

OSU PRECOLLEGE PROGRAMS (PCP) Broader Impact Opportunities for the K-20 Community

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Early and continued exposure to science and engineering concepts are keys to getting and keeping students interested in STEM fields and careers. This guiding principle of K-12 outreach is especially true for recruiting groups traditionally underrepresented in science and engineering, such as women and minorities.

OSU has a long history of delivering quality science and engineering outreach programs (e.g., Saturday Academy has offered enrichment classes since 1986). The office of **Precollege Programs (PCP)** enables faculty to broaden their education impacts by:

- Offering a **range of science outreach programs** to fit faculty needs.
- Providing program **infrastructure** (administration, marketing, registration, etc.) allowing faculty to **focus on delivering content** and connecting with students.
- **Consulting** with faculty to initiate new outreach programs, advising on outreach best practices and connecting faculty with local K-12 resources.

A fundamental concept that must be realized in attempting outreach is that there are both similarities to be exploited and differences to be recognized in the delivery of science content across the K-20 continuum. *Precollege Programs (PCP)*, the *College of Engineering (COE)* and the *College of Science (COS)* offer a **portfolio of programs** to match the broader impact needs of OSU faculty.

Examples of Broader Impact Programs

The diversity of Precollege Programs offers faculty a choice of time and resource commitments ranging from delivering a content lecture to mentoring a student for the summer.

These programs are described in more detail at: <http://cbee.oregonstate.edu/education/> and many of the OSU K-12 programs are described at: <http://oregonstate.edu/precollege>.

Service Learning for OSU Students for the K-20 Continuum (Mentoring Pyramid)

The COE Women and Minorities in Engineering program (Ellen Momsen, Director) in collaboration with COE and PCP has established several recruitment and

retention programs targeted at women and minorities in engineering. The

motivation for this is that many studies show that when women students

are placed in mentorship roles, they gain increased

“ownership” of the project, which leads to increased interest,

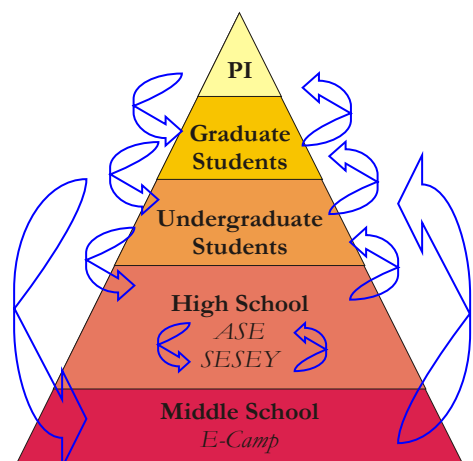
motivation and retention. COE has a well established

mentoring pyramid, in which faculty mentor graduate students,

who mentor undergraduates, who in turn mentor high school

students, who in turn mentor other high school, middle school,

and K-5 students. This has proven to be a powerful model for



recruitment and retention at ALL levels. All of the programs mentioned below can be serviced (that is, content developed and delivered) through this mentoring pyramid.

Center for Outreach in Science and Engineering For Youth (COSEY)

COSEY is a collaborative K-20 activity that is jointly supported by **COE**, **COS** and **PCP**. COSEY has been provided with a physical office space in Batchellar Hall (COE) that brings together several K-12 outreach units (PCP, Saturday Academy, Talented and Gifted Programs, COS Outreach) and provides support for the daily operating expenses (copying, mailing, phones, and computer support services). Having many programs in a single location provides increased synergies in program delivery (actions and thoughts) and also serves to portray the **OSU pipeline** of academic outreach programs to the outside community of people whose children participate in these programs. Below are examples of some of the programmatic opportunities currently available on the OSU campus. PCP personnel can facilitate interactions with any of these programs, and many more.

Elementary level programs (grades K-5): Goal is **exposure** to science content and vocabulary.

-Spirited Kids in Engineering and Science (SKIES): Science and engineering activities for grades K-5 where kids explore chemistry, physics, math, life sciences, ecology and engineering in a fun, interactive learning environment.

-Adventures in Learning (Talented and Gifted Youth, TAG): This 10-day summer program enables 5th and 6th grade learners with unique learning needs to participate in academic pursuits by interacting with adults who are enthusiastic about their field, and be introduced to possible career options.

-Expeditions (TAG): provides gifted, talented, and high-ability youth currently in grades 3 and 4 a 10-day educational experience with courses taught in a variety of topics.

-Winter Wonderings (TAG): offers challenging, fast-paced Saturday classes designed specifically for gifted, talented, and high-ability 3rd, 4th, 5th, & 6th graders.

Middle School level programs (grades 6-8): Goals are continued **exposure** to science/engineering content and **reinforcement** of vocabulary and concepts.

-Saturday Academy Middle School Engineering Camp (E-Camp): This week-long, non-residential summer program typically engages 24 middle school students in activities that relate to the entire range of engineering majors and careers. The activities are provided by faculty and are usually delivered by undergraduate and graduate students in collaboration with faculty.

-Advocates for Women in Science, Engineering and Mathematics (AWSEM): Undergraduate women studying science and engineering fields will lead AWSEM clubs for middle school girls which meet at least four times throughout the winter and spring term.

-Outside the Box (TAG): Enables gifted, talented, and high-ability youth who have completed grades 7 or 8 to pursue topics of interest through a unique combination of in-depth, challenging academic explorations and social interaction with intellectual peers.

High School level programs (grades 9-12): Goals are **exposure** and **reinforcement** of science/engineering concepts, **applicability** to daily life, and influence on college major and career options.

-Summer Experience in Science and Engineering for Youth (SESEY): SESEY is primarily for high school girls and ethnic minorities traditionally under-represented in science and engineering, and for science, math, or physics **teachers** who are interested in developing curricular materials to promote engineering activities in their classrooms. Students come to the OSU campus for a one-week residential summer camp and are paired with a faculty mentor in engineering for a mini-research project.

-Saturday Academy Apprenticeships in Science and Engineering (ASE):

Eight week summer research program offers high school students the opportunity to work with an engineer or scientist for eight weeks during the summer. Students also attend workshops, seminars, lectures, and leadership classes at the Midsummer Conference in July, typically held on the OSU campus. There is a Year-End Symposium in August, where students present their work in a professional research meeting format which includes poster sessions and oral presentations.

Community College or University (grades 13-14): Goals are **reinforcement** of science and engineering concepts, **applicability** to daily life, and **career path**.

example program: College of Engineering Ambassadors (<http://enr.oregonstate.edu/wme>)

Teachers (K-12): Goals are **lifelong learning** (increased content knowledge and career information) and curriculum content development.

example: teacher summer workshops and participation in SESEY

Parents/Community Members: Goals are **lifelong learning** through increased content knowledge and career information to pass along to their children so that the parents become true partners in the decision making process.

- example program: Family Science and Engineering Nights at Elementary and Middle Schools; Corvallis daVinci Days Engineering Village.

CONTACT INFORMATION

For more information on any of these diverse **BROADER IMPACT** opportunities please contact Skip Rochefort (skip.rochefort@oregonstate.edu) or Kyle Cole (kyle.cole@oregonstate.edu).