

# Bachelor of Science in Informatics

## Assessing the Senior Design Project — Final Report

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### Background

Informatics is part of the broad field of computer science. It includes the subdisciplines of software engineering, human-computer interaction, and the social and organizational impact of computing. The Department of Informatics in the Donald Bren School of Information and Computer Sciences (ICS) at UCI was formed as one of three departments making up the school; the others are Computer Science and Statistics. If we view traditional computer science as studying computers, informatics studies computers *and people*: the design and use of information technology in its human, organizational, and social context.

Around the time ICS became a school, it recognized that the broad field of computer science was too broad for a single undergraduate degree. It created three focused but overlapping undergraduate degrees: Informatics, Computer Science, and Computer Science & Engineering (joint with the school of Engineering).

The B.S. program in Informatics awarded its first degrees in June, 2008. One-quarter of the students in that class went directly on to graduate school, as did a similar proportion of the class of 2009. Other graduates went on to industrial employment, though we have less complete information on student employment because of the difficulty of maintaining reliable contact with students after they leave the university.

Each Informatics student takes the capstone course Informatics 191ABC, in which students undertake a year-long senior design project for real-world clients.

### Assessment Plan

Our project's goals were twofold. First, we wanted to articulate a set of student learning outcomes for the major, and second, we wanted to put some assessment mechanisms in place.

To articulate and refine the program's learning objectives, we planned and conducted a faculty retreat; this event did produce a set of student learning outcomes.

We decided to focus our assessment on the senior design project course, since that year-long course, taken by all majors, serves as a microcosm of the entire program's outcomes. We planned to survey the students, the external clients, and the course instructor and TAs, all of which we did. We also planned to examine students' course grades, which we did not do directly; the general grade distributions did come up in our conversations with the course staff.

We hoped in particular to gather information that would help us address these issues:

- We have had difficulty attracting high numbers of freshman applicants because the name Informatics is unfamiliar to most high school students and their parents.
- We found that the interest and skill levels among Informatics majors varied widely. Some were enthusiastic programmers and software developers; others were more interested in designing human-computer interactions or evaluating the organizational impact of information technology. The lat-

ter were unenthusiastic about the most heavily technical aspects of the program (and arguably those highly technical aspects were of less importance given their career directions).

- We observed that students in the third quarter of the senior design project, where the most intense software development work was necessary, were not uniformly enthusiastic about completing this work. We believed this was due in part to their having jobs or graduate school plans already in place, in part to the general reluctance of some students to do programming when they felt that their careers were not aimed in that direction, and in part to simple senioritis.

## Results

We held a faculty retreat in Spring 2009, at which we arrived at this set of learning outcomes:

- Students completing the major should have these abilities:
  - ▶ Ability to recognize problems amenable to solution by information technology (IT) and to solve those problems by designing and implementing computer systems according to best practices of software engineering.
  - ▶ Ability to analyze situations in organizations that might be improved with IT, to design and implement IT that addresses those situations, and to evaluate the impact of that IT.
  - ▶ Ability to analyze human interaction with IT systems and to design, implement, and evaluate appropriate interactions.
  - ▶ Ability to work effectively and professionally in these areas, both as individuals and in teams: communication, client relations, and ethical behavior.

We administered a pilot student survey to the senior class in 2008 and a refined version to the senior class in 2009. We interviewed the instructor and TAs of the senior design project course in Spring 2009. We solicited evaluative comments from the project clients for the 2008-09 academic year.

Informed in large part by these events, the Informatics department implemented the following changes to its program in the 2008-09 academic year, to take effect in Fall 2009:

- We revised the Informatics major to require that each student complete one specialization, either Software Engineering, Human-Computer Interaction, or Organizations and Information Technology. These three areas reflect the first three learning outcomes listed above; they also reflect the three major topic clusters within the department. While we still expect students to have a core background in each of these areas, as reflected by the first three outcomes, we no longer require the same specialized courses of every student. This has the added benefit of reducing the total number of units required by the major. While the revised major is still, like most computer science and engineering-oriented programs, a very full program, the revision freed up approximately four courses compared with the original Informatics major. We expect this addition of specializations to have these benefits:
  - ▶ The specializations allow students to focus on the advanced courses that suit their needs best. This will address the diminished motivation and enthusiasm that non-programming-oriented students, for example, experienced in the most advanced software development courses.
  - ▶ We expect the specializations to aid in recruiting because all three specialization names are more informative or better known than the umbrella term, Informatics. We can have informational materials or web pages that refer directly to the specializations, with titles like “Study Software Engineering at UCI.”

- ▶ We also expect that the specializations will aid in recruiting by making the program more flexible because of the (slightly) lower number of required units. This flexibility may make it easier for some students to minor, double-major, study abroad, or undertake research projects, all of which are difficult for students in many technical disciplines to fit into a four-year undergraduate program.
- We revised the program of study to start Informatics 191A in the spring quarter (of students' junior year). Interviews with the teaching staff of the course led us to conclude that this change would enhance the learning outcomes of teamwork and professionalism in working with clients. Students with identified professionalism issues in that first quarter, or with other deficiencies, have the summer to remedy them; this will prepare them better to work effectively on their teams, for their client. The schedule shift also places the final quarter of the project, Informatics 191C, in the winter quarter, evading the worst period of senioritis.

## Sustainability

Our implementation of this project appears to be sustainable over time. The involvement of various constituencies seems minimal and manageable:

- The full faculty was actively involved only in a one-time retreat to establish the learning outcomes. Occasional follow-up reports and discussions can occur as part of regularly scheduled faculty meetings. This should be sufficient for some years to come.
- The department's vice chair for student affairs is involved with curricular administration in any case. His or her involvement includes
  - ▶ Administering the senior survey to each year's graduating class; since the survey has been drafted and implemented using the EEE survey tool, only minimal changes should be necessary in subsequent years and the main effort would be in keeping after students to respond and in reading and analyzing the results
  - ▶ Conducting interviews annually with the instructor and TAs of the senior project course; this would involve only an hour or two of conversation
  - ▶ Conducting interviews or surveys of the external clients of the project course; these can administered by the course instructor, who already manages relationships with these clients
  - ▶ Review and analysis of these results with reports and recommendations to the faculty

Overall we were very pleased with the outcomes of this project. It has left us with a defined set of learning outcomes for our program; it produced or corroborated some beneficial changes to the program, most of which have been implemented; it has left in place a manageable process for continuing assessment and review. We are very appreciative of DUE's support.