

# An Integrated Approach to Providing First Year Engineering Experience

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**Abstract** - The College of Engineering at the California State Polytechnic University, Pomona, uses an integrated approach to providing engineering students with a comprehensive and useful first year experience. It involves several elements including a Summer Orientation Program for incoming freshmen during the summer just prior to their entering the university; an engineering course, EGR 100/L, “Engineering, Society, and You,” consisting of a three-unit lecture section and a one-unit laboratory section that satisfy the General Education requirement of “lifelong learning and self-development; an Engineering Freshman Advising Program provided by a dedicated Engineering Advising Center; a Maximizing Engineering Potential Program targeting traditionally underrepresented students; and a Women in Engineering Program that provides female students the resources and support services to succeed in engineering. Through integrating these various elements, the College of Engineering aims to provide students with a first year experience that would be useful throughout their college and professional careers.

*Index Terms* – First year engineering experience, FYEE, Integrated approach, Maximizing Engineering Potential, Women in Engineering

## FYE AT CPP

At the California State Polytechnic University, Pomona (Cal Poly Pomona or CPP), the university-wide First Year Experience (FYE) program is overseen by the Office of Academic Programs under the Division of Academic Affairs headed by the Provost. The mission of the FYE program at CPP is “to support the university’s efforts to increase undergraduate retention and academic success by providing programs that facilitate the students’ transition to the university through experiences that outline the university’s academic expectations, support services, social resources and opportunities.” The expected outcomes of the FYE program are as follows:

- Students will demonstrate a commitment to and a responsibility for their own education.
- Students will understand the relationship of their education to their personal and professional development.
- Students will develop the skills to work cooperatively in diverse communities and build a strong support network of faculty, staff, and peers.

- Students will develop information literacy skills to enhance their academic and personal success.
- Students will develop an appreciation of intellectual inquiry.

To achieve these expected outcomes, the College of Engineering at CPP uses an integrated approach to providing engineering students with a comprehensive and useful first year experience. Several elements are implemented to provide this experience. They include:

- A Summer Orientation Program for incoming freshmen during the summer just prior to their entering the university
- An engineering FYE course, EGR 100/L, “Engineering, Society, and You,” consisting of a three-unit lecture section and a one-unit laboratory section that satisfy the General Education (GE) requirement of “lifelong learning and self-development”
- An Engineering Freshman Advising Program provided by a dedicated Engineering Advising Center
- A Maximizing Engineering Potential (MEP) Program targeting traditionally underrepresented students
- A Women in Engineering (WE) Program that provides female students the resources and support services to succeed in engineering

Through integrating these various elements, the College of Engineering aims to provide students with a first year experience that would be useful throughout their careers at CPP and beyond.

## INTEGRATION OF FYE ELEMENTS

The FYE course and various programs identified above are interrelated and can be integrated to provide a well-balanced and meaningful learning experience to first year engineering students. Their interrelationships are depicted graphically in Figure 1 and described here, followed by more detailed descriptions of the FYE course and the individual programs in subsequent sections.

The first year experience of our students actually starts during summer orientation just before the start of their first academic year in the fall. During the summer orientation, students receive academic advising from professional staff advisors and faculty advisors and are introduced to or placed in the FYE course EGR 100/L, Engineering Freshman Advising Program, MEP Program, and the WE Program.

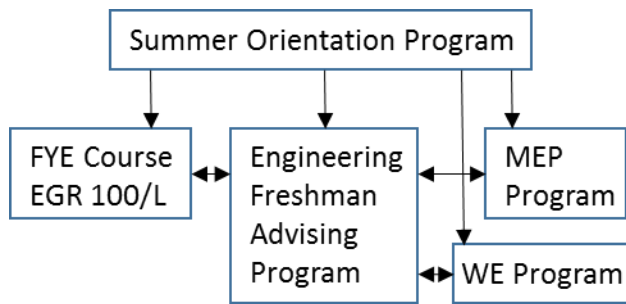


FIGURE 1  
INTEGRATION OF THE FYE COURSE AND VARIOUS PROGRAMS.

During their first year in our engineering programs, students are advised by the professional staff advisors in the Engineering Advising Center through the Engineering Freshman Advising Program. All freshmen are advised to take the engineering FYE course EGR 100/L and other appropriate courses as defined by their individual curricula. Additional academic advising and other FYE activities and services for underrepresented and female students are provided by the MEP and WE Programs, respectively.

In short, the engineering FYE course EGR 100/L is the central element that covers all the expected FYE outcomes, while the other elements provide academic advising and other FYE activities and services that make the FYE of our students richer and deeper.

### EGR 100/L

The FYE course EGR 100/L, “Engineering, Society, and You,” consists of a three-unit lecture section and a one-unit laboratory section that satisfy the General Education requirement of “lifelong learning and self-development.” It covers the development of the individual in society from an engineering perspective and the integration of society and technology. Expected outcomes of this engineering FYE course are consistent with those of the university FYE program and include:

- **Community Building:** Students will develop a sense of their place in the University and how they can support each other.
- **Team Building:** Students will learn how to function as a multi-disciplinary team. Several creativity projects will require students to form teams of three or four to conceive, design, and present designs for new products using various techniques.
- **Communication:** Students will develop written, oral, and presentation skills including report generation, technical presentations, and in-class discussions.
- **Professional Development:** Students will gain an understanding of engineering as a profession and its responsibility to society. Students will conduct themselves ethically and in a professional manner.
- **Motivation:** Students will understand contemporary theories of motivation, such as the Achievement,

Affiliation and Power model and Maslow’s Hierarchy of Needs.

- **Ethics and Professionalism:** Students will learn ethical and professional practices. Students will analyze and discuss various real-life examples of projects involving engineering and technology and their impact on society. Students will consider safety, ethics, and professionalism as part of an assigned group project.
- **Academic Skills:** Students will learn time management skills to devote appropriate time to studying. Students will identify the skills and knowledge needed to complete their degree and to be lifelong learners. The course will include assignments in note taking, scheduling, time management, and goal setting.
- **Peer Interaction:** Students will work effectively with peers through group study and collaborative learning projects. Assignments will include group projects and team building activities.
- **Faculty Interaction:** Students will be encouraged to interact regularly with their instructors during class time and during office hours.
- **Campus Resources:** Students will be exposed to campus resources (the writing center, the counseling center, the health center, the library, the career center, etc.). Speakers, tours, and assignments will be provided to assist in learning about these resources.
- **Self-Confidence:** Students will develop confidence in their ability to succeed academically.
- **Self-Assessment:** Students will develop clear goals and a plan for their personal development based on a self-assessment of their strengths and weaknesses.
- **Stress Management:** Students will engage in good health and wellness practices and learn how to manage stress through stress-reduction methods.
- **Creativity:** Student will learn how to use a variety of creativity techniques when faced with problem solving and design challenges.

It can be seen that the expected outcomes of the university FYE program are developed in the engineering FYE course EGR 100/L, with particular emphasis on engineering-related aspects.

One signature feature of the EGR 100/L course is a major project required by the EGR 100L laboratory section. Major projects that have been used include the design and construction of a Mini Rose Float, a model All-Terrain Vehicle, and a model Tracked Vehicle. Through working on this major project, students learn knowledge and skills and develop attitudes that allow them to achieve many of the expected outcomes. In addition, these projects are designed to give the students a taste of the interesting and challenging real-world engineering problems that engineers are working on in practice, which should motivate students to continue their studies in engineering and eventually graduate. As part of the MEP and WE programs, there are some EGR 100L laboratory sections designated for MEP students and female students.

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In summary, the EGR 100/L course is designed to help students understand the integration of society and technology, and to help them acquire the knowledge, skills and attitudes required to be successful as engineering students and subsequently practicing engineers. The College of Engineering has found that on average students who have taken the EGR 100/L course have higher grade point averages (GPAs) than students who have not. While more assessment of EGR 100/L is still needed to demonstrate its effectiveness, this course has served as a key element in the FYE of our engineering students.

### SUMMER ORIENTATION PROGRAM

The Summer Orientation Program is a mandatory program for all incoming students that the students participate in during the summer prior to their first academic year at CPP. For freshmen, the Summer Orientation Program is three days long and involves overnight stays at student residence halls. The program introduces incoming freshmen to campus life and includes advising sessions in which staff advisors from the Engineering Advising Center, who are professionally trained and highly experienced in academic advising, and faculty advisors, who are engineering faculty and experienced in engineering curricula and engineering careers, advise incoming freshmen on academic and curricular issues and help them develop their academic plan to graduation. With help from student assistants, the staff and faculty advisors also help the incoming freshmen formulate their class schedules and register for classes for their first quarter at CPP.

### ENGINEERING FRESHMAN ADVISING PROGRAM

Recognizing the importance of the critical first year of college to the success of a student, the College of Engineering has set up the Engineering Freshman Advising Program that serves first year students. The Engineering Freshman Advising Program is managed by staff advisors in the Engineering Advising Center and is provided to first year students. These staff advisors are professionally trained and highly experienced in academic advising. They are the same staff advisors that are involved with the Summer Orientation Program and are well versed in the challenges students face during the transition from high school to college.

Under the Engineering Freshman Advising Program, which was recognized as CPP's Outstanding Advising Program in 2014, all first year students are required to obtain academic advising through group advising sessions or individual face-to-face advising appointments with staff advisors at least once during each of the Fall and Winter quarters. "Registration holds" are used to enforce this requirement. To help students fulfill this advising requirement, the staff advisors organize and conduct group advising sessions throughout the Fall and Winter quarters, especially for early in the quarter before registration for the next quarter begins. They also have blocked out time periods for individual face-to-face meetings with students and walk-in advising periods as well. Students may sign up for an

advising session or make an appointment to meet with an advisor by contacting the Engineering Advising Center on line, by phone or by email.

To ensure a smooth transition from the first year to the second year, the Engineering Advising Center sends an email to all first year students at the end of their first year to inform them that they should start seeing their faculty advisor for academic advising starting their second year. This email also provides information customized to the student receiving the email on how to determine who his or her faculty advisor is. It represents a congratulatory send off from the Engineering Freshman Advising Program to academic advising by faculty advisors in the individual departments.

### MEP PROGRAM

Established in 1983, the MEP Program at CPP is an academic enrichment program for traditionally underrepresented students in engineering including first-generation, minority, female, and low-income students. It serves all students including first year students.

In conjunction with the Summer Orientation Program, MEP organizes a Summer Bridge Program called "Engineering in Your Future." During the academic year, MEP organizes many events and creates a learning community that is supported by mandatory tutoring, peer mentoring, field trips to industry sites, scholarships and stipends, and an undergraduate research community.

MEP collaborates with staff advisors in the Engineering Advising Center and works with the EGR 100/L instructors to offer EGR 100L laboratory sections designated for MEP students.

### WE PROGRAM

Established in 2012, the CPP WE Program provides resources and support services to female students and faculty to help them succeed in engineering. CPP WE focuses on recruiting and retaining female students and creating a welcoming and supportive environment for them. In collaboration with industry sponsors, CPP WE has initiated a variety of innovative programs including faculty mentoring workshops called WE Chats, alumnae based career development workshops called the WE Talk Alumnae Speaker Series, and a CPP WE Ambassador program.

The CPP WE Program works with the EGR 100/L instructors to offer the option of an EGR 100L laboratory section designated for female students.

### SUMMARY

A comprehensive FYE for engineering students is provided at CPP through integrating an engineering FYE course and several student support and academic enrichment programs. The engineering FYE course is EGR 100/L, "Engineering, Society, and You," and the programs include the Summer Orientation Program, Engineering Freshman Advising Program, CPP MEP Program, and the CPP WE Program. The EGR 100/L course is the central element that covers

most, if not all, of the expected student learning outcomes of the university FYE program. It is supported by academic advising and activities provided by the Summer Orientation Program, Engineering Freshman Advising Program, MEP Program and the WE Program. Together the engineering FYE course and the various support programs provide our engineering students a first year experience that they can build on, to continue in and eventually graduate from our programs.

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