

General Ed Course Approval Request

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Dept. Name: Computer and Electrical Engineering and Computer Science College: ENG

Course #: COP1034C

Course Title: Computer Programming and Data Literacy for Everyone

Course offered: Fall

Total yearly expected number of students in all sections: 90

Is this course WAC Certified? No

Are multiple sections offered? Yes

If yes, is there a common syllabus? Yes

Course Description- Provide a course description that conveys the general content of the course, and identifies methods of instruction (e.g., lectures modeling, event experiences, discussions, small groups, simulations):

The general population of incoming freshmen, and about half of incoming engineering students lack skills in computational thinking and using computers to analyze data and produce communicable results. This course is designed to introduce programming tools to freshman from all majors who have little prior experience with using computers to analyze complex mathematical processes and produce effective graphics for communication. The most common course and program outcomes (critical thinking, communication, mathematical literacy) are addressed by the skills taught in this course. For example, visual learning is the primary way people understand and communicate complex concepts, so the ability to utilize data, models and mathematical problems to derive graphical solutions is a critical skill for students to develop that can be employed by many majors in science, medicine, nursing, planning, social work, business and education during their coursework at FAU, and throughout their future careers. Because this course addresses skills necessary for student success in diverse program outcomes requiring critical analysis of theory/methods/principles, it will be useful in promoting student success in our institutional metrics (e.g., retention, DFW rates).

This course introduces students to computational thinking and the art of using computers to analyze data, vectors and complex numbers, equations and matrices and to produce graphics, like pie charts, histograms and graphs to display results and to calculate statistical parameters for the data. Excel and Python will be introduced as tools to build skills for data analysis and graphical depictions. All math topics will be presented within the context of applications, and reinforced through extensive examples in lecture and homework assignments. Some assignments are worked in class.

Describe the purpose of the course:

The course has two main objectives: 1) increase student retention, motivation, and success through the use of computers, and 2) introduce the use of computers as a tool to help solve common problems

encountered by students and professionals outside the engineering field, and effectively communicate data/results to peers. Understanding how to analyze, depict and communicate data through programming tools provides a lifelong learning skill. We are unaware of a basic computer programming course offered outside the our college and we feel we are in a unique position to offer the broader student population these basic tools for success

To wit, the course syllabus template lists three course objectives that could be generally used as necessary skills to transfer or be used globally:

1. Ability to apply basic programming concepts.
2. Ability to write small programs employing basic programming constructs, such as primitive data types and literals, operations, expressions and statements, logical decisions, and loops.
3. Ability to solve computational problems by reducing them into multiple algorithms using fundamental design techniques, such as abstraction and program decomposition).

Foundations of Mathematics and Quantitative Reasoning

Learning outcome #1: Utilize computers as a means to apply mathematical theories and equations to solve simple and complex issues associated with non-engineering majors. The basis for this SLO will be to the start with simple programming skills in Excel, creating spreadsheets and incorporating equations. Results will be homework assignments that include graphics. The python effort will introduce algorithms to permit student to develop means to analyze the data, create graphics and ultimately develop graphical tools from datasets. Multiple course modules will use ad reinforce these skills, building upon prior work. Students will be assessed on this outcome through responses developed from assigned algorithms, and scored based on derivation of a correct result.

Learning outcome #2: Determine and apply appropriate mathematical and computational models and methods to everyday problems by employing basic programming constructs, such as primitive data types and literals, operations, expressions and statements, logical decisions, and loops. The basis for this SLO will be to develop simple programs with the intent of solving an equation, creating a graph and other representations of the data, ultimately leading to image processing. The use of lectures, text, and online materials supplemented with specific homework assignments that reinforce the class learning will help students navigate the basics of programming. Students will be assessed using a rubric the measures the degree of success experienced through successfully obtaining the results of the computer program and application a mathematics principles embedded within the assignment.

Learning outcome #3: Display quantitative literacy by developing fundamental designs and techniques to teach students how to reduce problems into computational algorithms. The basis for this SLO will be image developing and processing of large data sets. The students will be required to demonstrate ability to formulate programming steps to obtain a meaningful solution. The skills are reinforced throughout the course, but also build upon skills learned in prior weeks. Students will be assessed via a midterm and final exam, and by complex image processing assignments during the last 1.3 of the class. A rubric will be developed for homework assignment assessments.

This is intended to be an application-based course, so developing rubrics to score student performance on applying theories, models, and demonstrating math literacy may be a potential assessment approach. The assignments and learning objectives are relevant to any major where data may need to

be encountered and may require some degree of analysis and graphics creation to explain the salient points.

Please see attached table outlining how each SLO will be addressed with respect to the three angles of general teaching/learning strategies employed, how student learning will be assessed, and how you will know if the outcomes were met. The Common Core committee suggested making this an ASL designated class.