Multidisciplinary Design Program

The new Multidisciplinary Design (MD) Program and its associated minor is promoting increased student opportunities for hands-on project opportunities that enable the integration of technical knowledge with skills of practice across many disciplines and with people of diverse backgrounds. The program is intended to encourage teaching through doing as well as motivate an increased understanding classroom derived knowledge. It promotes the importance of seeing the *big picture* in the development process and the criticality for being a *life-long learner*. These goals have remained constant through the process of developing this program.

The MD Minor encourages the creation of *specializations* by faculty and faculty teams from across the University that promote projects of unique themes. It encourages faculty collaboration and joint advising of students who participate in specialization projects. A good example of this is a new specialization under development in Campanology. Campanology includes faculty collaboration from the School of Music, College of Engineering, and Art and Design. And in turn, will allow close interaction of students from each of these major areas of study. Students gain valuable hands-on real-world experience through these opportunities. They graduate and enter the work force much wiser and better prepared to tackle today's problems which are often complex and require working across disciplinary, geographic, and cultural boundaries.

The challenges of this program (modeled in Figure 1) is to not only get students from different backgrounds and schools/colleges working together, but to be able to coordinate and have the faculty from each area collaborate on the advising and creation of new joint projects and specializations within the minor. There is also the overall challenge of how to effectively integrate multidisciplinary development (we call this "design-build-test") experiences with traditional educational programs. [1]

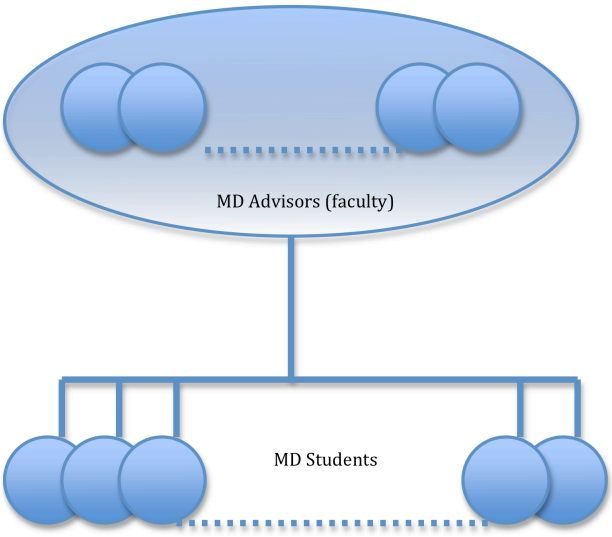

Figure 1. Multidisciplinary Design Program Model for specific projects.

The Multidisciplinary Design Minor has four core elements that make this diverse and a success; an introductory Design-Build-Test (DBT) experience, Project specific course preparation, a Multi-term DBT, and Peer Mentoring and Leadership experience.

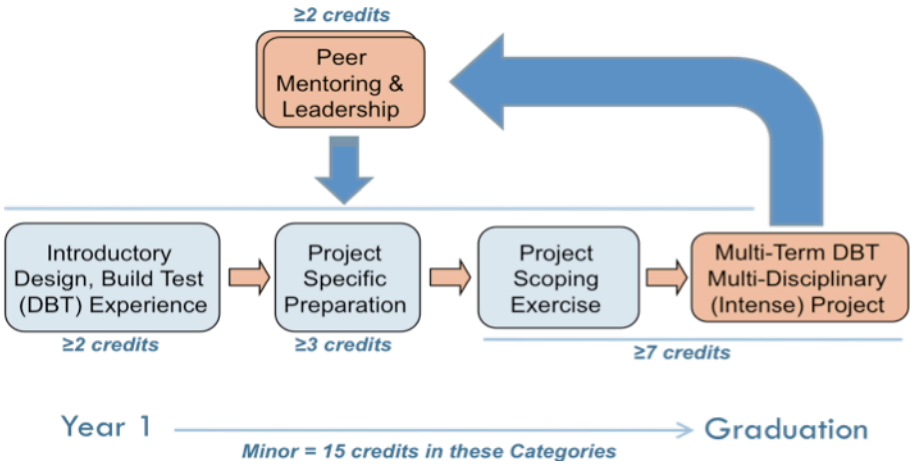

Figure 2: MD Minor Template

1. Introductory DBT requirement: The introductory Design, Build, Test requirement is meant to give students their first immersion experience in a small engineering team project. This is where students first learn what it is like to go through the whole DBT process but on a smaller scale. This is most usefully done in the Freshman or Sophomore year.
2. A preparatory course requirement: Students are required to take a "cornerstone" course that serves to prepare them in depth for the multi-term

major design, build, test, requirement. This requirement is to be taken outside of the student's major department and required major course work.

3. Major DBT requirement: The major design, build, test requirement is a multi-term, multidisciplinary project that gives students the opportunity to 1) identify the problem through qualitative and/ or quantitative requirements, 2) generate creative solution concepts, 3) analyze the quality of proposed concepts, 4) select and optimize the final concept, 5) evaluate the final concept through the building and testing of prototypes or virtual models, and 6) iterate and/or detail recommendations for improvement of the final concept based on the lessons learned from the previous steps.
4. Mentorship and/or Leadership requirement: The leadership/mentorship requirement of this program is to help encourage and to pass on knowledge to less experienced design project team members, as well as to reinforce learned abilities in the senior team members. In addition, it provides the human resources to allow the DBT teams to grow and sustain themselves for many years without faculty having to provide all of the mentoring of team members. [1]

The MD Minor has added value to the faculty members through the ability to easily create specializations within the minor. The advantages of developing specializations are the following:

1. Students participate in a design focus that is recognized on their transcript while gaining expertise that might aid in gaining future employment or grad school admission in a related area.

2. Faculty can develop a pool of students around a specific topic related to their research interests while getting this investment in student education institutionally recognized through the transcript designation of the specialization.

3. The existence of specializations creates the potential for the program of minors to grow more sustainably and in larger increments than might be possible with ad hoc projects - since the specializations themselves are required to last at least four years and are linked directly to faculty interests in their specific areas of expertise.

4. Departments and the college can benefit through the evolution and creation of new programs of high visibility and interest to future students and the general public.

5. Departments and the college have an additional vehicle to create and bring visibility to programs that link engineering to departments across the university.[1]

1. Boria, Jessica, Gilchrist, Brian, Holloway, James, Nilton, Renno, Skerlos, Steve, Teorey, Toby, Washabaugh, Peter, Weinert, Daryl, Integrating Real-World Experience in to a College Curriculum Using a Multidisciplinary Design Minor, ASEE Annual Conf, 2009, June, 2009.