

## **Helping Undeclared Engineering Students Find Their Best-Fit Major**

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Rosie's career in higher education has included roles in financial aid, admissions, and academic advising. She currently advises Mechanical Engineering students in their first three years, and provides leadership for the administration of UNIV E101 across the college. She also coordinates the Engineering Leadership Scholars program, which is a peer mentorship and leadership development program for College of Engineering students.

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Full Paper: Helping Undeclared Engineering Students Find  
Their Best-Fit Major

## introduction

Factors relating to the potential for First-Year Engineering student success have been well considered, and continue to be evaluated. Areas of study include: self-efficacy, persistence, confidence, math and science readiness, resources available, a sense of belonging at the University, and “best-fit major” for retention purposes [1,2,3]. For many students, these factors are intensified by the uncertainty in choosing a major. It is not uncommon for an incoming student to have selected “engineering” as a career goal without understanding the specific disciplines within the field [1,3]. Therefore, choosing the right major may lead to student success (and improved retention)[1].

During the fall of 2018, all 738 incoming students at the Drexel University College of Engineering, located in Philadelphia, Pennsylvania were enrolled in a section of UNIV E101: The University Experience. This course is required for all new freshmen and transfer students, and is designed to help students acclimate to life at the University. Topics such as time management, course registration, academic policies and campus resources are discussed in the course. Sections were all advisor-taught and were designated by special populations (Engineering Learning Community, Peer Mentor, transfer), and by major for a total of 31 sections. UNIV E101 instructors met bi-weekly as a group to discuss course assignments, lesson plans, and policies, and to share ideas on topics like student engagement, and classroom interaction and management. For Academic Year 2018/19, (AY 1819) COE administered UNIV E101 using a similar model as the previous year - that being an in-person, seminar-style delivery format.

## components of the course

Although the delivery format of the course remained unchanged from AY 1718, several modifications were made for AY 1819. First, the syllabus was modified to include fewer optional assignments. This change was made after reviewing survey feedback from students that the previous syllabus had been difficult to follow, since students were offered a greater level of flexibility in choosing assignments. This change in syllabus deliverable specificity was also recommended by a campus partner from the University Autism Support Program as a way to ensure that the defined assignment requirements were more accommodating to all students. An additional learning outcome was added to the course that focused on intentional network development, and an assignment was added that required students to attend an event on campus and write about their experience at the event. The reflection paper included the requirement to elucidate how attending the event may help the student to build their network at the University. In addition to this assignment, course instructors were focused on building in additional group activities and in-class assignments that encouraged students to share ideas with peers, thus building their in-class peer network. A final group project was replaced with a final reflection paper.

## undeclared students

The greatest adjustment to the delivery of this course was the increased focus on supporting Undeclared Engineering students. During AY 1718 Undeclared Engineering students were

integrated into sections that were major-specific. The result of this enrollment arrangement was that the undeclared student population was being underserved and did not receive guidance towards the selection of their major. In AY 1819, a targeted approach was implemented to address the unique needs of this population which makes up approximately 24% of the incoming freshman class each year. The undecided students were placed in their own sections. The reasons for the change were twofold. First, recent major curriculum changes within the College of Engineering were implemented this fall, which affected first year coursework based on major. In previous years, all engineering students followed an identical first year curriculum, regardless of major. The recent changes made it imperative for Undeclared students to choose a major sooner to ensure that they were in the right classes and to promote relationship building with an undergraduate Academic Advisor. Additionally, throughout higher education, research shows that the transition to college is complex for any traditionally-aged learner, but this is especially so for those who have not chosen a major. As they grapple with mastery of independent decision-making, balancing competing responsibilities, developing new relationships, and academic rigor, they are also challenged with career and major choice. These barriers can place significant pressures on the undeclared student, making them more at more risk for attrition.

At Drexel, a research institution that promotes career readiness via its co-op program, required as early as the fall of second year, decisions about major are critical. Students must declare a major during the first-year while preparing for co-op and adjusting to the fast-paced quarter system. To address this process more proactively, an Undeclared Student Workgroup was formed. This group, made up of academic advisors who also teach UNIV E101, was created over the summer of 2018. This group focused on tailoring UNIV E101 content to meet the needs of this cohort, and created an in-depth communication plan to connect these students with resources that would help them to explore and ultimately declare a major before their spring term.

Of the 118 Undeclared Engineering students who began in the Fall of 2018, 36 opted into the Engineering Learning Community, and 15 opted into the Peer Mentor program. Membership in these special programs entailed enrollment in program-specific sections of UNIV E101, and for the sake of this paper, these special populations are not considered. The 73 remaining Undeclared students were enrolled in one of four sections designed specifically for the needs of this population. Sections were intentionally smaller (average class size of 18 compared non-undeclared sections which averaged 24 students per class) to ensure student engagement and to promote a sense of community among peers.

Throughout the 10-week course, curriculum and activities were developed within the Undeclared workgroup to encourage major selection prior to end of the Winter term (March 15), but as a result of this initiative, 15 students had already declared majors within Engineering prior to the conclusion of the fall term. Given the needs of the student population, each section was taught by an Academic Advisor and 2 Peer Mentors. The Peer Mentors consisted of second and third-year engineering students, typically representing 2 different majors. Peer Mentors worked in support as teaching assistants, taking attendance, helping to coordinate activities, but also significantly contributed to conversations about to enhance student engagement (i.e. major selection, understanding registration, campus engagement, how to prep for finals, & co-op).

At the conclusion of Fall term, 23 students had declared their major. As a result, the Undeclared Workgroup initiated targeted outreach through its communication plan to continue reinforcing the importance of declaring a major to the remaining 81 students. Advisors of these students engaged in continued conversations about major exploration and the declaration process. By the end of the Winter term, all students had declared a major.

Other accomplishments from the Undeclared Workgroup were:

- Advisors unofficially provided weekly mentorship, presentation & leadership skills development to Peer Mentor participants.
- Developed and administered a survey to catalog the experiences of students enrolled in the class and those of the Peer Mentors.
- Created a resource section/tab for Undeclared Students within the College of Engineering's student resource portal through Blackboard Learn labelled Advising for Engineers (A4E), and created a checklist with suggested activities to aid in the major declaration process.
- Revised the UNIV E101 syllabus with a focus on redesigning activities with a more career exploration and self-reflective approach.
- Scheduled weekly visits to each section of faculty/advisors within each major to give Undeclared students a brief overview of each major within the college
- Developed a multi-term communication plan to encourage remaining undeclared students to declare. Sent first communication during the second week of winter term to remind and warn students of academic hold should they not declare a major by March 15.
- Incorporated a communications plan to the larger advising Operations Calendar so strategic activities like this may be replicated.

student learning outcomes for the course

All sections of UNIV E101 included five learning outcomes, and an additional sixth outcome was added for Undeclared sections specifically. The learning outcomes for the course included:

- *identify a range of university, college/school, and program resources*
- *identify goals for University career and beyond*
- *engage in appropriate opportunities*
- *identify success strategies that facilitate the effective transition to the University/College*
- *build and expand their university/college network to support their transition to the University/College*
- *gain a deeper understanding of the Engineering major selection process (specific to Undeclared sections only)*

Curriculum and activities were developed by the workgroup to intentionally engage students in a guided exploration of majors in support of these learning outcomes. For example, unlike students enrolled in a major specific section of UNIV E101, students in the undeclared sections were tasked to complete a major comparison assignment in which they had to research and write a brief comparison paper about 2-3 majors they were deciding between. Through this assignment, students reviewed the university's catalog to compare course plans which shows the plan of study and required classes for each major and the academic department's webpages for each of the majors.

Faculty involvement also was a key difference for students in Undeclared sections of UNIV E101. Faculty representatives from all of the Engineering majors visited each week to provide a 10-minute presentation about the major which included: description of the major, prerequisite course requirements, intersections with research and career path trajectory. Those who completed the end-of-term survey for the class for undeclared students remarked that it was the faculty visitations that had the largest influence in their major declaration decision making. This factor will be revisited in the following section of this paper.

impact of course on major selection: discussion of student survey results

Each student enrolled in UNIV E101 received a survey administered through Qualtrics at the end of the fall term. This survey included questions pertaining to quality of instruction and impact of learning outcomes, and students were asked to provide feedback on course topics and assignments.

Students enrolled in Undeclared sections answered additional questions relating to their in-class peer mentors, as well as aspects of the course that may or may not have influenced their choice of major. Of the 73 students enrolled in Undeclared sections, 16 (21.92%) responded to the survey.

Overall, students felt positively about their experience in the course. When asked whether they found their instructor to be approachable, 93.75% of respondents agreed. When asked if having peer mentors in their class contributed to their learning, 93.33% of respondents agreed.

Students were asked: "Did you declare your major while enrolled in this class? If so, which of the following aspects of the course assisted you with making your decision?". Response percentages are shown in Table 1 below.

Table 1. Course components that affected students' choice of major

Aspect Surveyed	Response Percentage
Strategies for Success	12.5
Faculty Advisor/ Overview of major	14.58
Course Registration/ Academic Planning	12.5
Life Outside the Classroom	4.17
Long Term Academic Planning	10.42
Engineering careers and research opportunities	12.5
Involve Yourself Assignment	2.08
Major Comparison/ Career Assignment	10.42
Reduce Registration Drama Assignment	2.08
Treat School Like a Job Assignment	2.08
Support from Instructor	8.33
Support from Peers	4.17
Support from Peer Mentors	4.17

It's important to note that faculty/advisor overviews of each major were most impactful in helping students decide on a major. Students ranked "short term academic planning," "strategies for success," "engineering careers and research opportunities," and "major comparison" as other topics/assignments that equally contributed to their major exploration.

Students were also asked if they were still undecided about a major, and 73.33% said no. Of those who were still undecided, the following comments were offered when asked what information/support would be helpful in choosing a major:

- "More opportunities to work with those in multiple engineering fields"
- "Explore classes in different majors"

exploring the success of this effort

In order to assess the effectiveness of this overall effort, which included both a targeted communication plan and modified activities in UNIV E101 meant to engage students in major exploration, it's important to look at supporting data. The following table details the number of Undeclared Engineering students in the College of Engineering based on institutional census data at the start of each academic quarter during AY 1718 and AY 1819. The total number of new undergraduate students in the College was consistent between last year and this year (671 in Fall 2017 vs. 668 in Fall 2018). Approximately the same number of students declared their majors between fall and winter terms between last year and this year (37 vs. 36), however significantly more students declared their major between winter and spring term this year vs. last (82 vs. 46). Tabulated values are presented in Table 2 below.

Table 2. Number of Undeclared Students at the beginning of the term

	<b><i>2017-18 Academic Year</i></b>	<b><i>2018-19 Academic Year</i></b>
<b><i>Fall Term</i></b>	110	118
<b><i>Winter Term</i></b>	73	82
<b><i>Spring Term</i></b>	27	0
<b><i>Summer Term</i></b>	7	

Implications for the future/ strategic initiatives include:

- Develop Peer Mentor training program to establish expectations and minor supervision
- Incorporate Co-op to create a job shadow experience (using faculty, students who have been on co-op, alumni, or employers).
- Survey students outside of UNIV E101 to determine factors informing their major choice

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