Science or Computer Science Courses – Curriculum Map to 2010 AAOT Outcomes

Department/Discipline: Science/Watershed Science Technician Course: WST 230 – Watersheds and Hydrology

1. Science or Computer Science Discipline Studies Outcomes

As a result of taking Science or Computer Science Discipline Studies courses, a student should be able to:	Course Outcome(s) related to the Science or Computer Science Outcome	Under what conditions and criteria will the course outcome be assessed? (i.e., a menu of suggested assessment options)
1. Gather, comprehend, and communicate scientific and technical information in order to explore ideas, models and solutions and generate further questions.	As a result of taking this course students will be able to describe and classify, compare and contrast, and analyze data from different watersheds. Students will be able to integrate and synthesize concepts of the physical and biological interconnectedness of freshwater systems and pursue further lines of inquiry.	Quizzes, exams, lab activities, and/or case and field studies will assess student knowledge and comprehension of material. This will also be expected to be part of the assessment of a project write-up. Participation in class discussions will demonstrate students' ability to generate probative questions.
2. Apply scientific and technical modes of inquiry, individually and collaboratively, to critically evaluate existing or alternative explanations, solve problems, and make evidence-based decisions in an ethical manner.	As a result of taking this course students will be able to evaluate an array of information sources (including those published by governmental agencies and media) about the water cycle and the condition of various watersheds, particularly those in Oregon. A comprehensive approach to the individual and collective components of the hydrological cycle will be explored in detail. Students will be able to use diverse technologies in field settings to measure physical and chemical properties of water.	Problem solving skills will be assessed by labs, quizzes and exams. Group discussions about specific case studies, for example catastrophic oil spills, will be used to assess student ability to collaborate. Student interaction and sharing of data are encouraged during lab activities.

As a result of taking Science or Computer Science Discipline Studies courses, a student should be able to:	Course Outcome(s) related to the Science or Computer Science Outcome	Under what conditions and criteria will the course outcome be assessed? (i.e., a menu of suggested assessment options)
3. Assess the strengths and weaknesses of scientific studies and critically examine the influence of scientific and technical knowledge on human society and the environment**.**	Students will examine, synthesize and interpret scientific studies and popular media reports relating to watersheds. Students will be able to analyze flaws in and judge the validity of specific hydrological studies and their conclusions as they investigate best practices. Students will be able to critique the ability of scientific and technical knowledge to mitigate potential climate change effects on watersheds.	Case studies, discussions, labs, homework and analysis of real-time data will be used to assess understanding. Exams will be deployed to test depth of understanding and exposure to new data to test interpretation in new contexts.

2. Science or Computer Science Discipline Studies Course Criteria

A General Education course in either Science or Computer Science should:	How course meets criterion	Related Course Outline statements
1. Analyze the development, scope, and limitations of fundamental scientific concepts, models, theories, and methods.	Students will learn the scope and limitations of science and technology as they apply to watersheds. Examples would include the limitations of our ability to completely understand the effect of certain pollutants on aquatic environments and water supply, overpumping (including in coastal areas where salt water intrusion could be a problem). Hydrological science principles covering all aspect of the water cycle and water budgets are covered, including the scientific discovery and evolution of laboratory and field methods. The class explores hypothesis and prediction, aquatic adaptations, natural selection, data analysis, and interpreting and constructing graphs using lab activities and field trips to aquatic habitats.	Upon successful completion of this course students will be able to hone critical thinking skills by gathering and assessing information about current environmental issues related to watersheds. Students will engage in classification of of stream geomorphology, sediment and channel processes and watershed ecology.

A General Education course in either Science or Computer Science should:	**How course meets criterion**	**Related Course Outline statements**
2. Engage students in problem-solving and investigation, through the application of scientific and mathematical methods and concepts, and by using evidence to create and test models and draw conclusions. The goal should be to develop analytical thinking that includes evaluation, synthesis, and creative insight.	Students will solve problems involving mathematical and scientific concepts. Students will apply their knowledge to evaluate concepts such as the interaction of surface water and groundwater, relationships between precipitation and runoff, and impacts of changes in the hydrologic cycle on climate change.	Upon successful completion of this course students will be able to develop hypotheses and collect field data to study life in watersheds determine and evaluate responses of streams to natural and human-caused disturbances, including short-term and longer-term climate change.
3. Examine relationships with other subject areas, including the ethical application of science in human society, and the relevance of science to everyday life.	Students will be assessing popular media reports on topics such as water pollution, coastal erosion, salmon restoration efforts, hydrofracking and impacts on groundwater, and flood and drought situations; potential impacts of climate change on watersheds are also covered in depth.	Upon successful completion of this course students will be able to explain and assess the causes of watershed degradation. Students will evaluate effects of common land-use practices on watershed ecosystems, stream corridors, and ecosystem services provided by the watershed.
In addition, a General Education course in Science should:	**How course meets criterion**	**Related Course Outline statements**

A General Education course in either Science or Computer Science should:	**How course meets criterion**	**Related Course Outline statements**
• Engage students in collaborative, hands-on and/or real-life activities that develop scientific reasoning and the capacity to apply mathematics, and that allow students to experience the exhilaration of discovery, and	Students collaborate on labs. These labs often require math skills through data analysis of trends and cycles and patterns in data. On campus field trips visit distinctly different watershed environments to expose students to real-life situations, and two field trips to a fresh water river and a coastal estuary will enhance their deeper understanding. Lab reports and projects will allow students to enhance their collaborative skills to come up with cogent analyses of these watershed ecosystems in an inquiry-based approach.	Upon successful completion of this course students will be able to discuss and assess the health of watersheds. Students will also be able to compare and contrast the physical and chemical properties of many aquatic zones including (but not limited to) those in Oregon. Students will have a fundamental grasp of hydrology including water budget and water cycle principles.
A General Education course in Computer Science should:	**How course meets criterion**	**Related Course Outline statements**
• Engage students in the design of algorithms and computer programs that solve problems.	Students will perform rainfall-runoff curve simulations using spreadsheet or other hydrological software packages, and will also explore flood frequency analysis software to examine establishment of 100 year flood zones. Software will also be deployed to allow for examination of factors involving water quality.	Upon successful completion of this course students will be able to model and simulate impacts of physical variables on the health and physical aspects of a watershed, including watershed dynamics.

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Instructor **Date** **Academic Dean** **Date**