

University of Hawaii Maui College

SSM 402 - Water Resources Management

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.

402

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

Water Resources Management

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/lab (3)

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

Examines typical means of managing fresh water resources with emphasis on island water and wastewater management techniques. Introduces water quality testing techniques and parameters as well as advanced wastewater treatment processes. Discovers principles of sustainability from hydraulics, hydrology, and distribution systems. Discusses water reuse and recycling practices on Maui.

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

SSM 202, BIOL 171/171L, CHEM 151 or 161/161L, and MATH 135, all with grade C or better; or consent.

Co-requisites.

9. Recommended Preparation.

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.

Course prerequisites are being changed to be consistent with minor program changes made in response to student feedback and a consensus regarding program improvement.

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	Assesses three phases of wastewater treatment process including	Explain the Safe Drinking Water Act	Describe the technology of water distribution systems	Compute pressure, discharge, volumetric flow, yield, oxygen	Derive, solve, and interpret equations, charts, and graphs for	Solve for rainfall intensity, utilize hydrographs and	Construct and define the biogeochemical cycle, carbon, nitrogen and	Describe the difference between chlorine and UV	Solve for components and functions using standard	Identify existing and recycled wastewater facilities and
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	screening, shredding, grit removal, sedimentation, filtration, and biological treatment		including design factors, water mains, centrifugal pumps, distribution storage, flow in pipe networks, and computer applications	demand, chemical concentration, hydrostatic pressure	design factors, water mains, centrifugal pumps, distribution storage, flow in pipe networks, and computer applications	nomographs	phosphorous cycle	disinfection	hydraulic and hydrological equations such as Bernoulli's equation, Manning's Equation, Darcy's equation	applications and discuss new use solutions for usage and distributi
Assess, analyze, and explain water quality, water pollution, and drinking water purification processes including policy and standards established by the environmental protection agency	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		
Explain the fundamental concepts and drivers for water resources management and wastewater treatment processes.	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>			
Detail the process and components of hydraulics and hydrology including biogeochemical cycles	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
Analyze water supply and distribution techniques	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>
Explore diverse approaches to solving water reuse and water supply challenges while building upon or adapting the ideas of others to create new solutions.		<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>
Describe the technology of water distribution systems and sanitary sewer systems	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

Course SLO/PSLO	Explain how 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	Describe the unique sustainability challenges faced by island communities	Identify, outline and illustrate the fundamentals of existing and emerging technologies in energy production, distribution and management; water supply; wastewater treatment; and waste management; their applications, processes and requirements
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Describe the technology of water distribution systems and sanitary sewer systems	<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
Assesses three phases of wastewater treatment process including screening, shredding, grit removal, sedimentation, filtration, and biological treatment
Explain the Safe Drinking Water Act
Describe the technology of water distribution systems including design factors, water mains, centrifugal pumps, distribution storage, flow in pipe networks, and computer applications
Compute pressure, discharge, volumetric flow, yield, oxygen demand, chemical concentration, hydrostatic pressure
Derive, solve, and interpret equations, charts, and graphs for design factors, water mains, centrifugal pumps, distribution storage, flow in pipe networks, and computer applications
Solve for rainfall intensity, utilize hydrographs and nomographs
Construct and define the biogeochemical cycles: carbon cycle, nitrogen cycle, and phosphorous cycle
Describe the difference between chlorine and UV disinfection
Solve for components and functions using standard hydraulic and hydrological equations such as Bernoulli's equation, Manning's Equation, Darcy's equation
Identify uexisting recycled wastewater facilities and applications and discuss new use solutions for usage and distribution

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 week: Course introduction and basic concepts of water use and availability
1-2 weeks: Fundamentals of hydraulics
1-2 weeks: Fundamentals of hydrology
2-4 weeks: Water quality- sampling, physical, chemical, and biological parameters
1-2 weeks: Water pollution
1-2 weeks: Drinking Water Purification
1-2 weeks: Water Distribution Systems and Stormwater Management
1-2 weeks: Introduction to wastewater and facilities
1-2 weeks: Preliminary Treatment in wastewater
1-3 weeks: Secondary treatment- fixed films, activated sludge, microbiology
1-2 weeks: Stabilization ponds, filtration, disinfection, effluent disposal
1-2 weeks: Water Reuse, sludge handling
1-2 weeks: Laboratory procedures and facilities safety

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
Explain how 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
Describe the unique sustainability challenges faced by island communities
Identify, outline and illustrate the fundamentals of existing and emerging technologies in energy production, distribution and management; water supply; wastewater treatment; and waste management; their applications, processes and requirements

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"/> Level 1
<input checked="" type="checkbox"/>	Critical Thinking - Apply critical thinking skills to effectively address the challenges and solve problems. <input checked="" type="checkbox"/> Level 2
<input checked="" type="checkbox"/>	Information Retrieval and Technology - Access, evaluate, and utilize information effectively, ethically, and responsibly. <input checked="" type="checkbox"/> Level 2
<input checked="" type="checkbox"/>	Oral Communication - Practice ethical and responsible oral communications appropriately to a variety of audiences and purposes. <input checked="" type="checkbox"/> Level 2
<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"/> Level 1
<input checked="" type="checkbox"/>	Written Communication - Write effectively to convey ideas that meet the needs of specific audiences and purposes. <input checked="" type="checkbox"/> Level 2

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 quantitative 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)
- HITS/Interactive TV (0)
- Hybrid (0)
- Online (0)

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

1. BASIC ENVIRONMENTAL TECHNOLOGY: Water Supply, Waste Management and Pollution Control. Fifth edition. Author: Jerry A. Nathanson. (required)
2. When The Rivers Run Dry, ebook. Fred Peirce. (required)
3. Operation of Wastewater Treatment Plants, Volumes I and 2 seventh edition (recommended)

- Jerry A. Nathanson. BASIC ENVIRONMENTAL TECHNOLOGY: Water Supply, Waste Management and Pollution Control. Fifth. Prentice Hall, 2007, 0131190822.
- Fred Pearce. When the Rivers Run Dry. Second. Beacon Press, 2006, 0807085723.

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

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

YES

Computer Lab

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

YES

Laboratory availability for specified classes

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:	Liberal Arts	LE - Elective
AS:	Human Services - All	NS - Natural Science
AAS:	ANY	NS - Natural Science
BAS:	Other	CR - Core Course/Requirement - BAS
Developmental/ Remedial:		

Core Requirement for Bachelor of Applied Science in Sustainable Science Management (BAS SSM)

Natural Science-Diversification Physical

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

Diversification Physical

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.

UHMC 2013-2014catalog at p. 141.

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.		
Outcome 1.2 - Identify and analyze the audience and purpose for any intended communication.		
Outcome 1.3 - Choose language, style, and organization appropriate to particular purposes and audiences.		
Outcome 1.4 - Gather information and document sources appropriately.		
Outcome 1.5 - Express a main idea as a thesis, hypothesis, or other appropriate statement.		

Outcome 1.6 - Develop a main idea clearly and concisely with appropriate content.		
Outcome 1.7 - Demonstrate a mastery of the conventions of writing, including grammar, spelling, and mechanics.		
Outcome 1.8 - Demonstrate proficiency in revision and editing.		
Outcome 1.9 - Develop a personal voice in written communication.		
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.		
Outcome 2.2 - Demonstrate mastery of mathematical concepts, skills, and applications, using technology when appropriate.		
Outcome 2.3 - Communicate clearly and concisely the methods and results of quantitative problem solving.		
Outcome 2.4 - Formulate and test hypotheses using numerical experimentation.		
Outcome 2.5 - Define quantitative issues and problems, gather relevant information, analyze that information, and present results.		
Outcome 2.6 - Assess the validity of statistical conclusions.		
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.		
Outcome 3.2 - Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology.		
Outcome 3.3 - Recognize, identify, and define an information need.		
Outcome 3.4 - Access and retrieve information through print and electronic media, evaluating the accuracy and authenticity of that information.		
Outcome 3.5 - Create, manage, organize, and communicate information through electronic media.		
Outcome 3.6 - Recognize changing technologies and make informed choices about their appropriateness and use.		
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.		
Outcome 4.2 - Gather, evaluate, select, and organize information for the communication.		
Outcome 4.3 - Use language, techniques, and strategies appropriate to the audience and occasion.		
Outcome 4.4 - Speak clearly and confidently, using the voice, volume, tone, and articulation appropriate to the audience and occasion.		
Outcome 4.5 - Summarize, analyze, and evaluate oral communications and ask coherent questions as needed.		
Outcome 4.6 - Use competent oral expression to initiate and sustain discussions.		
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.		
Outcome 5.2 - Identify and analyze assumptions and underlying points of view relating to an issue or problem.		
Outcome 5.3 - Formulate research questions that require descriptive and explanatory analyses.		
Outcome 5.4 - Recognize and understand multiple modes of inquiry, including investigative methods based on observation and analysis.		
Outcome 5.5 - Evaluate a problem, distinguishing between relevant and irrelevant facts, opinions, assumptions, issues, values, and biases through the use of appropriate evidence.		

Outcome 5.6 - Apply problem-solving techniques and skills, including the rules of logic and logical sequence.		
Outcome 5.7 - Synthesize information from various sources, drawing appropriate conclusions.		
Outcome 5.8 - Communicate clearly and concisely the methods and results of logical reasoning.		
Outcome 5.9 - Reflect upon and evaluate their thought processes, value system, and world views in comparison to those of others.		
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.		
Outcome 6.2: Explore diverse approaches to solving a problem or addressing a challenge.		
Outcome 6.3: Sustain engagement in activities without a preconceived purpose.		
Outcome 6.4: Apply creative principles to discover and express new ideas.		
Outcome 6.5: Demonstrate the ability to trust and follow one's instincts in the absence of external direction		
Outcome 6.6: Build upon or adapt the ideas of others to create novel expressions or new solutions.		

33. Additional Information

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