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CUSP (CU I&E) Submission: Introduction to Engineering Online Course [1]

Description

Learning Experience Designers on the OIT Academic Technology Design Team partner with campus leadership to pilot and evaluate emerging educational innovations. We focus on wicked learning problems, and seek solutions that improve both instruction and efficiency at the University of Colorado.

In 2014 Associate Dean Diane Sieber of the College of Engineering and Applied Sciences approached me with a challenge: how might the college use new innovations to meet the growing demands of the Introduction to Engineering course? Historically, Introduction to Engineering is a large, 1-credit survey course designed to excite students about a degree in engineering. Based on Dean Sieber's request, we reimagined Introduction to Engineering as a next-generation, massive online course. The course, offered in Fall 2014, reduced staffing requirements, freed up much-needed classroom space, and saved thousands of dollars, all while delivering a quality learning experience.

As the lead designer (given the unofficial title of "course architect" by the college) I worked closely with the faculty-of-record to design an entirely new type of course. We built upon the lessons learned in the CU System-wide Coursera MOOC effort, taking new learning insights and blending them with already-existing campus resources. Previously the instructor, Assistant Dean Sarah Miller, had never taught online and had limited experience with online education. However, through a careful design process and close collaboration, we used the following techniques to expand our impact while using significantly fewer resources:

Lectures replaced by professional-quality video
Synchronous lecture hall meetings were eliminated and replaced with professional quality video content. The majority of the video content consisted of interviews with professional engineers and alums. Additional video content included recorded panel sessions with faculty and upperclass students, as well as advisor-led overviews of majors. Students were given participation credit based on tracking their viewing of the videos. Many videos can be reviewed on the course YouTube Channel: http://j.mp/COEN1500 [2]

Compressed schedule
The course schedule was compressed, distributing the previous 15 weekly meetings into 15 modules delivered over 8 weeks. No modules were released on weeks with Calculus and Chemistry mid-terms. The course was complete by Fall Break.

In-person opportunities
Four in-person synchronous panel discussions were available for students to meet alums, upperclass students, and faculty. These were recorded and made optionally available to the

class online.

Active learning
Students were required to have one “Engineering is Doing” hands-on experience. Coordinating with campus programs such as Space Grant and LASP, along with external partners including SparkFun Electronics and the Boulder Hackerspace, every student had an opportunity to explore at least one hands-on engineering opportunity.

Project-based group experience
Partnering with OIT students created, in groups, final video projects connected to the learning outcomes of the course.

You can learn more about my personal role in the project in this letter of commendation, provided by the Assistant Dean and course instructor, Sarah Miller: http://j.mp/CoryCommendation [3]

How does this impact the University?

In the Fall of 2015 Introduction to Engineering was launched to 1000+ students as the largest ever online, main campus course. We identified the following successes:

–Created significant increases in faculty/staff efficiency
Reduced from the 2013 teaching team of 3 faculty, 2 staff, and limited TA support to the 2014 team of 1 faculty, 1 staff, 1 10 hr/wk undergraduate assistant.

–Increased available lecture hall space
Reduced classroom usage from 5 sections offered Monday, Tuesday, and Thursday in 2013 to 0 classrooms in 2014. This is the equivalent space impact of opening up three, 200 student 3-credit courses.

–Identified significant cost reductions
2012: $60,000 (not including instructor of record cost) 2014: $6,000

–Determined that students prefer online delivery of Introduction to Engineering rather than large lecture hall delivery.
Post-course, 70% of the students expressed a preference that COEN 1500 be offered online. 44% indicated the strongest possible preference the course remain online.

–Found evidence of student learning at scale
Student pre/post surveys indicate an increased knowledge of the engineering profession and engineering careers.

Implementation Status

Introduction to Engineering is widely considered a success by the College of Engineering, the Office of Information Technology, and CU Boulder campus leadership. Associate Dean Diane Sieber said they were “overwhelmingly satisfied” with the course, and Assistant Dean Sarah Miller wrote that the course would not have been possible without OIT, and that the performance was exceptional. Associate Vice Provost for Innovation in Education, William

Kuskin, described it as a showcase project for future of the University. OIT highlights the project on this webpage: http://www.colorado.edu/oit/reshaping-large-lecture [4]

The course will be offered again this year, using the same format and building an even more immersive environment. Conversations about the future of the course also include the possible conversation into an outreach MOOC offered free to the State of Colorado, or possibly using the course as a larger platform for the College of Engineering's first year experience.

Submitter's Information

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Source URL:https://www.cu.edu/controller/i-e-awards/past-submissions/cusp-cu-ie-submission-introduction-engineering-online-course

Links
[1] https://www.cu.edu/controller/i-e-awards/past-submissions/cusp-cu-ie-submission-introduction-engineering-online-course [2] http://j.mp/COEN1500 [3] http://j.mp/CoryCommendation
[4] http://www.colorado.edu/oit/reshaping-large-lecture [5] mailto:cpav@colorado.edu