The Oregon State University College of Engineering enables learning of engineering practice, discovers new knowledge of engineering science and technology, and engages the citizens of Oregon, the Northwest region, the nation, and the world in the application of engineering knowledge.
Administration Team
Ron Adams, Dean
Chris Bell, Associate Dean for Research and Graduate Studies
Sabah Randhawa, Associate Dean for Operations
Roy Rathja, Assistant Dean for Undergraduate Programs

Accreditation
Accreditation Board for Engineering Technology (A.B.E.T.)

Research
FY 00 new grants and contracts: $13.5 million,
Technology transfer rate: 2-3 licenses per year
Areas: data base mining, data security, mixed signal circuit design, electronic materials, metallic materials, energy, environmental remediation, infrastructure technology, reactor cooling, bioengineering, micro technology based energy and chemical systems, human factors, wave/structure interaction

Research Centers and Institutes
- Center for Advanced Materials Research
- Extension Energy Program
- O.H. Hinsdale Wave Research Lab
- Motor Systems Resource Facility
- Oregon Space Grant Program
- Transportation Research Institute
- Northwest Alliance for Computational Science and Engineering
- Parallel Tools Consortium
- Water Resources Research Institute
- Western Region Hazardous Substance Research Center
- Oregon Metals Initiative
- Advanced Thermal Hydraulics Research Lab

Faculty
Professorships: 6, growth of 1 since 1998
Faculty Fellows of International Societies: 22

Departments
Bioresource Engineering
James Moore, Department Head
Undergraduates: 33
Graduate students: 28
Number of teaching faculty: 11
Number of staff: 5

Chemical Engineering
Carol McConica, Department Head
Undergraduates: 165
Graduate students: 22
Number of teaching faculty: 8
Number of staff: 1

Civil, Environmental, & Construction Engineering
Ken Williamson, Department Head
Civil Engineering
Undergraduates: 350
Graduate students: 66
Environmental Engineering
Undergraduates: 77
Construction Engineering Management
Undergraduates: 214
Number of teaching faculty: 24
Number of staff: 7

Computer Science
Mike Quinn, Department Head
Undergraduates: 424
Graduate students: 75
Number of teaching faculty: 12
Number of staff: 3

Electrical & Computer Engineering
Terri Fiez, Department Head
Computer Engineering
Undergraduates: 272
Electrical Engineering
Undergraduates: 305
Graduate students: 103
Number of teaching faculty: 23
Number of staff: 8
**Engineering Physics**
Henri Jansen, Department Head
Undergraduates: 37
Number of teaching faculty: 15*
Number of staff: 5*
*All faculty and staff housed in and funded by the College of Science

**Industrial & Manufacturing Engineering**
Richard Billo, Department Head
Undergraduates: 138
Graduate students: 49
Number of teaching faculty: 10
Number of staff: 2

**Mechanical Engineering**
Gordon Reistad, Department Head
Undergraduates: 458
Graduate students: 65
Number of teaching faculty: 19
Number of staff: 5

**Nuclear Engineering/Radiation Health Physics**
Andy Klein, Department Head
Nuclear Engineering
Undergraduates: 44
Graduate students: 13
Radiation Health Physics
Undergraduates: 18
Graduate students: 9
Number of teaching faculty: 6 full-time, 3 part-time
Number of staff: 3

**Student Enrollment (Fall 1999)**

<table>
<thead>
<tr>
<th>Total</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate:</td>
<td>2659</td>
<td>2298</td>
</tr>
<tr>
<td>Masters:</td>
<td>284</td>
<td>233</td>
</tr>
<tr>
<td>Doctoral:</td>
<td>146</td>
<td>123</td>
</tr>
</tbody>
</table>

**Fall 1999 Freshman Class**

Enrollment: 846, 18% growth vs. 1998
28.7% have SAT > 1300, 37% growth vs. 1998

**Degrees Granted**

July 1, 1999-June 30, 2000

<table>
<thead>
<tr>
<th>Total</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate:</td>
<td>415</td>
<td>359</td>
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<tr>
<td>Masters:</td>
<td>117</td>
<td>20</td>
</tr>
<tr>
<td>Doctoral:</td>
<td>14</td>
<td>12</td>
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</tbody>
</table>

**Engineering Graduates**

Number of alumni: 24,906
Fundamentals of Engineering Exam pass rate: 96% vs. national average of 75% and high of 97%
Alumni inducted into the National Academy of Engineering: 15
Rhodes Scholar: Debra Walt Johnson, BS EE 1994
Multiple Engineering Co-Op (MECOP) experience: 1/3 of current students

**Financial Information**

**Research Expenditures**

$13.55 million

<table>
<thead>
<tr>
<th>Grants &amp; Contracts</th>
<th>OSU &amp; OUS Cost-Share</th>
<th>OSU Research Centers</th>
<th>Faculty Start-Up Funding</th>
<th>Service &amp; Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>$11,201,733</td>
<td>884,644</td>
<td>334,789</td>
<td>480,214</td>
<td>653,494</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>13,554,874</strong></td>
<td></td>
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</table>

**Grants & Contracts**

$11.2 million

(millions of dollars)

<table>
<thead>
<tr>
<th>BRE</th>
<th>CHE</th>
<th>CCEE</th>
<th>NE</th>
<th>ME</th>
<th>IME</th>
<th>ECE</th>
<th>CS</th>
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</thead>
<tbody>
<tr>
<td>.96</td>
<td>.16</td>
<td>2.48</td>
<td>1.16</td>
<td>1.94</td>
<td>.56</td>
<td>1.95</td>
<td>2.0</td>
</tr>
</tbody>
</table>
The Oregon State University College of Engineering is aiming to become a top tier engineering college to meet the needs of Oregon’s future. And we are well on our way, with support from industry and individuals.

Each year, your College of Engineering increases its impact. This year our contributions to Oregon and the nation exceeded those of the last and our plans for the future call for even greater impact. We have set our sights on doubling the number of our graduates and becoming one of the nation’s top 25 engineering colleges by 2010 and have made operational progress toward that goal:

- The fraction of our incoming freshmen with SATs greater than 1300 increased by 37% while the number of freshmen grew 18%.
- Since 1998, our new grant and contract awards have grown by 24% and our industry funding has increased 50%.
- We graduated 415 engineers this spring, up from 390 last year.

More importantly, we have the Engineering and Technology Industry Council, representing Oregon’s high tech industry, fully behind our cause, and companies and individuals have contributed nearly $45M toward the $180M investment ($120M private/$60M public) needed over the next 5 years to achieve our goals. We will be working very hard during this legislative session to gain the state’s commitment to also invest.

Our goal to be one of the nation’s top engineering colleges is not in self-interest. It is an imperative for Oregon’s future economy. Studies have shown that the presence of a top engineering college is strong factor in determining the success of technology industries. Oregon’s high tech industry has outgrown the state’s engineering education infrastructure. The industry needs more graduates and it needs future leaders. Oregon’s computer science and engineering institutions supply less than 40% of the new graduates needed and a small fraction of the top engineers needed, mostly from OSU. And what we do for Oregon will impact the Northwest region and the nation as well.

I’m very proud of the impact we have had this past year and enthusiastic about the opportunities ahead.

Ronald L. Adams
Dean, College of Engineering
For Heather McCaig, space travel has been a lifelong dream. As a freshman at Oregon State University, the College of Engineering provided her the first step toward turning her dream into reality.

Who among us hadn’t once, during a clear summer night in childhood, dreamed of traveling among the stars?

OSU freshman Heather McCaig was no exception. The only difference is that McCaig, still determined to become an astronaut, hasn’t given up her dream. And this year, as part of OSU’s Microgravity Flying Team, a collaboration between NASA and the Department of Chemical Engineering, she took one step closer toward making her dream a reality.

Heather was one of 12 students, ranging from high school to graduate level, who participated in this historic project that places the College of Engineering on the cutting edge of research and educational opportunities.

“In order for the human race to survive, we will eventually have to colonize space,” says chemical engineering professor Goran Jovanovic.

Jovanovic and his group of students began their research by focusing on a piece of equipment that, here on Earth, relies entirely on gravity. Fluidized bed technology, in which a bed of solid particles is suspended in a gas or liquid in a fluid-like state, is used in a range of industrial applications and would be invaluable on long-range space missions, such as a flight to Mars. To face the challenge of zero-gravity, the team developed an instrument that replaces gravity with artificially controlled electromagnetic forces that can be adjusted to any value.

Then came the test. Jovanovic and his students traveled to Houston to give their experiment a ride on the “vomit comet,” NASA’s KC-135 reduced gravity aircraft. McCaig and her peers worked—balancing nausea with excitement—as their work proved to be an unqualified success.

“Not only did the instrument work,” said Jovanovic, “it turned out to be more versatile than alternative technologies planned to be used in the future. Its immediate significance for industries on Earth may be even greater than its long-term effect on space exploration.”

Even more important is the impact of the project on the students involved. “This is what education can do,” Jovanovic said. “With the right opportunities, it can bring out all the curiosity, ambition, and creativity that already exists in our students.”
Mass production of miniaturized components and devices is a key technology for the 21st century with the potential to radically change the way we live.

Bigger does not always mean better.

In fact, OSU researchers are working from exactly the opposite principle. Faculty and graduate students involved in the college’s Microtechnology-based Energy and Chemical Systems (MECS) research have acknowledged that miniaturization is a key technology for the 21st century, with the potential to improve our standard of living and enhance U.S. industries’ global competitiveness.

Specifically, OSU engineers are investigating mass and heat-transfer in miniature components and devices, some no thicker than a human hair. Such devices produce extraordinarily high outputs of energy and will allow manufacturers to reduce the size of heat-transfer, chemical, biomedical, and biological systems to one-tenth their current size.

According to Kevin Drost, professor of mechanical engineering, “micro-scale structures are portable. By bringing energy-transfer and chemical processing on site, we can reduce transportation costs.”

In addition, said Drost, “they have distributive advantages. For example, home-heating systems have only one heat pump, most of whose energy is lost in ducting systems. With miniaturization technology, we can place 10 small pumps throughout a house and eliminate energy loss.”

MECS technology encompasses a wide range of applications and crosses the boundaries of numerous disciplines. Researchers from mechanical, chemical, electrical, and bioresource engineering are working on a variety of projects.

In one collaboration presently underway with Pacific Northwest National Laboratories, OSU researchers are developing a compact cooling system for soldiers wearing biological warfare gear. The device, one quarter the weight of current cooling systems, keeps soldiers from overheating without overburdening them with additional heavy equipment.

Other projects include creating small biological sensors to detect germs such as e-coli, and micro-scale reactors that can clean hazardous wastes on-site, reducing the danger involved in transporting toxic materials.

“This technology is not an evolutionary process, it’s a revolutionary one,” Drost said. “It will radically change the way we live.
The Motor Systems Resource Facility, the nation’s best power motors, drive, and power quality testing facility located at any university, is helping to save our environment and our natural resources.

Industrial demand for high quality electric power increases every year, but our existing infrastructure and energy resources—such as fossil fuels—remain limited. In order to meet such needs, many industries are interested in improving the efficiency and reliability of their processes in order to make the most of available resources.

That’s where OSU’s Motor Systems Resource Facility (MSRF) comes in. No other university in the nation has a power motors, drives, power electronics and power quality research and testing facility with the capabilities of the MSRF, which is widely used by industry for a range of projects. The MSRF has been used for testing everything from generators for high power windmills to an innovative permanent magnet coupling system.

The facility is directed by Alan Wallace and co-directed by Annette von Jouanne, professors of electrical and computer engineering. According to Wallace, one of the major advantages of the MSRF is its versatility. “We can test motors and generators for their compliance to specifications, energy efficiency, and performance response” among other factors, he said.

One current project in the MSRF includes testing a new breed of hybrid electric and gasoline car engines. “Some people thought that the next generation of automobiles would be all electric,” said Wallace. “But gasoline is what’s available, it’s easily portable and the energy stored in a gallon of gas is incredible. So the goal of the new technology is to take those advantages and make gas-powered automobiles far more efficient than ever before.

The new engines pair two different systems which work together to keep energy use to a minimum while still providing the variable power needed for driving—ranging from coasting down a city street to pulling a trailer up the side of a mountain.

To improve the efficiency of its new hybrids, Ford Motor Company—one of the first U.S. manufacturers to produce such engines—gladly makes use of the MSRF and the expertise of its researchers. With their help, these hybrid cars should hit the roads in increasing numbers over the next decade, stretching the life of our resources far into the future.
The college’s industry-driven Multiple Engineering Cooperative Program has been helping to create top-notch employees for 20 years. And in the process, everyone wins.

Internships have long been an important part of university life as a way for students to gain experience, build résumés, and sometimes earn credit or money while working toward a degree. But the Multiple Engineering Cooperative Program (MECOP) and Civil Engineering Cooperative Program (CECOP) has utterly changed the meaning of internships, with unprecedented benefits for students, the companies who employ them, and the university itself.

The programs—rather than simply leave students to find summer internships on their own—builds internships directly into students’ curricula. Participants serve two six-month internships at two different companies and graduate in five years.

Another element that sets MECOP/CECOP apart from other programs is that this program is “externally-driven,” according to coordinator Gary Petersen. “Most of the decision-making and planning is done by the customers,” the 55 companies throughout Oregon and Washington who make up MECOP/CECOP’s board of members.

These two factors alone have radically changed the internship experience and its significance for all involved. Because students work at two diverse companies, they get very different experiences. In addition, when students return to school after an internship, the hands-on knowledge they’ve gained allows them to select courses that work best for their specific career needs.

Participating companies fare equally well. Through MECOP/CECOP, they play a large role in producing graduates who know what they want and are prepared to work in the real world. The companies are often in good positions to later hire the students they’ve already trained. Petersen points to a significant example: “Since it joined the program, Intel has hired more than 125 MECOP graduates. Only six of those have moved on to other companies.”

For OSU, the benefits are tremendous. Participating companies are able to evaluate the strengths and weaknesses of their interns’ background knowledge and can suggest curriculum changes. Also, because the program attracts students from nearly all engineering departments, the program encourages cross-discipline collaboration and, said Petersen, “brings the college closer together.”
Researchers across the College of Engineering will likely influence the high technology marketplace for years to come, developing solutions and creating new technologies every day.

Flat Panel Displays

OSU researchers are developing a new class of flat panel display—which can be used in anything from high definition TV to automobile panel displays—with the potential to become a billion dollar industry within the next decade.

While most flat panel displays currently use liquid crystal technology, OSU engineers are focusing on electroluminescence, a chemical and electronic process which generates light within the display itself. Such technology, says John Wager, professor of electrical and computer engineering, will allow for displays “that are more robust—covering a wider temperature range and are more durable—able to take more shaking, and especially useful for portable devices.”

Internet2

While most of us are getting used to the Internet as a tool in our everyday lives, faculty at OSU and other top universities across the country have already implemented and begun testing the next step in network technology: Internet2.

According to computer science professor Cherri Pancake, there is a large performance gap between the technological potential of the Internet and its actual performance. Because of the heavy traffic that commerce and entertainment bring to the Internet, the potential for research and educational opportunities is limited.

Rather than a replacement for the commercial Internet, Internet2 will be used strictly to support research and educational opportunities in the nation’s major universities. More than anything, Internet2 is a “means of expediting the development of new technology,” said Pancake.

Microelectronics Research

OSU’s microelectronics program is one of the top 10 in the nation, with a primary research focus of integrated circuits for cost-effective, low-power wireless and wired communications.

Researchers are currently developing data converters for communication systems. These devices convert analog signals into a digital representation, and are used in applications ranging from high-speed Internet access to HDTV.

Others are developing software and design tools for integrated simulation and modeling of microelectrical-mechanical system (MEMS) design, used in portable military applications and portable medical equipment.
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