

***Applicant Information***

Department(s):

Computer and Information Sciences

Faculty Submitter(s) Name(s) and Rank(s):

Dr. James Atlas, Assistant Professor

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Department Chair's letter of support

(will be sent separately by Dr. Errol Lloyd)

## ***Course Information***

### **1. Proposed course number, title and brief description:**

CISC101, Computer Science Principles

Introduces students to the central ideas of computing and computer science. Instills ideas and practices of computational thinking and engages students in activities that show how computing and computer science change the world. Explores computing as a creative activity and empowers students to apply computational thinking to all disciplines including the arts, humanities, business, social and physical sciences, health, and entertainment.

This course could be designed to satisfy the Discovery Learning Experience. Planned final products would include reports, essays, and an exhibit.

### **2. Expected enrollment limit per course offering:**

80 students

### **3. This proposal is for a substantial revision of an existing course. The existing course emphasizes a computer literacy approach of using a variety of software, as well as covering the inner workings of computer hardware.**

The proposed course seeks to replace this with a focus on creativity. The revisions would address the research and scholarship initiative of CTL and UREL and join our department with the national effort to bring computational thinking to society as a core breadth area of knowledge. There is an existing initiative in this regard at the national level (see <http://csprinciples.org/>) that is still a work in progress. We envision our revised course as a research and scholarship approach to teaching CS Principles.

The revised course would emphasize the following "big ideas" in computational thinking:

- Creativity: Computing is a creative activity.
- Abstraction: Abstraction reduces information and detail to facilitate focus on relevant concepts.
- Data: Data and information facilitate the creation of knowledge.
- Algorithms: Algorithms are used to develop and express solutions to computational problems.
- Programming: Programming enables problem solving, human expression, and creation of knowledge.
- Internet: The Internet pervades modern computing.
- Impact: Computing has global impacts.

The extent of these revisions would include:

- Completely new lectures:
  - hands-on activities, PBL exercises, research and popular culture discussions, interactive media presentations
- Completely new assignments:

- reading/analyzing research and popular culture articles, writing responses, computational artifacts (algorithms, design diagrams, programs, animations, simulations)
- Class community development:
  - creation of materials and organization to establish CISC101 as a "social" course that students can engage in discussion with classmates and share their computational artifacts with friends (who may not be in the course)
- Contact and connecting with local K-12 and life-long education programs for collaboration and service oriented events.
  - students would prepare materials, activities, presentations, etc and work with these groups to help engage society with computational thinking

This course will address a growing need in society to have people trained in computational thinking -- that are not computer scientists. While many students may need/want to continue and minor in computer science, this course is designed as a fully self-sufficient introduction to computer science principles for a general education audience. It will achieve the following general education objectives:

#### Primary

- Attain effective skills in (c) quantitative reasoning, and (d) the use of information technology.
- Learn to think critically to solve problems.
- Expand understanding and appreciation of human creativity and diverse forms of aesthetic and intellectual expression.

#### Secondary

- Be able to work and learn collaboratively.
- Develop the ability to integrate academic knowledge with experiences that extend the boundaries of the classroom.

#### 4. This course would primarily emphasize:

- c. Students will create an original scholarly or creative project.

#### Secondarily this course will also emphasize:

- a. Students will understand how new knowledge is generated and disseminated through scholarship, and the importance of scholarship to society.

## ***Alignment with UD / College Strategic Initiatives***

We believe that our course proposal strongly supports several UD strategic objectives.

### **A Diverse and Stimulating Undergraduate Academic Environment**

"A solid understanding and facility with computational thinking, computing, and computer science is important, if not integral, to being part of a well-educated and informed citizenry. Although the computer science community has worked diligently to create intellectually rich and engaging courses, not all students have had the opportunity to take advantage of these courses." - from the national committee on the need for (and benefits of) a general education course in CS Principles (<http://csprinciples.org/>)

- CS Principles has the potential to attract a diverse group of students. It firmly establishes the relationship between computational thinking and other disciplines, while not assuming any prior computer science background.
- Our course design will allow students to explore computational thinking in their own areas of interest, and to create artifacts that show their innovation.
- Students require increasing skills in computing across all disciplines, but will not be computer science majors/minors and would benefit from a single course that explores principles, impact, and creativity.
- Empowering students with the techniques and ability to transform a problem solving idea into a tangible form will foster intellectual curiosity.

### **The Engaged University**

Our course proposes some specific components that will reach out to other students on campus, local and regional educational partners, and student family/friends:

- Students will share computational artifacts in an online community that they can invite their friends to see what they are creating
- Students will participate in a final exhibit of their artifacts that will be open to the UD community
- Students will connect with local educational programs. These will be opportunities for the students to share what they are learning about computational principles and lead activities with various groups including K-12 classroom and after-school programs and life-time learning programs.