

Program Overview

Established in 2000 through a National Science Foundation grant (NSF), the Enterprise Program focuses on interdisciplinary, team-based problem solving. Since its inception, Enterprise has grown to serve more than 800 students per year, or about 13% of Michigan Tech's enrollment. Enterprise is open to first-year through graduate level students of ANY major and includes a "portfolio" of 25 teams, shown below in Figure 1. Under the advisement of a Michigan Tech faculty member, each Enterprise has their own identity, culture, and organizational structure - mimicking a company in the private sector.

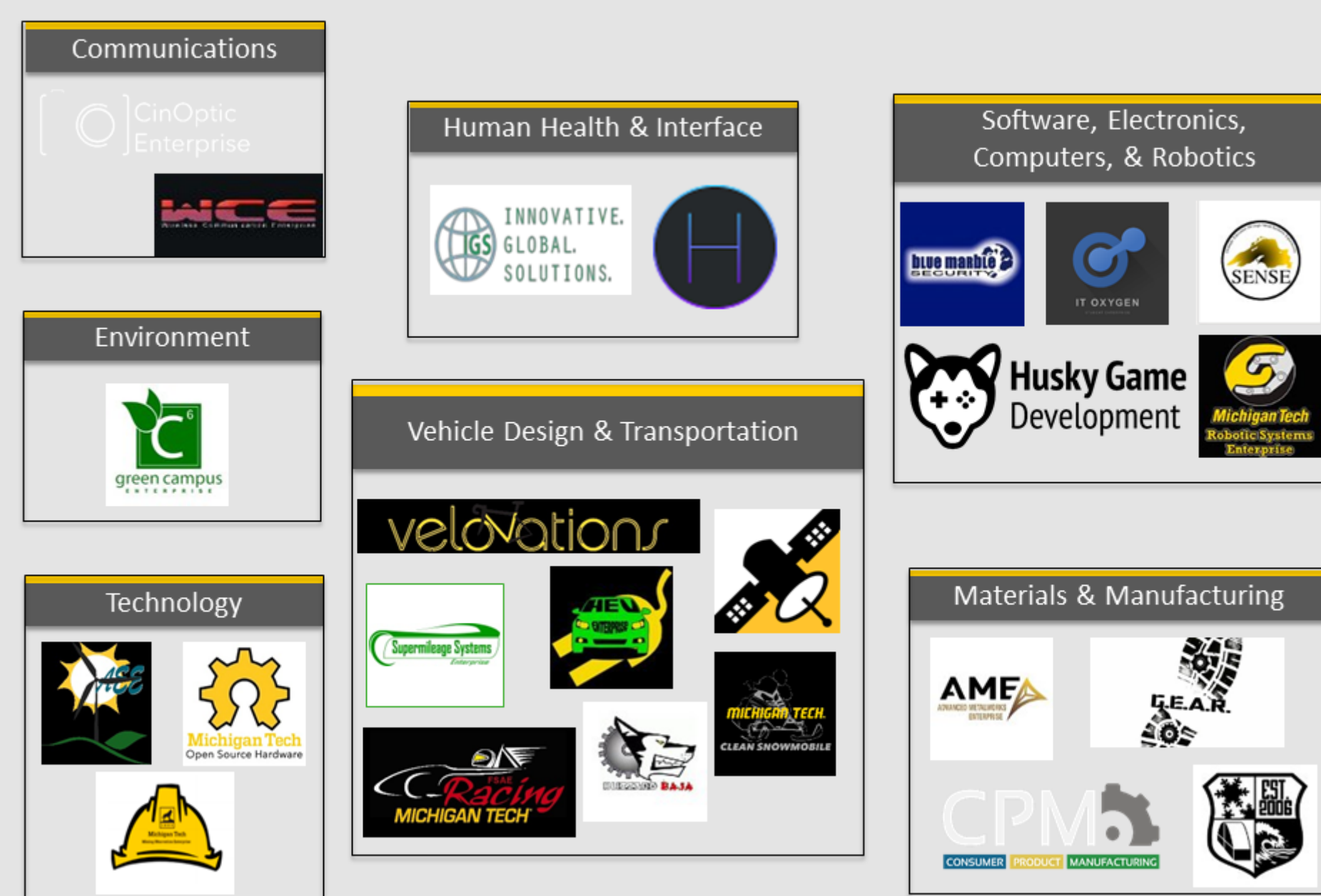


Figure 1: Enterprise Portfolio

Interdisciplinary & Multi-Year Design

The Enterprise program includes a mix of both externally supported as well as internal research and development projects. Projects are scoped to be open-ended in nature and framed such that a diverse team is required for successful completion. Projects frequently focus on more than engineering design, often incorporating marketing plans, feasibility and social impact studies, and financial analyses. Figure 3. below shows the diversity of Enterprise enrollment broken down by College/School at Michigan Tech.

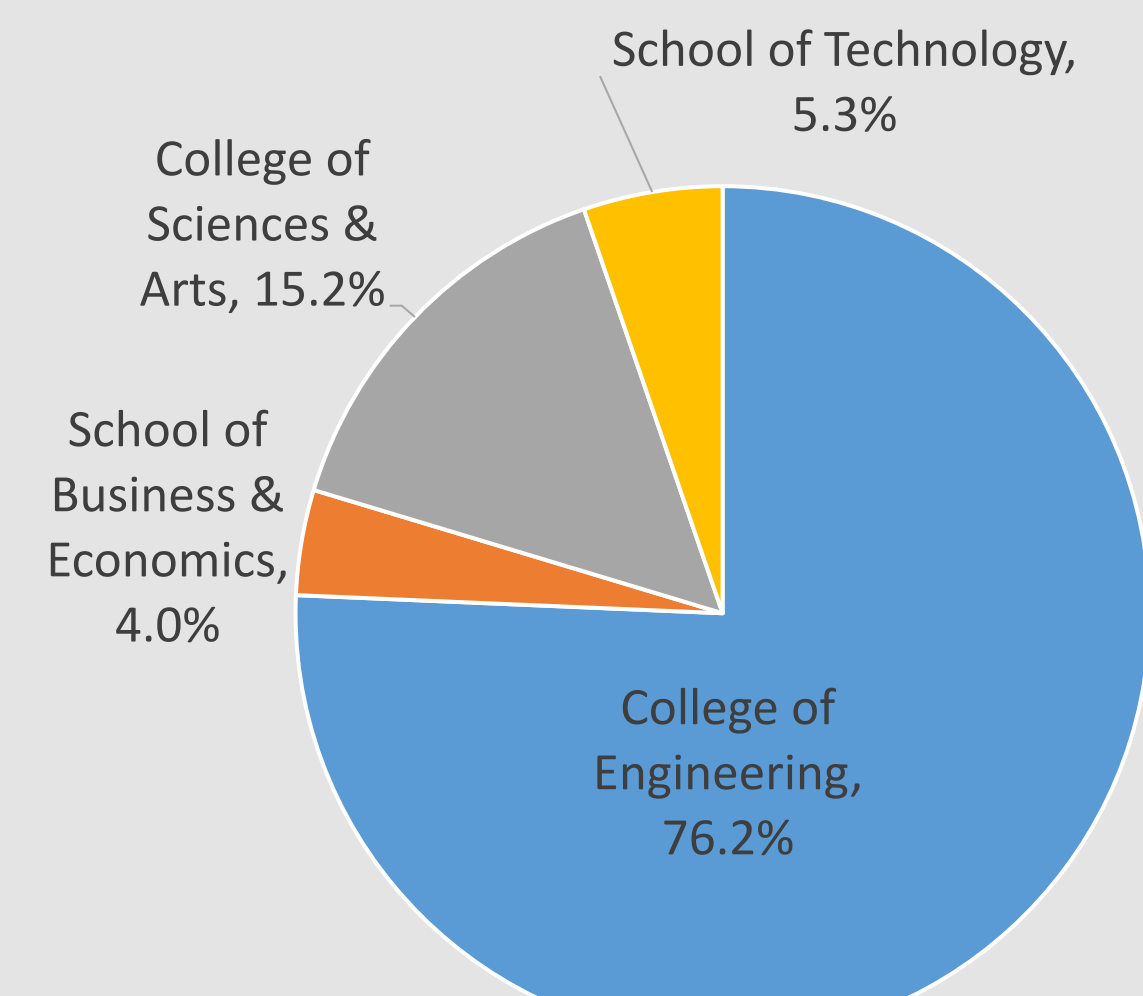


Figure 3: 2017-18 Enterprise Enrollment by College/School

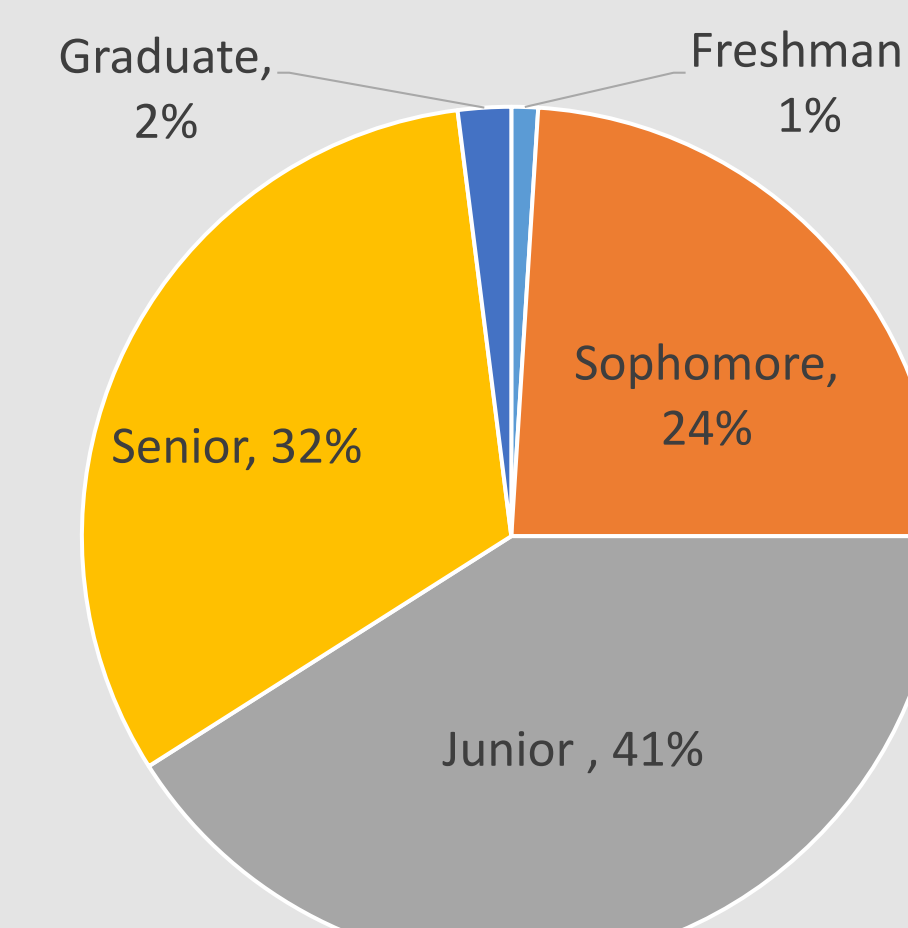


Figure 4: 2017-18 Enterprise Enrollment by Class Standing

Enterprise teams also include students at varying points in their academic career. A breakdown of Enterprise enrollment by class standing is shown above in Figure 4. The ability to enroll as early as the first year provides students earlier opportunities to gain valuable project experience. This also facilitates hierarchical team structures (see Figure 5. below) that create opportunities for student advancement and leadership within the Enterprise. This multi-year approach also enables phased projects that can span multiple academic years.

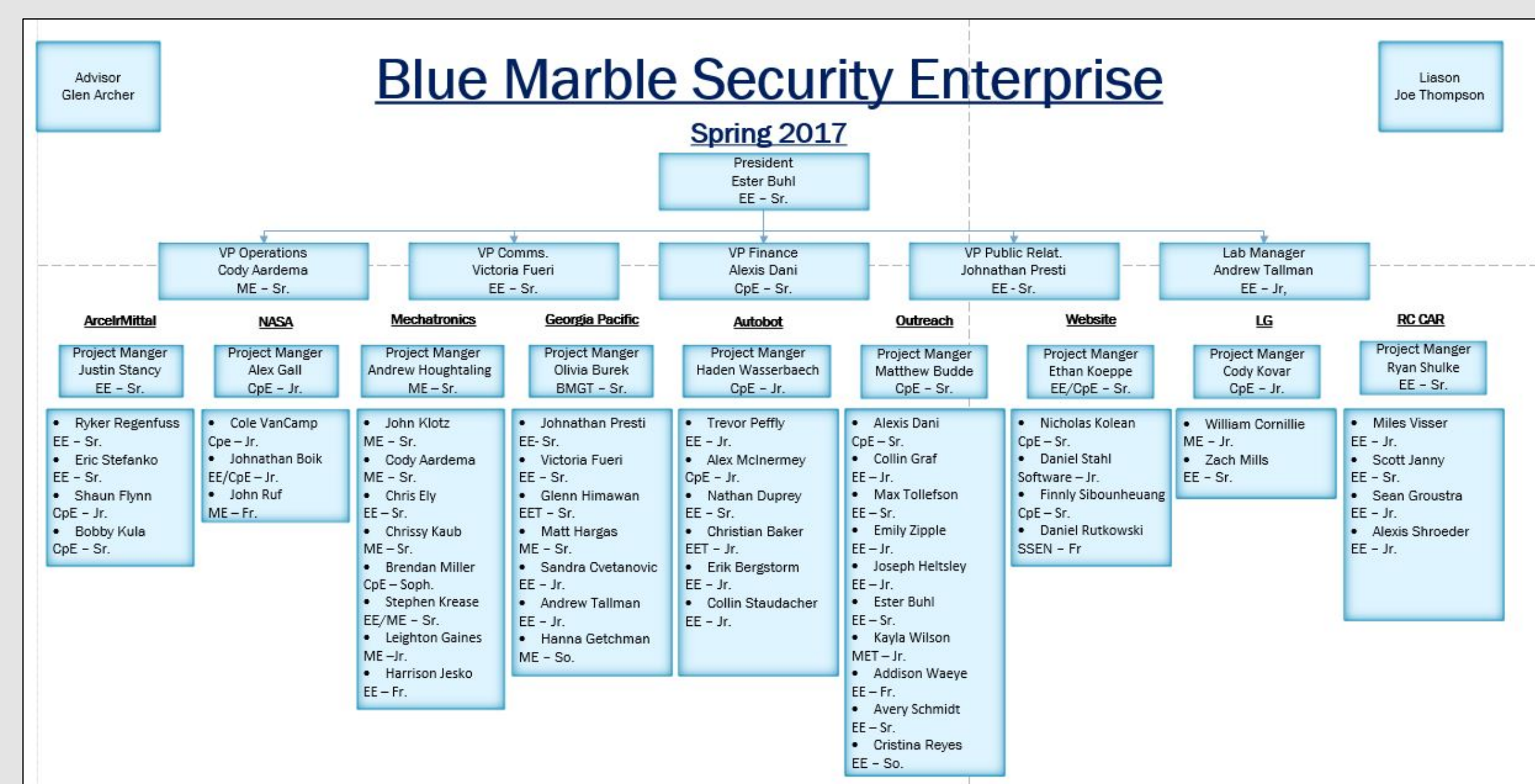


Figure 5: Example Enterprise Organizational Structure

Capstone Design & ABET Assessment

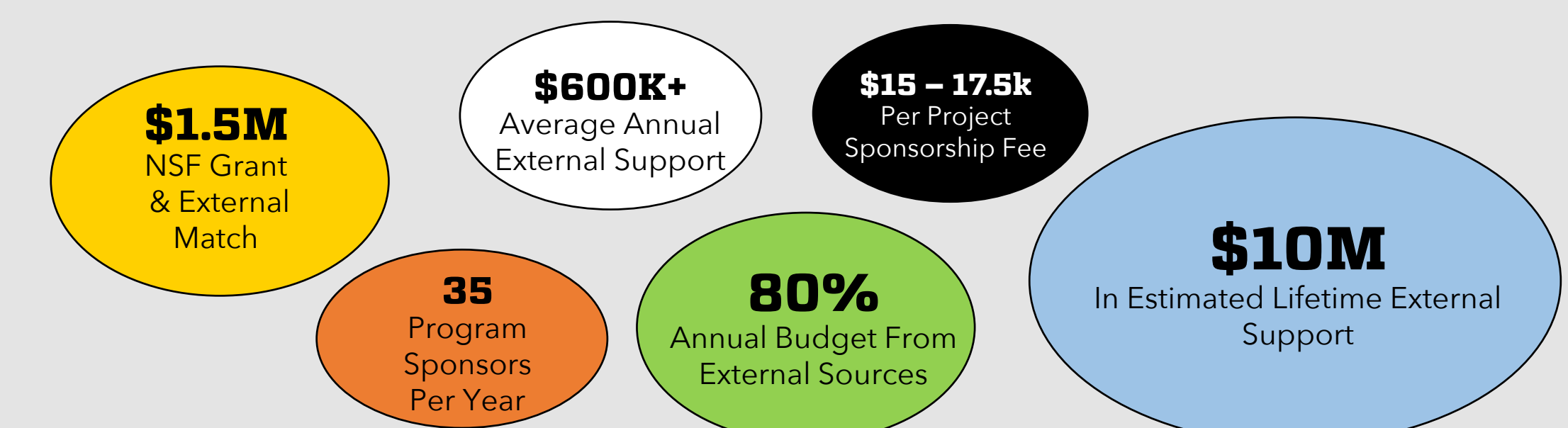
Enterprise provides Engineering and Technology majors an optional pathway for completing the required capstone design project. ENT3950/60 and ENT4950/60 (see Figure 2.) replace the departmental capstone course sequence. Enterprise project work conducted in ENT4950/60 is included in ABET assessment of the following ABET Criterion 3 student outcomes:

- c. (design)
- d. (multidisciplinary teams)
- e. (engineering problem solving)
- g. (effective communication)
- k. (techniques, skills, modern engineering tools)

In order to ensure that multidisciplinary Enterprise projects meet departmental ABET outcomes, a two-stage approval and assessment process is used:

- 1.) Project approval: ENT4950/60 project proposals must first be approved by the student's home department and Enterprise faculty advisor as a condition for enrollment in ENT4950
- 2.) Post-project outcomes assessment: individual students and teams are assessed by Enterprise faculty advisors and external sponsors, respectively.

Program Support & Sponsorship



Curriculum Design & Structure

The Enterprise curriculum is two-pronged and consists of participation in an Enterprise team (Project Courses) and completion of concentrated course material (Instructional Modules). Project course work consists of working on interdisciplinary teams, solving real-world, open-ended problems. Instructional modules are designed to help students develop valuable skills to be successful operating in a team-based environment. Figure 2. below depicts the typical course progression for the Enterprise project courses as well as topic/theme areas for instructional module courses.

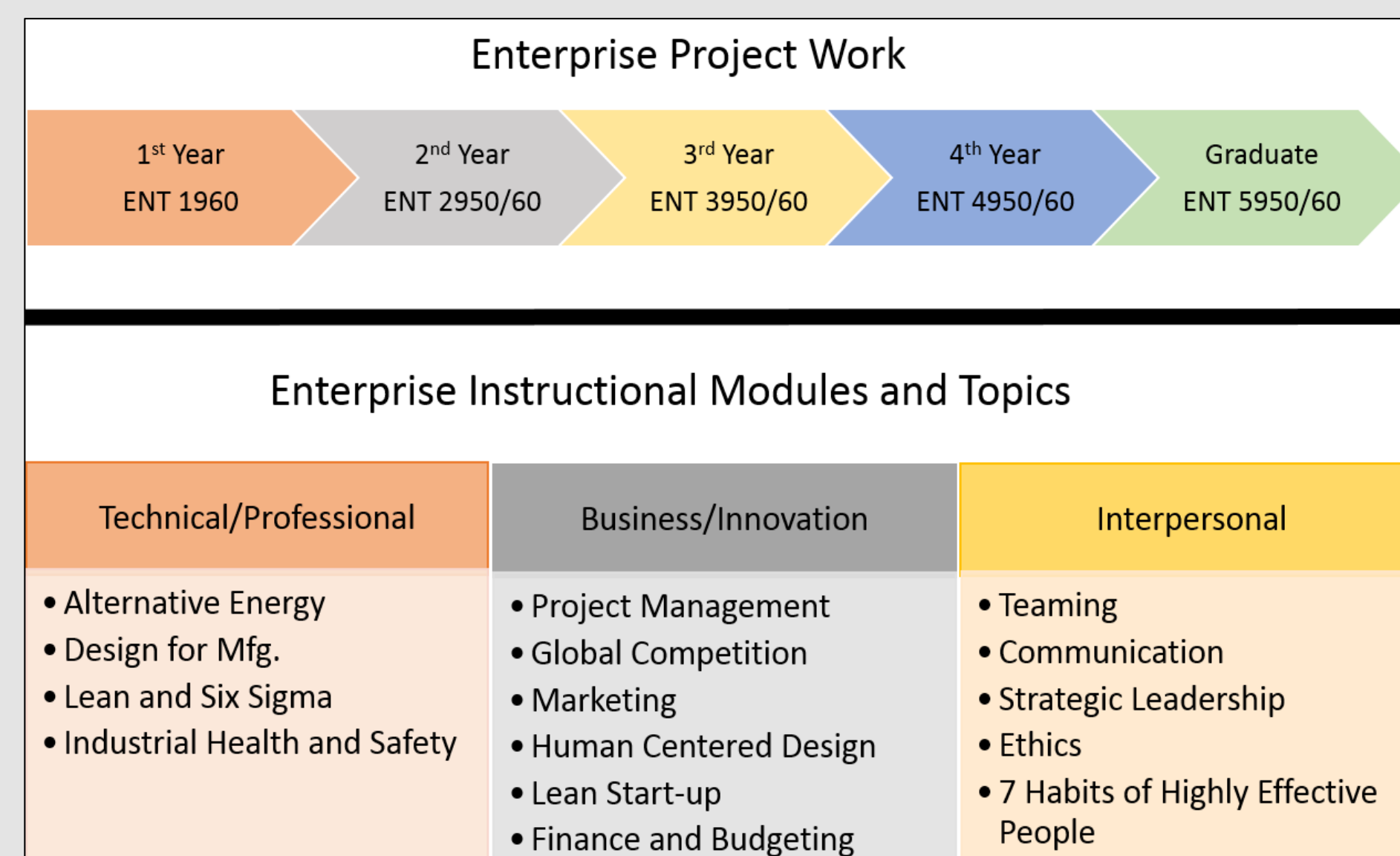


Figure 2: Enterprise Curriculum Layout

Program Outcomes

As shown in Figures 6. and 7., students enrolled in Enterprise have statistically higher third-year retention (+13%) and graduation (+16.6%) rates as compared with non-Enterprise students. More research is needed to understand whether this is the direct result of the Program, a result of the students who self-select into Enterprise, or perhaps a combination of the two. In 2018 the Program's alumni base of over 3,000 graduates was surveyed for the first time to assess the impact of Enterprise and other aspects of education on post-graduation success. With over 300 respondents, this data will be analyzed and used for program assessment and continuous improvement.

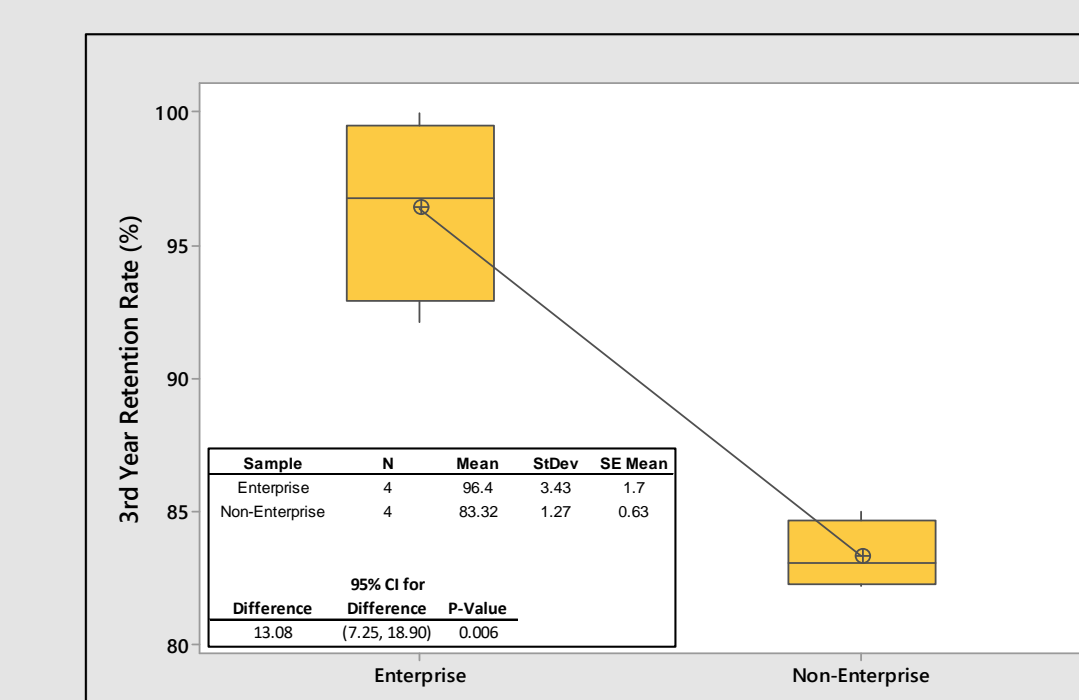


Figure 6: Comparison of Third Year Retention Rates for Enterprise vs. Non-Enterprise students (Engineering and Technology Majors, 2009-2012)

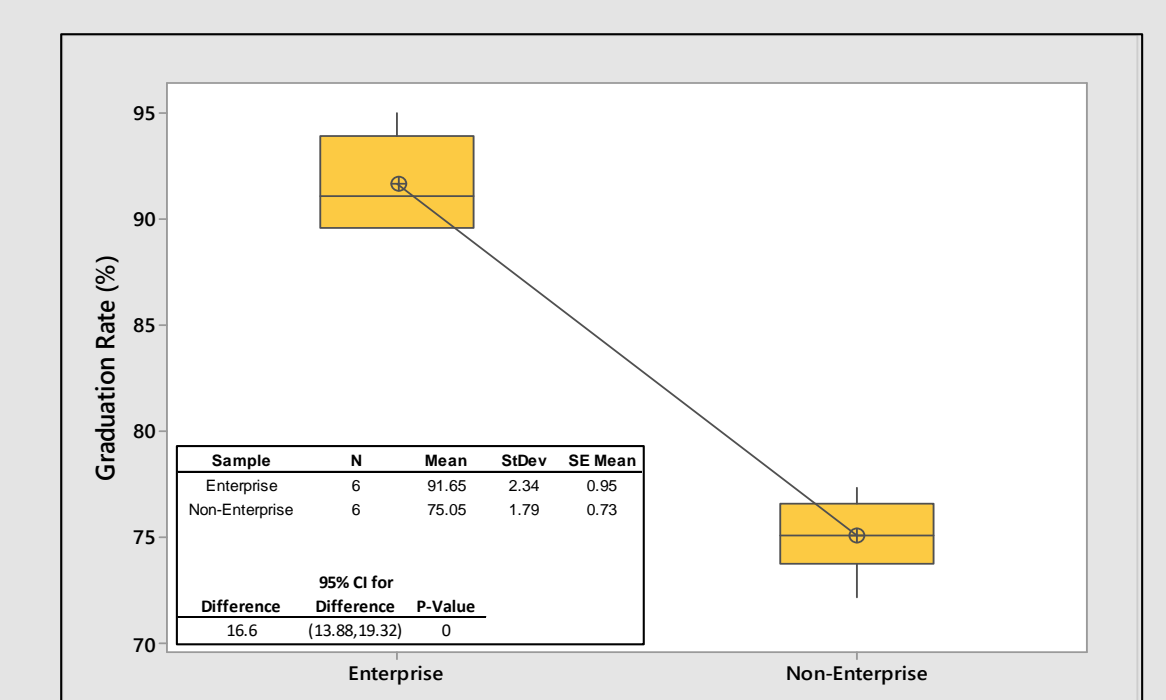


Figure 7: Comparison of Graduation Rates for Enterprise vs. Non-Enterprise students (All Majors, 2011-2016)