuracy and authenticity of that information.		2
Outcome 3.5 - Create, manage, organize, and communicate information through electronic media.		3
Outcome 3.6 - Recognize changing technologies and make informed choices about their appropriateness and use.		2
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.		2
Outcome 4.2 - Gather, evaluate, select, and organize information for the communication.		3
Outcome 4.3 - Use language, techniques, and strategies appropriate to the audience and occasion.		2
Outcome 4.4 - Speak clearly and confidently, using the voice, volume, tone, and articulation appropriate to the audience and occasion.		2
Outcome 4.5 - Summarize, analyze, and evaluate oral communications and ask coherent questions as needed.		3
Outcome 4.6 - Use competent oral expression to initiate and sustain discussions.		2
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.		3

Outcome 5.4 - Recognize and understand multiple modes of inquiry, including investigative methods based on observation and analysis.		3
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.		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.		3
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.		3
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.		3
Outcome 6.4: Apply creative principles to discover and express new ideas.		3
Outcome 6.5: Demonstrate the ability to trust and follow one's instincts in the absence of external direction		3
Outcome 6.6: Build upon or adapt the ideas of others to create novel expressions or new solutions.		2

33. Additional Information