**UNIVERSITY OF MARY WASHINGTON -- NEW COURSE PROPOSAL**

Electronically submit this completed form with PDF attachments to the Chair of the College Curriculum Committee.

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<th>COLLEGE (check one):</th>
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<td>Arts and Sciences</td>
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<td>Business</td>
<td>Education</td>
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Proposal Submitted By: David Toth
Date Prepared: 10/28/12

Course Title: Introduction to Modeling & Simulation
Department/discipline and course number*: Computer Science CPSC 109

*This course number must be approved by the Office of the Registrar before the proposal is submitted.

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<th>Number of credits proposed:</th>
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Prerequisites: none

Will this be a new, repeatable “special topics” course? (Do you want students to be able to take this new course more than once if the topic changes?)

NO X YES

Date of first offering of this new course: FALL SEMESTER, year

Fall 2013

Proposed frequency of offering of the course: Every other year

List the faculty who will likely teach the course: David Toth

Are ANY new resources required? NO X YES

Document in attached impact statement

This new course will be (check all that apply):

Required in the major
Elective in the major General Elective
General Education**

**AFTER the new course is approved, a separate proposal must be sent to the General Education Committee.

Catalog Description: This course introduces students to the concepts of modeling and simulation as tools for solving problems in the sciences. Students will be introduced to several modeling and simulation tools and will learn how to decompose problems so they can be represented and solved with the tools. Agent models and system models will be introduced. Example problems to demonstrate the modeling and simulation techniques and tools will be drawn from a number of scientific fields and will include basic problems that will not require depth of knowledge in any particular field of science. Examples of these problems include forest fires, predator-prey problems, transmission of diseases, chemical reactions, and elementary particle simulations. Students completing the course will be able to model complex systems and have attained programming skills equivalent to those learned in CPSC 110. Successful completion of this course is sufficient to continue on to CPSC 220. No previous programming experience or computer science background is expected.

COURSE HISTORY

Was this course taught previously as a topics or experimental course? YES NO X

Course Number and Title of Previous Course

Semester Offered Enrollment

CHECK HERE if the proposed course is to be equated with the earlier topics or experimental offerings. This means that students who took the earlier “topics” course will only be able to take the new course if they made a C- grade or lower in the earlier course.

NOTE: If the proposed course has not been previously offered as a topics or experimental course, explain in the attached rationale statement why the course should be adopted even though it has not been tried out.

REQUIRED ATTACHMENTS:
1. Rationale Statement (Why is this course needed? What purposes will it serve?)
2. Impact Statement (Provide details about the Library, space, budget, and technology impacts created by adding this new course. Include supporting statements from the Library, IT Department, etc. as needed.)
3. Sample Syllabus

Department Chair Approval: Jennifer Polack-Wahl
Date: 10/29/12

New Course Proposal Cover Sheet (July 2012)
CCC Chair Approval: Bradley Hansen
Date: 11/9/12

UCC Chair Approval: ____________________________
Date: __________
The proposed course (CPSC 109 Introduction to Modeling & Simulation) is an important addition to the University of Mary Washington as we attempt to teach our students the latest techniques for conducting scientific research. The course teaches modeling & simulation techniques and how they can be used as an alternative to the "wet-lab" and theoretical scientific research techniques. Modeling & simulation can be used to study phenomena that cannot be safely, legally, ethically, or even practically studied using the traditional wet-lab and theoretical methods. Examples of this are studying ways to limit the damage of forest fires, what happens when galaxies collide, how potential molecules may work as drugs, and whether small separate blocks of conservation land are more or less effective than a single large block of land for maintaining species diversification. It is clearly unsafe and illegal to set forest fires to study them. The collision of galaxies takes millions of years to complete. Testing millions of potential drug molecules would take millions of years and cost trillions of dollars with no guarantee of success. And it is certainly unethical to put up fences around plots of land and dump sacks of animals into these pens to see which animals still exist after a few months.

The target audience for this course is a subset of UMW’s natural science (Biology, Chemistry, Environmental Science, Geology, and Physics) majors and first or second year students interested in science and/or computer science. In particular, we believe that natural science majors (1) with technological or quantitative leanings, (2) who might continue on to graduate school, and (3) students interested in science education will find this course both appealing and useful. We recognize that modeling and simulation could be useful for students in disciplines outside of the natural sciences, particularly for students in education who might be focusing on teaching science in elementary, middle, or high school, or students in the social sciences. The reason for the explicit focus on the natural sciences is to make the course cohesive. It is critical that the students walk away thinking that "Wow! This really applies to ME and MY field of study.” However, few students think of themselves as “scientists.” Instead, most students think of themselves as “biologists” or “chemists” or “physicists”, etc. There are a limited number of examples that one can do in a 15-week course. Having them split between all of the natural science disciplines already means most of the examples will be outside the specific science that students are majoring in. To further dilute that by adding in examples from the social sciences may damage students’ perception of how relevant the material is to their own majors and how much they take away from the course. Having an analogous course that focuses on examples from the social sciences would be a great solution to this, and we are certainly open to running such a course, but it is beyond the scope of this proposal to address that. Therefore, we think it is important to keep this course focused on the natural sciences.

We believe that it is critical to teach the course at the 100 level for two reasons. The first reason is that we see this as an introductory course, rather than as an advanced course. The content of the course is equivalent to the content of our CPSC 110 course, which is an introductory course with no prerequisites. We also believe that it is important to keep the course at the 100 level to make students aware that this is not an advanced course with expectations, but rather an introductory course. In general, students are often reluctant to take a first course courses outside of their major beyond the 100 level.

Although the course has not been taught as a special topics course, it is important to add it to the catalog as we try to keep pace with other institutions. It will also serve as a prerequisite to CPSC 220, and thus should be a permanent course, rather than an experimental course. In addition to this, we do not have a special topics course at the 100 level that this could be run as.
CPSC 109 Impact Statement

The impact for creating the new course CPSC 109 is minimal. It requires the purchase of new software that will cost $1350 for the necessary licenses. It will require that the purchased software be installed in the Trinkle Hall B12 computer lab. It will require the use of the Trinkle Hall B12 computer lab for 3 hours per week. We plan on offering this course in place of an equivalent number of sections of CPSC 110, so it will not affect faculty resources to staff the course. No other impacts are envisioned.