

Teaching Engineering Statics and Dynamics completely on the Web

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Abstract - *This paper describes my experience with the design, development, and delivery of EGR 281: Engineering Statics and EGR 282: Engineering Dynamics at Broome Community College (BCC), entirely over the Internet. The Statics course was developed in the Summer of 1998, with implementation starting in the Fall of 1998. The Dynamics course was developed for implementation in the Spring of 1999. Both courses have been offered each semester since then, including a Summer session.*

In March of 1998, the Engineering Science Department at Broome Community College made a decision to deliver its entire two-year AS degree program in Asynchronous Learning (ASL). A three year implementation plan was developed that focused on delivery of "core engineering science courses" the first year. Engineering Statics (EGR 281) and Engineering Dynamics (EGR 282) were identified as part of that core in the second year of the program. As department chairperson, I decided I would develop both courses using the SUNY Learning Network (SLN). SLN and BCC's Computer Center provided valuable technical support for the delivery of the ASL courses and assisted in the development of the course templates and subject modules.

I had taught "Mechanics" for 30 years and wanted to make sure that the quality of the course was not compromised because of its delivery mode. I made the decision that any tools I developed would be used in my traditional seat-based section offered that semester as well. Both courses were to include student journals, group projects with papers submitted, group presentations, quizzes, four written exams, and an optional Final Exam. Student-oriented instruction components were to include the assessment of individual performance and team evaluation of group projects, as well as a self-evaluation in the course.

Seventeen modules were developed for each course: Module 1: An Introduction to the history of Mechanics and a review of software tools needed by the student to navigate the course. Tasks included downloading an executable file, opening a Word, Excel, and PowerPoint file, and viewing GIF files.

Modules 2-16: Each module represented a week in a traditional class. Each module was developed with PowerPoint lectures (usually 3 a week, including examples of homework solutions), a journal the student used to record time spent during the week on course related activities, a quiz or exam, group project activities with assessment tools, and a discussion area.

Module 17: Final assessment tool for course and an optional Final Exam.

The course template provided by SLN also allowed for a "Readings and Materials" section. I decided that I would post all solutions to homework problems in this section. As a result I decided not to collect any homework, but would use the problems as the tool for generating discussion and questions. In this section, past exams covering a ten year span were also included. Students were encouraged to review the past exams to establish a level of performance that would be expected on quizzes and exams.

Two group projects were assigned. The Static's projects focused on dams and bridges, while the Dynamic's projects focused on race tracks and roller coaster rides. Each project requires a paper with references and a PowerPoint presentation including a detailed analysis of the appropriate object, ride, etc. Team members assess the team performance and their performance on the team. They also assess the other teams PowerPoint presentations.

Functionally, I post the quiz or exam on a Wednesday and expect it to be delivered to me for grading by Sunday evening at 9:00 PM of the same week. Students normally fax the materials to me, however some have chosen to scan them and send them to me as GIF files. I grade the materials and post grades, normally by Tuesday, and the cycle starts again. Each quiz or exam is scanned in color and returned to the student in GIF format so that they can see my corrections and comments. Group projects are graded using an assessment tool given to the student at the beginning of the course based upon criteria discussed in the project overviews. Providing this tool to students has significantly improved the quality of papers and presentations submitted. Any document submitted for grading by a student must include a statement signed and dated by the student that "They did not have an unfair advantage over other students in the class and that they performed all tasks within the time constraints given for a particular assignment."

Although enrollment in these classes has not yet been significant enough to provide a large database of information, my experience is that:

- 1) Students that "start" the class (perform all required tasks in the first three weeks) complete the course with a passing grade. (C or better)
- 2) ASL students make the same mistakes on quizzes and exams that traditional students make.
- 3) *These courses are a lot of work...for everybody.*