

REPORT ON THE SCHOOL OF ENGINEERING INDIVIDUALLY DESIGNED MAJOR

The Individually Designed Major (IDM) provides Stanford undergraduates the opportunity to pursue a course of study in engineering, leading to a BS, outside the structure of the departmental majors. The IDM is for students with a strong vision of their areas of interest, and whose interests cannot be made to fit within one of our established majors.

The program was created by the School of Engineering Undergraduate Council, a group of faculty and students in engineering that serves as the chief policy making committee for all undergraduate requirements and programs in the School. Students could first declare an IDM beginning with the 1985-1986 school year. The IDM has since been reviewed and renewed periodically by CUS (responsibility now rests with CRUM) and by the Faculty Senate. In spring 2008 the authority to grant degrees was extended by a year so as to synchronize the reviews of the Engineering and the H&S IDM programs.

An IDM option in engineering is rarely found at our peer institutions. Only Berkeley and Caltech have something similar and there is no comparable program at MIT.

The IDM program is run by a small committee of faculty in Engineering, chaired by the Senior Associate Dean for Student Affairs, who review all the IDM proposals and who ultimately accept or reject a proposal. The committee is particularly careful to make sure that the student's interests cannot be met via an established major, and similarly, that the student isn't just creating a 'light' version of an established major. The current group consists of Brad Osgood (Electrical Engineering, Senior Associate Dean), Steve Monismith (Civil and Environmental Engineering) and Lynn Hildemann (Civil and Environmental Engineering).

There are no courses *per se* in the IDM program and thus there is no teaching staff associated directly with the program. The administrative home for the program is the Office of Student Affairs in the School of Engineering. The financial needs of the program are minimal, and if they weren't we'd probably cut them.

As with all Engineering majors, there are a number of requirements for an IDM beyond what the university requires: three Engineering Fundamentals; a minimum number of units in mathematics and science; one course in Technology in Society; sufficient courses in engineering depth, and so on. Procedurally, a student must submit a proposal that includes a Four Year Plan, a Program Planning Sheet, a Statement of Purpose, and letters of support from two faculty members. The steps are described in the Bulletin and in the School of Engineering Undergraduate Handbook, which also includes the necessary forms. These documents are attached. The IDM committee reviews and acts on each proposal, quite often suggesting changes to better meet the school requirements. Though all students in the School of Engineering must complete a Four Year Plan and a Program Sheet in their major, the IDM process as a whole clearly subjects students' plans to a higher level of scrutiny than would typically be found in a departmental major.

The common experience has been that freshmen are most likely to raise the possibility of an IDM; they are full of enthusiasm, less full of experience and knowledge of what is available at Stanford and in the School of Engineering. Their first inquiries are usually made to the Senior Associate Dean, who does his best to make sure the students know just what they're getting themselves into. The issues are well known to all of us:

- The departmental majors are rich in content and are often more flexible than students realize.
- Departments provide a community of students following a common curriculum.
- Departments provide a broad array of advising, activities, and events for majors.
- Employers and graduate schools may have a difficult time interpreting and assessing an IDM.

Nevertheless, for students intent on an IDM the option is a good one and a survey of past and present students, below, indicates a generally high level of satisfaction with the program. A list of IDM's over the last several years is also included; there are never more than a handful of students at any given time.

The School of Engineering is pleased to offer this option to Stanford students. We have no hesitation in recommending that the program be continued.

SURVEY RESULTS

We surveyed 37 past and present IDM students and received 12 responses. A summary of the questions and responses is as follows.

(1) Please list your name (optional) and the title of your IDM. Then let us know why you selected an IDM major, rather than a departmental major, within the School of Engineering.

- Interaction Design Engineering. I knew that I was interested in this field, the school already had a masters program with this focus so it was relatively easy to pull together a rigorous academic program, and I knew that I wanted to pursue a graduate degree.
- Engineering for Sustainability
- Telecommunications Engineering
- Architectural Engineering
- “Computer Interaction Design” I chose to mix CS with Product Design, with the goal of augmenting the existing Product Design program with some Human Computer Interaction aspects of CS.
- Neuroengineering. I initially planned to do an IDM in H&S, but after eventually learning that Engineering has its own IDM program I found that this suited me much better. I wanted the opportunity to combine research interests in computer science and neurobiology with the hands-on ”build” skills of mechanical and electrical engineering.
- Interactive Design Engineering. I switched very late to product design, so there was that factor, and also I wanted to incorporate HCI into my major (product design). Rather than just taking courses, I decided to do an IDM.
- Electrical Engineering and Economic Systems I chose this IDM instead of EE b/c my goal was to learn quantitative techniques from EE (specifically signal processing and control theory) and apply them to problems in Economics. So, I needed all of the quantitative courses but not all of the labs (so I selectively chose the labs that were relevant). I am now finishing my phd in business economics from Wharton and have found the IDM to have been the best possible major for me (it also allowed me to take undergrad and grad econ classes that would not have been possible with the 120+ unit EE major).
- I wanted depth in two disciplines
- Didn’t have a perfect program available. (Wanted graphics + computer science + art.)
- Wanted to focus more on Telecommunications along with the business of telecoms
- An IDM major allowed me to focus specifically on energy technology, drawing from courses across the SOE, while focusing on Management Science and policy. Given the unit load of the MS&E major, I felt that to do the energy technology component justice, I would have to create my own curriculum.

(2) Did the program meet your expectations in terms of academic quality and rigor?

Almost everyone said ‘Yes.’ The only negative reply was:

- It didn’t satisfy my academic curiosity

(3) Please give us your view of the program you selected.

- My advisors and the committee made sure that my program was comprehensive and covered the "core" of my IDM, just like for any other major.
- I had a good mix of ME, CS, and environmental science and engineering coursework that gave me a pretty well rounded academic experience
- Exactly suited to my interests and needs
- Well, I designed it so if I didn't like it I have no one to blame but myself! It fit me perfectly. Then a co-term Masters in Mechanical Engineering gave me the credential to get my foot in the door at engineering and design firms, and then solve problems using my broad-based undergraduate IDM education.
- I feel that was driven by me (and to a lesser extent my advisor Tom Kailath). I think an IDM is only fit for someone with very specific needs and ambitions so the rigor comes from themselves.
- I chose some challenging classes. My advisor helped me keep a good balance.
- I have certainly taken many interesting upper division classes that have been very rigorous. However, I would have liked to have taken more upper-division graduate courses.

(4) Did you have adequate advising within the program? Please give us your comments on the program's advising.

- Yes, professors and advisors were very helpful. I sought out advisors who were high energy and passionate, and they were great.
- I had great advising, but definitely had to seek it out.
- I could have used more help in defining my objectives. I ended up consulting with Industry professionals.
- Great advisors helped me pick really good classes
- Advising was fairly good, although I'm not sure that my academic advisors had a crystal clear vision of what the IDM program entailed, beyond what I explained to them myself.
- I had incredible advisors! I loved David Kelley.
- Hanrahan (my advisor) was great. Very helpful.
- Yes, Tom Kailath was amazing. I also had relevant advisors from Econ (Frank Wolak) who helped figure out where I could go with my IDM.
- Yes; Professor Weyant and Professor Shachter are excellent advisors. In the future, though, they might advise their students to take more graduate courses as part of an IDMEN.

(5) What were the major weaknesses of the program, as you saw them?

- In engineering, it is more practical and useful to get an accredited engineering degree and then getting a quirky graduate degree in something specialized. In tougher economic times, I bet my major would not be a great selling point.
- The program was as good as the student wanted to make it - without a peer group pursuing the same major, there wasn't always a strong academic community to be a part of.
- I was forced to leave some stuff out due to time constraints - basically a double major cut in half
- It's too bad there aren't more Engineering IDM students to share the experience with.

- Finding a name - that was the longest and most difficult process!
- No real weakness - other than perhaps no true identity major-wise and so not a natural cohort of people to go along with.
- The diploma: stating you majored in engineering on its own is not very nice. Should mention the name of the degree.
- Since I had been a part of the MS&E department through my sophomore year, I felt very much like I had a department. I think that this might have been a problem, however, had I not spent so much time with the MS&E students and faculty. I do also think that refraining from taking graduate courses during my senior year has made the year feel less difficult than it might otherwise, and I feel ready to handle the more difficult load.

(6) Did the program prepare you for employment or graduate school to the extent you expected? Please comment on your choice.

- I've got a good job, but not in my field. It prepared me for my masters degree in telecommunications policy. It did not prepare me to go out and be an interaction design engineer because, as noted above, it's better to be a "real" engineer with some "real" skills. I am also now a lawyer.
- Yes, got a fascinating job, graduate school opportunity. After leaving stanford i worked for two environmental non-profits and now work for a sustainability strategy firm that helps fortune 500 companies develop business oriented solutions to sustainability - the major gave me the perfect background for this work.
- I really had to scramble to find a job, graduate work. I pursued a Masters in EESOR. The job market was later tough, as I graduated in '01.
- I'm in medical school now...but I worked in housing and community development after graduation- abroad, no less- i loved my major and the chance to do exactly what i wanted. For those serious about architecture though, I would recommend the Urban Studies program.
- I'm currently at Carnegie Mellon in the Masters of Product Development program (also interdisciplinary). Design lends itself to interdisciplinary studies (as show by the new d.school - which would have suited my needs if it existed while I was an undergrad)
- Definitely, and the opportunity to study a diversity areas set me up perfectly for my current career in design consulting at IDEO.
- I went to Stanford Business School, I've worked for most companies I've wanted to, and the IDM is always a good conversation starter. I'm now at IDEO.
- Yes, had no problem getting a job a McKinsey & Goldman, etc. etc. amongst the most competitive business jobs. And then it prepared me very well for my current graduate program where I am finishing my phd in 3+ years rather than the usual 5+
- In retrospect, it would he been better to study additional foundational computer science courses rather than specialize so heavily in graphics. Because of missing the foundational courses, I wasn't as prepared for the working world. Also, the graphics field is very competitive.

- Yes, got a fascinating job, graduate school opportunity, Though my goal was to go into business.
- (7) Were you to do it over again, would you major in the IDM program?
- Definitely. I ended up getting a masters in telecommunications policy and then becoming a lawyer, so the major itself did not end up making a difference. But, I would not trade the opportunity I had to really explore computer-human issues from a variety of angles in my own way for a "real" engineering degree. There was no better way for me to explore this interest of mine and have a cohesive background in it.
 - In retrospect, I would have probably done EE.
 - Probably not ... but at the time, it was perfect for me, and I don't regret it at all.
 - Absolutely! I have taken incredible courses with excellent faculty that have given me a great picture of the energy and strategy landscape.
 - Several other 'yes', one 'no'.
- (8) Please add any additional comments that you think would be helpful.
- Would like the diploma to state more clearly the created major, instead of just Engineering General, and then the major in small letters.
 - Keep supporting the IDM out of the Engineering office, maybe make it a bit more known among the students and staff, and perhaps arrange for an organized meeting at least once in the process between all of the student's advisors and an Engineering senior administrator to get everyone on the same page.
 - I think there should still be a fairly decent hurdle to doing it though b/c it is mainly fit for people who have a vision for what they want to do with it. At the age of 19 that can be difficult. So without a compelling motivating reason, I would not suggest it to students.
 - Thank you for coordinating an outstanding program!