But wait! There's more! Developing Students Through a First-Year Course

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Abstract

This complete research paper describes a first semester course at University of the Pacific that serves as an introduction to the engineering and computer science disciplines. The research questions addressed in this paper are:

- How can a first-year course be used to develop students' knowledge, skills, and integration into the university, and
- To what extent does a well-defined, well-structured, and interactive course benefit student retention and engagement in the university community?

This 1-unit introductory course has been developed around three themes:

- Entering the Engineering/Computer Science Profession
- Engaging in the University Community
- Building Skills for Success

To develop students' professional skills and knowledge of career paths available, the first-year students in this course meet with student leaders, engage in breakout group discussions with the Chairperson or a faculty member from their intended major, watch and reflect on brief videos about each of the majors offered in the School of Engineering and Computer Science, and participate in classroom activities focused on professional communication and ethics.

Active engagement in the university community is encouraged by inviting student speakers from each of the engineering and computer science-related student clubs, by having teams of students participate in a Scavenger Hunt to find – and make a video of the team at – key locations on campus, and by including assignments that require students to participate in university-level activities. Active engagement in the course is facilitated by assigning students to a different team in most weeks and by incorporating group-based activities and assignments throughout each class meeting.

Course assignments and in-class activities are designed to help students develop their learning and metacognitive skills. Developing students' understanding of how they learn is intended to improve learning outcomes and retention within the major and the university. Students build skills for success by creating a time management plan, learning how to access university resources, meeting with their faculty advisor regularly, and developing a plan for success in an upcoming assignment and reflecting on its effectiveness afterwards. Two design projects foster teamwork and problem-solving skills. Students collaborate in teams to accomplish a predefined task, honing their ability to work effectively to deliver a project and communicate results.

The purpose of this paper is to describe the course and assignments in detail, present analyses of student retention and engagement, and present faculty and student reflections on the course content and management. We use this information to suggest effective practices for course content, course management, and instructor collaboration in a first-year course.

Building Excitement: Introduction

The "Dean's Seminar" course in the School of Engineering and Computer Science at the University of the Pacific provides first-year students with an overview of the academic programs available at the School and includes individual and group activities to support students in transitioning from a high school to a university learning environment. Redesigned significantly for the Fall 2021 semester, this course emphasizes an interactive approach to achieving course learning objectives centered around three major themes:

1. Entering the Engineering/Computer Science Profession (P)
2. Engaging in the University Community (C), and
3. Building Skills for Success (S)

Course learning objectives and the specific themes that they are associated with are as follows:

1. Identify resources and information from both the School of Engineering and Computer Science and the University of the Pacific *(C, S)*
2. Engage in the broader University community (for example, by attending a sports event, student club, career fair, or other activity) *(C)*
3. Describe the various branches of engineering and computer science, and associated career paths *(P)*
4. Apply the design process, from an initial design concept to design specifications and culminating in a final deliverable and documentation. *(P, S)*
5. Work effectively as part of a team *(P, C, S)*
6. Communicate effectively in multiple modalities (verbal, written, visual) *(P, C, S)*
7. Develop skills and identify strategies for personal development and academic success *(P, C, S)*

These course learning objectives are intended to increase motivation, build academic self-confidence, and support adjustment into a rigorous university curriculum.

The course is structured around weekly modules designed to lead students toward meeting the course learning objectives. All activities and assignments are related to one or more of the three course themes. Weekly learning objectives and course activities are summarized in Appendix 1, Table 1. Two team-based course projects address real-world challenges to provide a first exposure to design thinking, problem-solving, collaboration, and communication skills (visual, written, and oral) that are necessary for success in engineering and computer science disciplines.

The Common Threads: Course Themes

The design of an *introductory engineering course* – broadly defined as a course that encompasses multiple majors, acclimates new students to a university learning environment, and introduces them to the broader field of engineering –has been explored at many institutions. Such courses have been designed with specific outcomes in mind, such as improving student skills in engineering problem solving and teamwork [1], integrating real-world engineering challenges into the curriculum [2], and community building [3][4]. In many cases, multiple outcomes are

pursued simultaneously with the overarching goal of increasing retention and graduation rates [2][5][6][7].

From the authors' past experiences, one challenge faced by the "Introductory" course is the perception of the course as a catch-all or fix-all mechanism, resulting in a course with disconnected assignments and an overwhelming amount of work for students and faculty. When redesigning the course at the University of the Pacific prior to Fall 2021, the instructors prioritized three course themes based on their connection to school priorities and their strong support from prior work:

Theme 1: Entering the Engineering/Computer Science Profession – First-year students may enter the university with an undeveloped understanding of academic and professional career paths available in engineering and computer science. The introductory course provides an orientation to the profession. By exposing students to technical and societal problems and industry practices as early as possible, faculty can increase students' interest and motivation and further their commitment to continue with pursuing their engineering degree [6][8][9]. The redesigned Dean's Seminar course ensured students were actively engaged in the process of learning about the disciplines and developing professionally. First-year students engaged with seniors and graduates working in industry to help them envision their professional development and to perceive themselves as part of a larger profession.

Theme 2: Engaging in the University Community – Universities offer a wealth of resources to students, including support services like academic tutoring, career services, and mental and physical health support, together with co-curricular resources like student clubs, professional societies, Greek life, and athletics. Community engagement can increase students' academic success, develop skills outside the classroom, and support improved mental and physical health [10][11][12]. Building a sense of community increases student's intent to persist in the engineering field. Prior research in learning communities (namely, assigning students into common classes) shows that this sense of community can be credited with increasing retention of first-year students [4], boosting their first-year GPA, and improving their social experiences [13]. The significantly revised version of the Dean's Seminar course was first taught in the Fall 2021 semester, when the university returned to in-person classes for the first time since March 2020, the start of the COVID-19 pandemic. To facilitate the transition to in-person classes, the course instructors decided early-on that this redesigned first-year course should serve as a mechanism for building community within the class and for integrating students into the larger and physical university community. To encourage students to interact with one another both inside and outside of class, significant group work was included in the curriculum design, along with explicit assignments focused on participation in campus events.

Theme 3: Building Skills for Success – The transition from high school to college can be challenging for many students. Providing students with effective *individualized* learning strategies and boosting their metacognitive skills – an awareness of one's own thought processes – has been previously identified as critical to enabling success in formal and life-long education [14][15]. These skills for success, including techniques for time management and setting priorities, active reading, effective study aids, ways to boost motivation and perseverance, and methods for effective cooperative learning with peers, can positively influence student success

and retention within engineering programs [6][7][16]. Learning activities in the course were designed to develop students' study skills, time management skills, and metacognition. During the 2020-21 academic year (which was taught fully remote), faculty spent significant time and effort on advising and mentoring to support students through the challenges of learning in a remote environment. As part of this effort, two faculty members developed a robust advising program to assist in retaining and supporting students [17]. Key elements of this proactive academic advising program were incorporated into the first-year course.

The intentional design of the course around these three themes required that every activity, presentation, and assignment in the course be linked directly to one or more of the themes to create a coherent structure. The themes were explicitly conveyed to students and were included as logos on presentation slides related to an assignment or activity, as shown in Figure 1.

Figure 1. Example Presentation Slide

Achieving the Goals: Course Activities and Assignments

Course materials, activities, and assignments that were developed to guide students in the learning process each addressed one or more of the three course themes. Examples of key artifacts created for each theme are described in this section. Course components are designed to address the first research question, namely, how a first-year course can be used to develop students' knowledge, skills, and integration into the university.

<u>Theme 1: Entering the Engineering/Computer Science Profession</u>

- Brief, 5-to-8-minute, engaging videos were prepared by the Chair of each Engineering/Computer Science program discussing the relevance of the major, career opportunities, and student projects. Additional videos were prepared to introduce students

to the co-op program and to opportunities for pursuing minors. Students watched the ten videos (3-4 videos per assignment) over a three-week period, and then created a single PowerPoint slide on each video that addressed 3 reflection questions:
    - "I noticed…" (identifying important, interesting, or relevant aspects)
    - "I would like to know more about…" (building curiosity)
    - "This topic is important to me or my major because…" (recognizing the multi-disciplinary nature of the profession)
- Design Project #1 – The first course design project is a hands-on challenge where students work in groups to design, build, and test a mechanism to land a cup holding a ping pong ball safely when dropped from a height of 6 ft. Each team is given a kit of reusable, recyclable, and repurposed items for this task. As a first project, the focus is on creating an engaging challenge to emphasize teamwork, the design process, sustainability, and design for disassembly. In addition to the design, build, and test components, student teams develop a set of team expectations, communication plan, and project schedule to complete the tasks associated with the project. Students presented and tested their designs in class. Each team prepared a poster to document their design.
- Design Project #2 – The second course project is a design project proposal or pitch competition for a sustainable product or process where students identify a campus need and propose a solution that promotes the social, economic, and/or environmental well-being of the community. Students applied and further developed the teamwork and management skills necessary to complete their project. Student teams communicate their ideas and research through a poster and final presentation. Each team also submitted a memo reflecting on the effectiveness of the design process and their teamwork process.
- Panel Presentations – The instructors hosted panel presentations comprising speakers from different disciplines. Course instructors prepared a set of questions that were shared with the panelists. After approximately 20 minutes of hearing from the panelists, student groups were assigned the task of developing 1-2 questions to ask the speakers. Instructors invited a student reporter to ask the question on behalf of the group. Panels included:
    - Junior and seniors, selected from different majors, who were leaders in student or other organizations. Many had already completed an industry co-op or internship.
    - Early-career alumni (2-5 years after graduation) from different disciplines.
    - Mid-career alumni (5-15 years after graduation) from different disciplines.
- Roundtables with the Program Chairs – Students were assigned to two breakout groups of 20 minutes each: one to meet with the Chair or faculty representative from the student's intended major, plus one other major.
- Ethics Game – A Jeopardy-like game was created that required students to look up answers in codes of ethics such as the one provided by NSPE for engineers [20] or by the ACM for computer scientists [21].
- Effective Communication – Written and oral communication activities were included throughout the course, including:
    - Written Communications – K'Nex instructions. One half of the class was given "Kit A" with 6 K'Nex pieces, while the other half of the class was given "Kit B" with 6 different K'Nex pieces. Each team, serving as "Designers", was given 15 minutes to build a 2-D design and write instructions to recreate it. Then the instructors collected the instructions and handed them to a different team, along with a fresh kit. Each team now served as a "Builder." Builder teams were tasked

with building the design based solely on the instructions. Once completed, the Design and Build teams met to compare the original and recreated design. The course assignment was to take a selfie with both designs. Builder teams also assessed the effectiveness of the instructions and identified areas for improvement.
    - Written Communication –Each student prepared a résumé. Every group submitted a memo with a written reflection on the effectiveness of their design process and teamwork process for the Design Project Proposal.
    - Oral Communications – Oral communication skills were practiced at multiple points in the semester, including group introductions on day 1, a project presentation for the Safe Landing Design Project (Design Project 1), and a formal presentation for the Sustainable Design Project Proposal (Design Project 2).
    - Peer Reviews – Each team shared their draft poster with another team and identified strengths and suggested improvements to their deliverables.

<u>Theme 2: Engaging in the University Community</u>

- Weekly Seating Chart – Approximately 50-60 students were registered for each of two class sections. To encourage students to meet one another, instructors assigned different teams of 3-4 individuals for each class. Periodically, students were given the freedom to "choose their own adventure" and sit with friends or anywhere they preferred, but they had to sit with a group.
- Group Activities – Group activities in class required students to discuss topics and develop a group answer. Each activity typically had a designated reporter (e.g., the person wearing the lightest shirt). The assigned reporter was changed for each activity to encourage all students to participate.
- Student Clubs – Student leaders from different student groups were invited to present at the start of class (e.g., ASCE, SWE, NSBE) to inform first-year students about the group, invite them to their upcoming events, and to model student leadership.
- Scavenger Hunt – A group scavenger hunt assignment was created in which students were given clues to key university resources (e.g., Tutoring Center or Makerspace) or unique features (e.g., campus garden). Each team selected 10 items and created an edited video made up of photos or video clips of the team members at each location. Bonus points were awarded if Cali, the President's dog, was included in the video.
- University Event – Students were required to attend two university events other than a class, take a selfie or photo and write a two-sentence summary of the event and what they learned. Suggested events included athletics, performances, speakers, club meetings, and Student Life events.
- Guest Speakers – Speakers from different university entities presented in class. Speakers included staff from the following:
    - Career Services – Topics included resources available, self-reflection on work values, and a résumé-writing exercise.
    - Counseling and Psychological Services – Topics included resources available, guidance on wellness and stress management, and a meditation session.
    - Tutoring Center – Topics included tutoring and academic success resources.
    - Sustainability – Topics included the importance of sustainability on campus and how students can engage in related activities.

Theme 3: Building Skills for Success

- Weekly Schedule – Students were assigned to create a weekly schedule that identified their class times, specific times to study for each course, and times for exercise, friends, family, eating, sleeping, and personal care. Students completed this assignment in the third week of the semester to recognize early on the time required to keep up with courses and the importance of making time for non-academic interests.
- Assignment/Exam Planner – Students identified a desired grade on an upcoming assignment or exam in another class, and then identified resources, study strategies and time required to prepare so they could achieve their desired grade. Afterwards, on a "wrapper" assignment, students evaluated where they lost points on the assignment, assessed their study approach, and identified areas for improvement.
- Self-reflection Quizzes – Students were quizzed on their understanding of a growth mindset, learning beliefs, and goals.
- Résumé – Students drafted a résumé in class, received individualized feedback, and then submitted a final version.
- Meeting with Faculty Advisor – Although not a graded activity, each student was required to meet with their faculty advisor in Week 3 as a check-in, in Weeks 5-6 for Spring Registration, and Weeks 11-12 for a review of the semester.
- Short Stretch Breaks – Mini stretch breaks were included in each class when transitioning to a new topic, so that students could have a brief brain break. The advantages of taking short breaks in collegiate classes to improve student's ability to maintain focus and learning effectiveness was explored by authors in [19].
- Many of the topics included in the Building Skills for Success theme were inspired by the book, *Teach Yourself How to Learn* [15]. In the first year of this course, students received a printed copy to accompany class assignments and an electronic version was made available in subsequent years.

Making it Work: Course Management

Since Fall 2021, the Dean's Seminar course has typically been co-taught by two instructors from different disciplines. Close collaboration between the instructors was key to managing the course of 120-160 students. Instructors' practices included:

Weekly meetings – At these meetings, instructors would review student issues, define logistics and tasks for the following week, review lecture slides for the next two weeks, and look ahead to future needs (e.g., inviting panel speakers, assembling project supplies)

Clear division of labor and responsibilities – The two faculty members decided who would take the lead on key tasks, including:

- Maintaining the course learning management system (Canvas) and updating course assignments
- Managing graduate assistants and keeping track of course grading tasks
- Convening speakers, panelists, and student club representatives
- Updating the weekly PowerPoint class slides
- Dividing tasks as needed (e.g., contacting students who were missing class frequently)

Both instructors co-taught both sections – This collaboration facilitated running the class and allowed students to connect with, and be mentored by, multiple instructors.

Beginning with the significant redesign of the course in Fall 2021, all course materials including the Canvas site were created with the mindset of being able to transfer a well-designed and well-documented course to the next year's instructors so they could improve on the product and delivery. Examples of intentional course and assignment design for transfer included:

- File and assignment naming convention.
- Organization by weekly modules that included lecture files, assignments, and reference materials.
- A "pre-class prep" slide at the start of the PowerPoint file used each week, as shown in Figure 2.
- An unpublished "discussion" post maintained by the instructors and Graduate Assistants to track assigned grading duties and to provide samples of encouraging and constructive comments that could be included as feedback.
- A shared document maintained on Canvas to track the weekly schedule, similar to (but more detailed than) Table 1 shown in Appendix I.
- Project supplies and Opening Ceremony gifts inventoried and stored in labeled boxes in a common area.

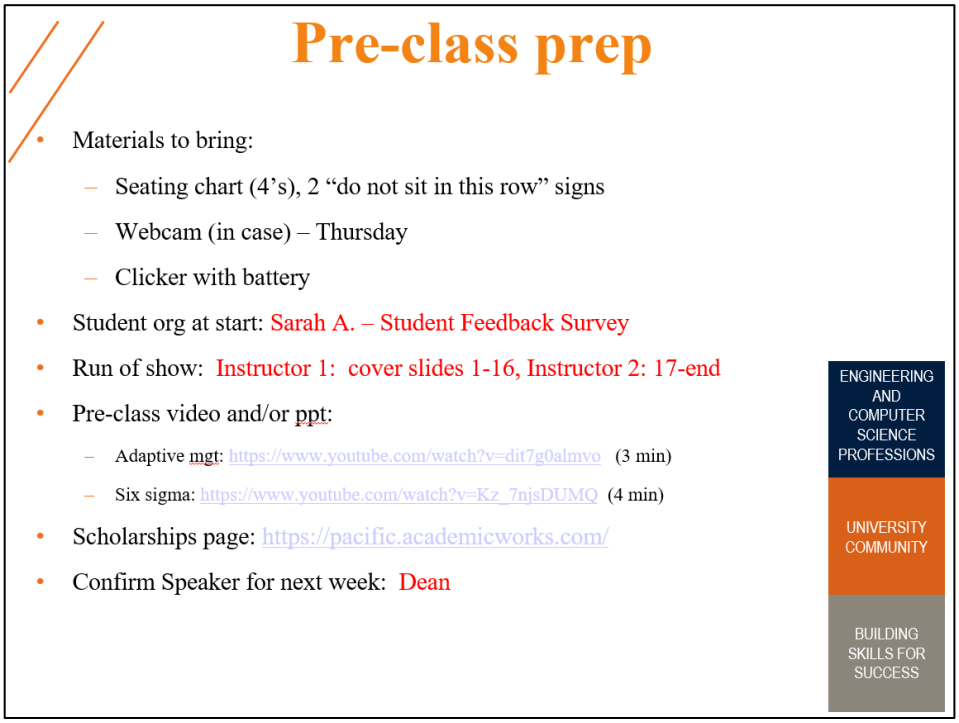

Figure 2. Sample pre-class preparation slide inserted at the start of each weekly PowerPoint file

Reflecting on Results: Data Analysis and Impressions from Students and Instructors

Every first-year student entering the School of Engineering and Computer Science was enrolled in this introductory course. As a result, each student was welcomed into the university community, was provided the scaffolding to develop skills for success, and was introduced to the engineering and computer science professions.

Although retention trends cannot be *specifically* attributed to this single course, we examined retention data for any changes in retention since Fall 2021. This analysis was done to answer the second research question posed in this paper, namely, to what extent does a well-defined, well-structured, interactive course benefit student retention and engagement in the university community? As shown in Figure 3, retention from first to second year within the university was higher for the Fall 2021 incoming first year class than in Fall 2020 and increased further for the Fall 2022 cohort. A similar trend is observed for retention of students within the School of Engineering and Computer Science. In addition to the revamped Dean's Seminar course, all students are advised as part of a revitalized first-year advising program.

Retention within the School of Engineering and Computer Science was determined by comparing student identification numbers as listed on course rosters in the Dean's Seminar course to student identification numbers listed in a monthly enrollment report for the School. Enrollment reports were unavailable for Fall 2017 and Fall 2018, so rosters from the Fall 2016 and Fall 2017 first year introductory course were compared to enrollment reports from Fall 2019. Although the approach yields an inaccurate measure of first year retention for the Fall 2016 and 2017 cohorts, the trends are consistent with retention trends observed at the university level.

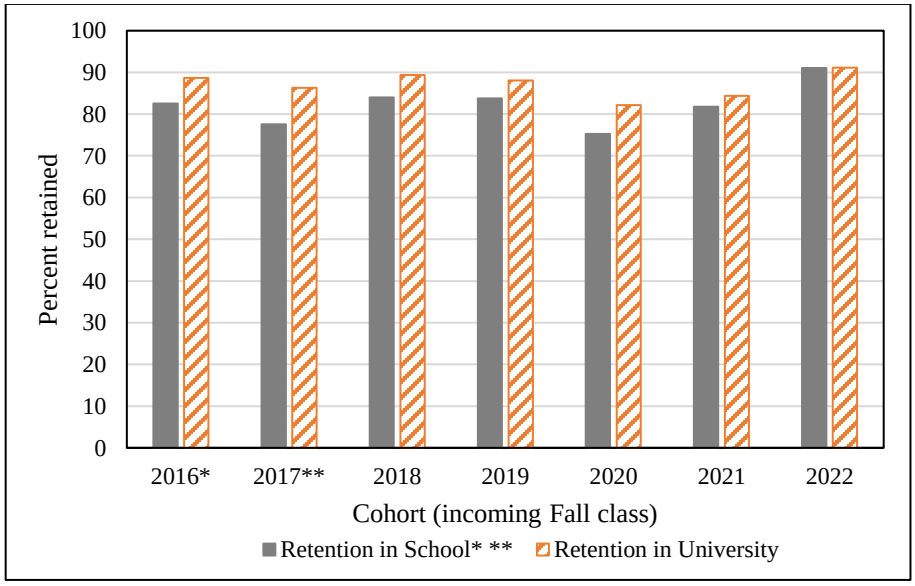

Figure 3. First to second year retention in School and within the University

Notes:

*For F16 students: compared F16 course enrollment list to School list in F19 (3 years)

**For F17 students: compared to enrollment in F19 (2 years)

Retention in School: Student retained in School of Engineering and Computer Science

University retention: Student retained in the university, but not necessarily in the school. Data from university Office of Institutional Research.

Students' Perspectives on Course Content and Logistics

In end-of-semester course evaluations, students assess the instructor and course using a Likert-scale survey and can also provide written feedback. Seventy substantive student comments were included in the evaluations received from Fall 2021 to Fall 2023 and are summarized below. All the instructors received positive feedback from the students regarding their handling and delivery of the class, their responsiveness to questions, and assistance with homework.

Several students indicated a strong dislike for the 8 a.m. start time and stated that a two-hour class was too long. In response to the surveys, the class was taught as a 75-minute class and started at 8:30 a.m.in Fall 2023, but the course evaluations still included comments about the early start and class length.

Approximately 10 comments focused on the amount of work required, particularly for a 1-unit course. This observation is a fair one. Rather than embedding all assignments related to building skills and metacognition in the first semester course, some assignments may be better placed in core courses that students take later in the first year or during the second year.

Finally, several students expressed disappointment in the amount of time spent on developing skills and resiliency rather than principally focusing on technical content. This observation may indicate a stronger need to emphasize the benefits of building study skills early on and to provide opportunities to reflect on the connection to success in the student's academic career.

Students' Perspectives on Engaging in the University Community

A survey was administered in Fall 2023 to gauge students' perception of community within the School. Students were offered extra credit to complete the survey and were asked to note when the survey was complete. The 16-question survey was anonymous but asked students to identify their major. Eighty-nine responses were received, although it is possible that a student completed the survey more than once.

Survey results for some questions were summarized and are shown in Figures 4-7. For this analysis, we combined responses indicating "Agree" or "Strongly Agree" and we also combined responses indicating "Disagree" or "Strongly Disagree."

As shown in Figure 4, over 70% of students feel connected to others in the course or are neutral. Results shown in Figure 5 indicate that a majority of students have developed trusting relationships with others and feel they can rely on others at the School. Due to the small number of students in some majors, e.g., EMGT (Engineering Management) with only 5 respondents, a few different answers can have a strong influence on the results. In Figure 6, results show that except for EMGT (5 respondents) and CS (37 respondents), students in the other majors perceive that they matter to others in the School. Finally, as shown in Figure 7, over 90% of respondents perceive that they feel close to others in the school, with a notable number of positive responses among Bioengineering and Civil Engineering majors. Fall 2023 was the first instance of administering the survey. Results are encouraging and consistent with the intent of one of the three themes emphasized in the course.

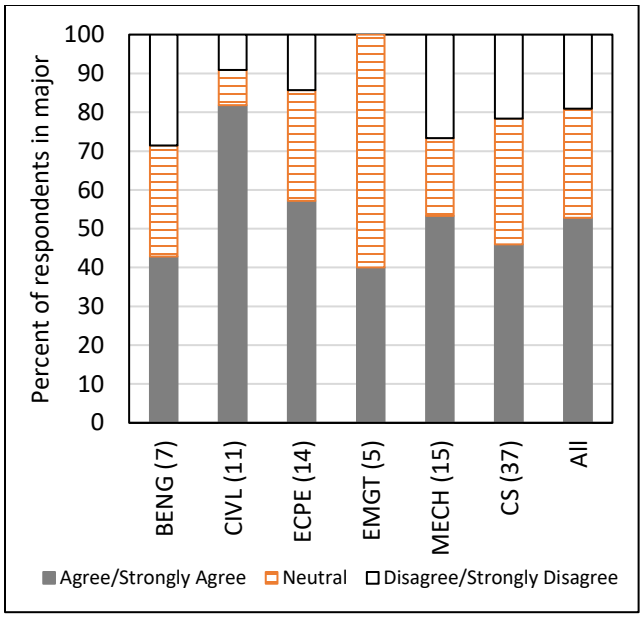

Figure 4. Students' response to the question "*I feel connected to others in this course*" (Number of respondents in parentheses)

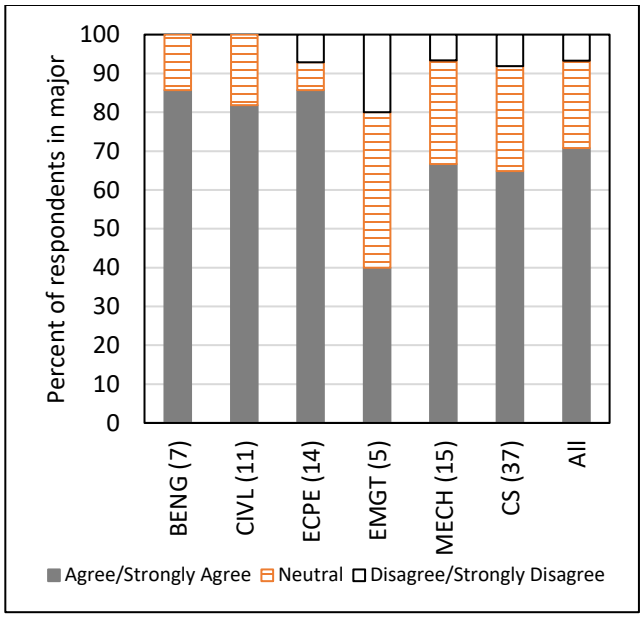

Figure 5. Students' response to the question "*I feel that I can rely on others at this school*"

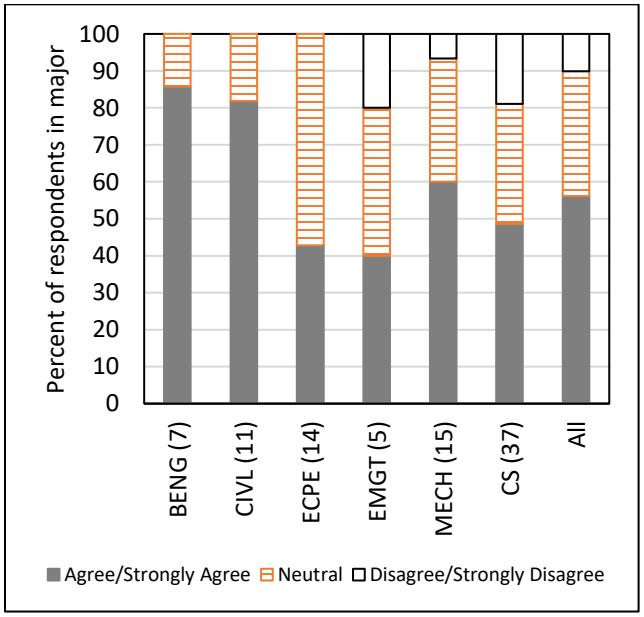

Figure 6. Students' response to the question "*I feel that I matter to other students in this school*" (Number of respondents in parentheses)

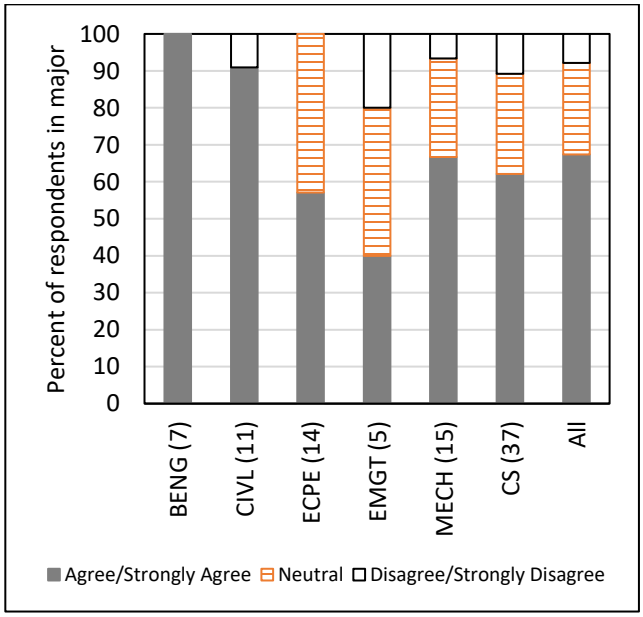

Figure 7. Students' response to the question "*I feel close to others at this school*"

Instructors' Perspectives on Lessons Learned

Teaching this current version of the introductory course for three years, with minor modifications each time, gives the instructors an opportunity to reflect on strengths and areas for improvement as related to content, course management, and instructor collaboration.

Instructor Lessons Learned: Content

Learning objectives and activities planned for class meetings helped achieve desired outcomes. The intentional focus on course themes and fun helped engage students.

Course Themes – Establishing central themes for the course around profession, community, and student success allows instructors to tie learning objectives together and provides context and relevance for students during each class meeting.

Engaging Activities – Active learning is central to course engagement between instructors and peers, especially during an early morning class. The course strengthens connections among students through group activities such as the university scavenger hunt, project presentations, fun design projects, and the ethics jeopardy game. These activities also place the focus on students, allowing students to be the "star of the show."

Every Class Counts – Lang [22] advises teaching a good first day of class by sparking students' curiosity, building community, engaging students in learning, and introducing course expectations (such as types of assignments, major deliverables, and attendance policies). This last item is particularly helpful, as we found through an anonymous in-class poll in Week 1 that some first-year students were quite nervous and scared about the unknowns of the college experience in their first semester while others were eager to get going. The instructors' philosophy and approach – and recommendations made to all guest speakers – was to make every class fun and engaging. This expectation was established and modeled beginning on Day 1.

Instructor Lessons Learned: Course Management

Team management and student workload are important considerations for a class with first year students adapting to new academic environments.

Manage Student Teams – In this course, students were assigned teams using a random number generator. Team members establish team contracts to articulate their expectations for communication, meetings, quality of work, and other responsibilities. However, the instructors also used different strategies to support teams, particularly when a team member was not contributing or if the team was struggling to coordinate their work or manage different personalities. Some techniques used in this class include distributing no-show students across groups and holding in-class status update meetings with instructors. Instructors invited students to bring any concerns to the instructors individually, so that issues related to interpersonal communication or lack of engagement could be addressed. Peer evaluations at the end of the project allowed students to give feedback on each team member's contributions. Scores were adjusted for students who made little or no contribution to the deliverables. Where possible, instructors met with those students to identify underlying issues that prevented them from contributing.

Manage Workload – A first-year course is often a convenient source of assessment data from a targeted cohort. There is often pressure from the institution to include multiple

surveys and assessments as homework assignments into an introductory course that bloats the curriculum. Not everything needs to be in this one class.

Instructor Lessons Learned: Instructor Collaboration

A collaborative approach to teaching is critical to ensuring a cohesive learning experience for students in a co-taught course. The following elements were considered instrumental in promoting successful instructor collaboration:

Transfer of Knowledge – During each iteration of the course, one faculty member would overlap to teach the course in consecutive years. This structure, along with shared course materials, allowed for consistency between years and mentoring of faculty new to the course.

Division of Labor – Before the start of the semester (i.e., during the first weekly meeting), instructors identified course needs and assigned key roles based on interest, need, or availability as follows:

Instructor 1:

- Manage the course Learning Management System (Canvas)
- Coordinate outreach to Faculty Advisors
- Update class PowerPoint files

Instructor 2:

- Manage Teaching Assistants (assign and monitor tasks)
- Coordinate guest speakers and panelists
- Coordinate competition/activity supplies and prizes

Both instructors attended and presented in class, followed up on student issues, and where needed, graded assignments that were not graded by the student assistants.

Weekly Meetings – Regular weekly meetings serve as the foundation for consistent communication and alignment between instructors. These meetings allow course instructors to plan for future weeks and to assign and resolve logistical tasks or student issues.

Run-of-Show – The run-of-show (example outline below) details the minute-by-minute plan of teaching activities, transitions, and designated roles for each instructor. Creating and reviewing this detailed document for each class meeting helps instructors identify any course preparation needs and clarifies each instructor's responsibilities.

- 8:30 am - Student Group Overviews
  - Solar Car, ASCE, SAE Formula Car
- 8:40am - Brief Project Overview and Design Process
- 8:45am - Team Expectations Activity (Canvas assignment)
- 8:55 - Design Kit and Project Criteria
  - Design problem - 20 minutes in class for teams to work on their design project and team rules
  - Show design kit contents
- 9:13am – Stretch Break

- 9:15am - Recent Alumni & Current Student Panel on Leadership, involvement, and the Profession (via Zoom)
    - CS Student, CIVL Student, MECH Student, ECPE Student
- 9:45 am - Review Advisor Assignment, Wrap-up, Pick up your team's kit on the way out

Instructor Lessons Learned: Faculty Mentoring

In keeping with the intentional approach to conducting the course, this course also offered an opportunity to mentor a new faculty member (one of the co-authors) who was assigned to co-teach the course. Co-teaching the course allowed the new faculty member to learn about the university culture, resources, and the different academic disciplines side-by-side with first year students and equally important, gave the faculty member a built-in mentor with whom they met on a weekly basis and could ask questions and address concerns as they arose. The new faculty member had taught at a large public institution prior to joining University of the Pacific, a private and primarily undergraduate institution. Their observations include:

Learning the culture – As a new faculty member, it is crucial to understand the context and requirements of the student population to better serve their needs. As a private, primarily undergraduate institution, University of the Pacific focuses on students who require extra support and assistance during their studies, many of whom are first-generation students. Co-teaching this course with an experienced mentor provided valuable insights and guidance to help achieve this understanding.

Identifying resources – University of the Pacific provides a range of resources to facilitate students' academic success and social development. Co-teaching the course offered the new faculty member an accelerated lesson on the university's traditions, resources, landmarks, student activities, celebrations, the various academic disciplines, and other units within the University.

Learning the tools – The learning management system (Canvas) is used extensively in courses. Managing a course with over 120 students required using Canvas to communicate content and manage student deliverables. Co-teaching the course and using an established Canvas site whose structure and content were created the previous year enabled the new faculty member to learn the features and capabilities of Canvas quickly, and improved the site because the faculty member provided the perspective of someone looking at the site for the first time.

Limitations

The improvements in first year retention data discussed in this paper are likely the result of multiple efforts within the School of Engineering and Computer Science that include the implementation of a student success program, early grade reporting, and an expanded first year advising plan. While the design of this first-year engineering course likely contributed to the improvements in retention yearly, it was not the sole reason.

Factors not considered in the preliminary analysis of retention data include the following: Different instructors taught the course before the Fall 2021 redesign and the return to in-person instruction following the COVID-19 pandemic.

Conclusions

In this paper, we have described how a first-year course at University of the Pacific was adapted to develop students' knowledge, skills, and integration into the university. We have documented the elements of a well-defined, well-structured, and interactive course that can benefit student retention and engagement in the university community. Preliminary data on retention statistics and student feedback on community engagement indicate the course may positively influence these goals.

The intentional design of this first semester introductory course revolves around three themes, namely, Entering the Engineering/Computer Science Profession, Engaging in the University Community, and Building Skills for Success. Every activity, presentation, and assignment in the course is linked directly to one or more themes, thereby creating a coherent structure. Instructor communication and collaboration were key for successful execution of the course. The course in its current form will not be taught in fall 2024. However, the lessons learned from this course will inform the development of the revised course that will be offered starting fall 2024.

Teaching this class was a rewarding experience for the instructors because of the opportunity to influence student growth and integration into the university. Teaching a well-organized and structured course with colleagues across disciplines was also a very enjoyable experience.

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APPENDIX 1 – Course Organization

Table 1. Summary of weekly learning objectives and course activities

Week	Learning Objectives	Activities
1	• Identify other students in the class • List skills that lead to academic success • Identify at least 2 study strategies to improve your learning	• Welcome & Introductions • Effective study skills • Welcome ceremony
2	• Identify effective learning strategies • Create a weekly schedule • Explain the importance of ethical decision making in your academic and professional career	• Effective Learning Strategies • Time management • Syllabus, Ethics, and the University Honor Code
3	• Locate university resources • Develop a set of team expectations • Design and test an engineering mechanism • Explain the role of student involvement in your academic and personal growth	• Building Success: University resources • Design project assignment • Effective teamwork • Speaker panel: Student involvement and leadership
4	• Present and test your design	• Design presentations and testing • Poster presentations
5	• Describe characteristics of the ENGR/CS professional • Explain how different majors apply to your personal and professional development • Meet faculty in your discipline and other disciplines	• Speaker panel: Engineering and Computer Science professionals • Faculty roundtables: Meet the Chairperson for each program
6	• Develop a curriculum plan • Use tools to help you track academic progress • Identify academic support resources	• Building Success: Curriculum plans, advising, DegreeWorks • University resources: Tutoring Center, Writing Center
7	• Evaluate your time management and study skills. Identify strengths and areas for improvement • Meet students in the School of Engineering and Computer Science • Identify strategies for academic and personal growth	• Building Success: Exam wrappers, self-reflection • Student roundtables: Meet Engineering/Computer Science students
8	• Develop a set of team expectations • Design a product and communicate the design	• Design project assignment • Effective teamwork

Week	Learning Objectives	Activities
9	• Apply the code of ethics • Identify your mindset, motivation, and learning goals	• Engineering and Computer Science Ethics game • Building Success: Learning Beliefs and Goals
10	• Communicate team progress • Identify strategies for communicating clearly	• Team project and status report • Build success: Clarity of Communication
11	• Identify career resources available • Prepare your résumé • Define your values	• Building Success: Careers, scholarships, résumés • Résumé Writing Basics • Values Activity
12	• Describe strategies for maintaining good mental, physical, and emotional health • Describe strategies to practice and promote sustainability	• Building Success: Personal and environmental wellness • Sustainability • Mindfulness
13	• Review your résumé and provide feedback on other students' résumé	• Building Success: Résumé review
14	• Assess your academic performance, identify strengths, and strategies for future success • Describe the goals of the Dean of the School of Engineering and Computer Science and explain how they apply to you	• Building Success: Assess and Adapt • Guest presentation: Dean, School of Engineering and Computer Science
15	• Describe elements of career success and fulfillment and how they apply to you • Refine your résumé	• Guest presentation: Looking ahead! • Résumé feedback
Final	• Present your team's design	• Final presentations