Please attach/submit additional documents as needed to fully complete each section of the form. See Writing Course Resources

### I. COURSE INFORMATION

Department: Computer Science  
Course Title: Interdisciplinary Computing: Practical Computational Problem Solving  
Course Number: CSCI 291ST

Type of Request: [ ] New  [X] One-time Only  [ ] Renew  [ ] Change  [ ] Remove

Rationale: Course was made possible by recent gift to department and can help increase the reduced number of intermediate writing offerings for the fall semester.

### II. ENDORSEMENT / APPROVALS

* Instructor: Rob Smith  
  Phone / Email: 406-243-2886 / robert.smith@mso.umt.edu  
  Signature: [Signature]  
  Date: July 19, 2016

* Program Chair: Andrew Ware  
  Signature: [Signature]  
  Date: July 19, 2016

* Dean: Jenny McNulty  
  Signature: [Signature]  
  Date: [Date]

* Form must be completed by the instructor who will be teaching the course. If the instructor of the course changes before the next review, the new instructor must be provided with a copy of the form prior to teaching the course.

### III. OVERVIEW OF THE COURSE PURPOSE / DESCRIPTION

Provide an introduction to the subject matter and course content:

Computation provides a context for critical thinking, information evaluation, and problem solving whose modern relevance extends far beyond the domain of computer science. Nevertheless, most students at UM are not provided an opportunity to explore computational thinking. This course is an attempt to engage students in computational thinking in an interdisciplinary approach through presenting contextual examples of computational problem solving within a range of broad disciplines. The course is designed to be accessible by all campus demographics through the use of written English expression for problem discovery, analysis, resolution, and evaluation rather than a programming language. Therefore, the outcomes of this course fit quite naturally within the objectives of the Intermediate Writing course.

### IV. LEARNING OUTCOMES (SEE FAQS)

Provide examples of how the course will support students in achieving each learning outcome

- Use writing to learn and synthesize new concepts.  
  [ ] Yes  
  If yes, how will student learning be supported?  

  While students have no doubt solved problems, it is expected that they have never been exposed to the formal process of analyzing a problem, designing a solution, describing that solution with mathematical precision, and formally evaluating the outcome. The general approach and specifics of this process will be
foreign at first. Students will internalize this paradigm through phased writing assignments that gradually expand their understanding of the general approach, specific steps, and helpful models for problem solving and critical thinking. These assignments range from high level first passes to in-depth detailed descriptions of applications of the process. Each assignment is preceded by several examples that we will discuss in class to form the reinforcement provided by the writing assignment.

☐ No If no, course may not be eligible

• Formulate and express written opinions and ideas that are developed, logical, and organized.
  ❌ Yes If yes, how will student learning be supported?
  Computational problem solving is inherently developed, logical, and organized. The framework we will teach students formalizes the transfer from normal, fuzzy thinking to a systematic and developed form of thinking through the explicit analysis of a problem, design of a solution, formal specification of a solution, and analysis of that solution. We take extra effort to demonstrate the application of this framework to examples outside of computer science; in fact, the majority of examples used to demonstrate elements of the framework and the framework as a whole are non-computer examples. We firmly believe that the skills imparted in this course are applicable to domains outside of computer science, and have developed the written assignments to showcase this to the students. The bulk of their work will be learning how to formulate and express developed, logical, and organized ideas and opinions. The content of the course provides them a mechanism for how to do this with nearly any problem.
  ☐ No If no, course may not be eligible

• Compose written documents that are appropriate for a given audience, purpose and context
  ❌ Yes If yes, how will student learning be supported?
  Students will have assignments that span a broad range of contexts, from social issues to tactile problems to routine situations. In each case, they will be tasked with looking at problems in a much more detail oriented and logical way than is typical. The assignments also span a broad range of purposes and audiences, from providing instructions that a machine could follow, to persuading others that a certain proposed solution to a problem is sufficient, to communicating why a certain implemented solution is insufficient for its intended purpose. In each case, considerable in-class time will be spent providing examples of how to tailor writing for each audience, purpose, and context to assist students in learning to consider these variables in their manner of writing.
  ☐ No If no, course may not be eligible

• Revise written work based on constructive comments from the instructor
  ❌ Yes If yes, how will student learning be supported?
  Students will be provided detailed rubrics for each writing assignment. All written assignments will receive feedback from the instructor in the form of markup and summary comments on their submitted documents. Several assignments will be resubmitted after revision. These opportunities will assist the student in learning how to write according to a rubric and improve their writing ability.
  ☐ No If no, course may not be eligible

• Find, evaluate, and use information effectively and ethically
  (description of information literacy outcomes appropriate for each class level)
  Subject librarians are available to assist you embed information literacy into your course
  ❌ Yes If yes, how will student learning be supported?
  We live in an age of information. One of the applications of the problem solving skills students will learn in this course is the ability to analyze a given position by investigating other points of view, researching them, and drawing their own conclusions based on the full set of observations. There are several assignments where students will need to find, evaluate, and use information for following the problem solving process on current events and other relevant topics. We will provide examples on how to analyze problems,
research other points of view, and communicate ethical best practice in lecture, and provide reinforcement through assigning similar projects to students out of class.

☐ No  If no, course may not be eligible

• Begin to use discipline-specific writing conventions
  ☒ Yes  If yes, how will student learning be supported?
  
  This course will provide exposure to several discipline-specific writing conventions. A significant portion of the course focuses on general scientific writing: what is the problem; why is it a problem; what have others done to solve it; why is that insufficient; what is your solution; why is it sufficient? Another portion of the course focuses on writing pseudocode: a style of English that aims at precise specification that is high level enough to not be considered programming. The majority of the course consists of expressing specific, technical ideas in written English, including describing problems and solutions in greater-than-usual detail.

☐ No  If no, course may not be eligible

• Demonstrate appropriate English language usage
  ☒ Yes  If yes, how will student learning be supported?
  
  Technical writing demands precision. Students will be taught to recognize what it takes to clearly communicate using written English. We will review positive and negative examples of writing to recognize elements that make communication successful or unsuccessful. Students will be given many opportunities to convert ideas to precise written English, and receive feedback on how to improve their writing.

☐ No  If no, course may not be eligible

V. WRITING COURSE REQUIREMENTS (SEE PAGE)

• Enrollment is capped at 25 students.  ☒ Yes  ☐ No
  
  Explain how outcomes will be adequately met for this number of students.
  
  Our lecture time will be divided between instruction and example—exhibits of good and poor writing for each type of assignment, as well as clear rubrics defining expectation. I will provide written feedback on all written assignments and students will be given several opportunities to revise and resubmit written assignments.
  
  Justify the request for variance.

  n/a

• Which written assignments will include revision in response to instructor’s feedback?
  
  Assignments including revision in response to instructor’s feedback are indicated by (*) in the assignment list below.

VI. WRITING ASSIGNMENTS

Please describe course assignments. Students should be required to individually compose at least 16 total pages of writing for assessment. At least ten (10) of these 16 pages should be new, previously unsubmitted content rather than revised work. Clear expression, quality, and accuracy of content are an integral part of the grade on any writing assignment. At least 50% of the course grade should be based on students’ performance on writing assignments.
• Formal Graded Assignments (24 pages)
  o Initial essay, revised submission. Students will write a 4 page essay describing what they aim to achieve vocationally and otherwise in their lives.* (Take home)
  o After a broad survey of interdisciplinary applications of computer science, students will write a 1.5 page essay reflecting on how computer science skills might assist them to achieve the goals described in their initial essay. (Take home)
  o A 2 page essay on how and why computational skills affect a worker’s capacity, compensation, and demand in the modern economy.* (Take home)
  o Current event perspective. Students will write a 4 page essay where they analyze an author’s perspective on a current problem. They will investigate the proposed solution to the problem and research alternative perspectives, either supporting or refuting the author’s perspective using the problem solving framework presented in class. (Take home)
  o Students will use the analysis step of the problem solving framework to better understand two problems. They will write one 1-page essay where they answer the analysis questions for each problem. (Take home)
  o Students will use the design step of the problem solving framework to formulate the structure of two problems. They will write one 1-page essay for each problem where they answer the design questions enumerated in the framework. (Take home)
  o Students will write a half page essay describing how to subdivide a complex problem into smaller, specific subproblems. (Take home)
  o Students will describe two common problems using pseudocode (no page limit). (Take home)
  o Students will describe a complex problem using pseudocode (no page limit). (Take home)
  o Students will write a 3-5 page essay where they use the verification step of the problem solving framework to validate a publicly proposed, implemented solution to a societal problem. They will research the original claims of the proposed solution and analyze outcomes to argue whether the solution was effective. If not, they will propose alternatives that are suggested by their research. (Take home)
  o Students will write a 5 page essay where they revisit their life goals and describe how computational problem solving skills and certain computer science courses and/or degrees might assist them in achieving those goals.* (Take home)

• Informal Ungraded Assignments (6 pages)
  o Initial essay (see description above), initial submission. (Take home)
  o A 2 page essay on how and why computational skills affect a worker’s capacity, compensation, and demand in the modern economy. (In class)

• Attach a sample writing assignment. Include instructions / handouts provided to students.

VII. ASSESSMENT

✓ I will participate in the University-wide Program-level Writing Assessment by requiring students in this course to upload a sample paper to the designated Moodle location. Please clearly communicate the requirement to your students and include language on your syllabus (sample below).

• This course requires an electronic submission of an assignment stripped of your personal information to be used for educational research and assessment of the writing program. Your paper will be stored in a database. A random selection of student papers will be assessed by a group of faculty using a rubric developed from the following writing learning outcomes.
• Compose written documents that are appropriate for a given audience or purpose
• Formulate and express opinions and ideas in writing
• Use writing to learn and synthesize new concepts
• Revise written work based on constructive feedback
• Find, evaluate, and use information effectively
• Begin to use discipline-specific writing conventions (largely style conventions like APA or MLA)
• Demonstrate appropriate English language usage

The rubric score points are: (4) advanced, (3) proficient, (2) nearing proficiency, and (1) novices. This assessment in no way affects either your grade or your progression at the university.

VIII. SYLLABUS

Attach syllabus and send digital copy with form to faculty.senate@mso.umt.edu.
The syllabus must include the list of Writing Course learning outcomes above.
Submission