

**Title III Grant, Strengthening Institutions Program
Faculty Innovations in Learning Project Proposal**

**REDESIGN OF ENGI-101
INTRODUCTION TO ENGINEERING**

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TITLE III PROJECT PROPOSAL

A. Title: Redesign of ENGI-101 Introduction to Engineering

B. Purpose

There has been considerable discussion in the media over the last several years about the decrease of engineering enrollments in the US colleges and universities. If this trend continues, US employers will have difficulty finding US citizens to fill technical jobs. This problem will become particularly acute when the baby-boomer generation starts retiring around 2010. Currently there is a nationwide effort among colleges and universities to respond to this problem by introducing instruction in engineering design in the freshman year*. The thrust of this effort is to hopefully retain students in engineering programs by providing them a better understanding of the nature of engineering work.

The purpose of the project described in this proposal is to redesign the Introduction to Engineering ENGI-101 course in a manner that attracts and retains more students and ultimately to support an expansion of Ohlone's engineering program.

When fully developed, this course will provide a solid foundation for our students' engineering education. They will acquire the soft and hard skills they will need to continue in their technical courses and prepare them to complete their education and become contributors to the continuing success of the US economy in the 21st century.

C. Scope

The existing course needs to be extensively redesigned. It presently includes concepts such as introducing the students to the engineering profession and learning some computer applications. The most difficult, and by far the most time consuming, part of this task will be to find adequate hands-on activities and design projects that do not require prior engineering knowledge. This is a freshman level course which requires no engineering background. Many 4-year universities with full engineering faculties are producing materials for their various classes and placing them on their websites to share with others. A significant amount of my time and effort has been and will continue to be focused on searching the Internet to find suitable materials for use in this course. Further, in many cases, permission to use the materials may have to be sought from the authors.

* Normally, students are not introduced to design work until The Capstone Course in the Senior Year.

One significant change which has already been implemented has been the removal of the computer applications element from this course. It is now included in a 0.5 unit online class specifically designed to support ENGI-101 and is being taught by a computer applications faculty member. Further, it has been structured as a hybrid course. It has been amplified to include a WebCT course management tool which was added to allow communication with the students through e-mail and online discussions as well as providing a depository for course materials and the syllabus.

The primary focus of the proposed course revision is to introduce students to hands-on projects and to introduce an understanding of the engineering design process using active learning skills. Students will be taught and encouraged to use a team approach to problem-solving. By using the tools taught in the separate computer applications class, they will be able to present their results both orally and in written reports.

By blending all these elements together - i.e., hands-on, teamwork, computer applications, communications skills - students will be prepared to start their working careers as effective and productive engineers able to respond to the challenges that will face them in the 21st century.

D. Course Description

The textbook for the course will be a cooperatively produced and custom-designed effort from Prentice-Hall developed from course material in their ESource Series.

The new course will consist of four components:

1. Lecture: Engineering – what is it?

- a. Engineering as a profession
- b. Descriptions and examples of the engineering design process
- c. Survey of engineering disciplines, amplified by:
 - Lectures
 - Guest speakers
 - Films
- d. Active learning methods, as class participation exercises in:
 - Brainstorming
 - Team-building
- e. Engineering ethics – free ranging class discussions
- f. Case studies

2. Laboratory: What do engineers do?

- a. Hands-on projects
- b. Design projects that embody the engineering process:
 - Translating the need into a set of requirements
 - Using brainstorming to propose alternate solutions
 - Evaluating design tradeoffs and selecting a design
 - Constructing a prototype
 - Preparing written reports
 - Presenting results orally
 - Maintaining an Engineers Logbook

3. Computer Applications Course – as described above it is separate from the Introduction to Engineering course

This course will teach students skills in Internet searches, Internet etiquette, spreadsheets, presentation slides, and word processing. It is a co-requisite for ENGI-101.

4. ENGI-101 WebCT Course Management

This is a tool which will be used to communicate with the class via email, discussion boards and a chat room. It will provide course materials, display the syllabus, and collect students' assignments.

E. Project Outcomes

Upon completion of Introduction to Engineering, students will be able to:

1. Apply the engineering design process to a “need”.

Evidence of assessment: Portfolios - consisting of

- a. A final design report and/or other documentation
- b. An Engineering Logbook in which students describe their work using the engineering design process.

2. Participate as team members while engaging in team projects

Evidence for Assessment: Peer evaluations – as expressed by:

A collection of students' assessment of their team members and their teamwork experience will be turned in after class assignments.

3. Value the importance of active learning skills in the solving of engineering problems

Evidence for Assessment: Student Survey

4. List the major engineering disciplines and give examples of job functions

Evidence of assessment: Tests

5. Apply computer applications

Evidence of assessment: Portfolios

Successful completion of computer applications online class

F. Project Implementation Timeline

This is a year long project which started in fall 2006 and is planned to be completed by the end of spring 2007. This course requires a great deal of Internet research on my part to find materials for active learning methods, hands-on activities and design projects. A revised pilot course was offered in fall 2006. It included all four of the components described in section D. I learned much from this experience which will allow me to further change and improve the course through its restructuring as proposed.

G. Faculty Responsible for Development and Implementation

I, Linda Messia, am responsible for the overall redesign and instruction of this course. Lesley Buehler and I are collaborating in the design of the computer applications course. Lesley Buehler is developing and teaching the computer applications course. I am developing the WebCT ENGI-101 course. This is my first experience using WebCT, so I am learning new skills as well.

The stipends provided under the Title III Grant are requested for each of us as participants in this proposal.

H. Technology and Software Requirements

The following software is required:

- Internet access
- WebCT
- Microsoft Word*
- Microsoft Excel*
- Microsoft Powerpoint*

* Or equivalent word processing, spreadsheet and presentation programs