California Baptist University College of Engineering- Brochure highlights

Why Engineering?

Engineers solve problems and provide products and services that serve the needs of humanity. Engineering graduates are highly sought after for their critical thinking, communication and team skills and are thus well compensated. Engineering degrees prepare students for the broadest number of outcomes. In addition to a growing variety of engineering jobs, engineering students use their training as doctors, lawyers, teachers, professors, missionaries, military officers, business entrepreneurs and salespeople.

Developing students employees want to hire

"Businesses appreciate the fact that we take the time to listen to their needs for workers," Dr. Donaldson says. "We need industry to help us to determine how to educate these students, and we're open about this with the partners we recruit and work with."

Two things make the College unique in its industry partnership: First, in order to be prepared to contribute to the workplace their first day on the job, all students complete an internship within industry, a non-governmental organization, or another organization they plan to work with in the future.

Second, for every course taught in the College of Engineering, the professors seek feedback from industry and other educational institutions, at least once a year. This

keeps the faculty from becoming insular, ivory tower academics and keeps the school involved in the business community.

Focus Areas

1. OUTSTANDING CURRICULIM

The College of Engineering has adopted what research has shown to be the best models for teaching physics and mathematics. The College recently completed a $100,000 three-year National Science Foundation grant along with 15 other schools around the country to develop the best teaching methods for math and science.

Our math approach is hands-on, taught by engineers, and covers from Algebra to Calculus II and beyond in a single class. All the problems and examples in the curriculum are engineering and science examples students will see in later classes. So, for example, students first learn how to use an oscilloscope in a math class.

2. SUSTAINABLE SOLUTIONS

Sustainability means using the minimal amount of resources to accomplish a purpose at the lowest cost. In the past, environmentally sustainable technologies were more expensive than traditional ones, but that is changing. “Looking at sustainable design means you’ve looked at the question of whether you can

continue to operate a system within the current environment," says Dean Donaldson. "By pursuing sustainable solutions, we're doing things that everybody can agree on, that make sense for us to do."

The College's location in Riverside affords opportunities to partner with Riverside Public Utilities in projects related to sustainability. For one such project, faculty and students received a grant for $100,000 to explore the use of solar power to run air conditioning systems. The researchers found out that while economies of scale make this impractical in the current market, changing parameters, such as energy costs, could affect the break-even point.

3. PROMOTING HUMAN HEALTH

For this focus, College of Engineering students are following Jesus' teachings, promoting human health at home and abroad by:

- Designing better prosthetics and biomaterials,
- Providing systems that purify water to prevent spread of disease,
- Engineering low-cost, easy-to-build wheel chairs that work off-road in 3rd world countries,
- Simplifying hearing aid adjustments in order to make expensive and time-consuming visits to a specialist unnecessary, and
- Improving rehabilitation technologies, such as using robotics to aid in stroke recovery.

4. GLOBALLY ENGAGED:

All College of Engineering students are required to engage in a significant cross-cultural experience before they graduate. “You think differently about engineering design, constraints, materials and methodologies when you’ve been in another cultural setting and you’ve seen how they had to solve a problem,” says Dean Donaldson. “You take account what is happening there, and what is sustainable in that setting.”

Students my fulfill this cross-cultural requirement as part of their internship, on a summer missions trip in conjunction with their local church, or even as a weekly volunteer tutoring local children from different cultures.

One source of cross-cultural opportunities for students has been a strategic partnership between the School of Engineering and the Riverside Sister City program. The infrastructure is already in place, so that the College can “piggyback” on the work that local businesses, the mayor, and civic leaders are already doing.

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“The construction culture is very different in other countries: the methodology for putting things together, the materials, cost and availability, and the people maintaining and using it are all different. So students have to understand another culture inside and out in order to build a project and make sure it’s well-maintained after they leave.”-- Helen Jung, Ph.D., P.E., Civil Engineering Department Chair

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Engineering Faculty

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"One of the most important decisions we make are the people who we hire as faculty and staff."—Dean Donaldson

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The College of Engineering currently employs 10 faculty members and expects to add eight more by 2020.

"All of our engineering faculty members have PhDs, and most have years of industry and teaching experience, but what we're looking for in addition is that attitude toward teaching and young people. It sets us apart," says Dean Donaldson.

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"What I love about the professors here is that they're truly willing to invest their time and they truly care about how you're doing in school."--Machie Tabaru, Construction Management Engineering

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"I tell parents that our faculty members want to spend time with their son or daughter in helping them achieve their purpose," he says. "We genuinely care about their education."

Indeed, one-on-one attention is something that is difficult to achieve in a much larger, more research intensive university than CBU's College of Engineering.

Degree Programs

One of CBU's biggest advantages is that it graduates most engineers in only four years, whereas many secular and state engineering schools take five or even six years on average to graduate engineers with a bachelor's degree. This means that even though CBU tuition may be higher per semester, it becomes cost-competitive when the total semesters required to graduate are taken into account.

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"The dynamic of fantastic professors and small classroom sizes leaves little room for competition among some of the overcrowded schools. Getting your classes when you want them is something to consider as well."—Patrick Dietz, Mechanical Engineering student

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The first year at the College of Engineering, all student take the same curriculum (except for Construction Management Engineering students). One course, the Engineering Seminar, highlights speakers from different areas of engineering, as well as nationally recognized engineering professionals. The Seminar helps freshmen see if engineering is right for them, and helps them decide on a major and a career goal.

CBU College of Engineering currently offers four specific BS degrees, as well as a generalized BS in Engineering, with concentrations in five specialized areas: biomedical engineering, pre-law, pre-med, business, and global affairs.

Technical competence

Students at the CBU College of Engineering are trained to meet the rigorous technical demands of today's marketplace. All programs require the standard engineering, science and math courses, benchmarked with programs at other universities.

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As of August, 2012, the CBU engineering programs have been accredited by the Accreditation Board for Engineering and Technology (ABET).

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In addition, students are required to participate in an internship to help them develop the skill sets they will need on the job. All seniors take part in teams that design, build and present a Capstone design project that solves a specific engineering problem from industry.

A final requirement for graduation is that students must pass the Fundamentals of Engineering (FE) exam, which is the first step in the process leading to the Professional Engineering license.

Engineering Facilities

The school encompasses a classroom-office complex and two laboratory buildings. One, the former Woodmen of the World Lodge, was renovated and converted to the Bourns Laboratories, named in honor of Marlan and Rosemary Bourns, founders of Bourns, Inc. in Riverside, who made a generous donation to the College of Engineering.

The Bourns Laboratories contain state-of-the-art equipment, including a $30,000 rapid prototype printer that can digitally design and print a three-dimensional styrene part, cutting production time by weeks.

The College recently received a $250,000 grant from the William Keck Foundation to build a field-programmable gate-array technology (FPGA) lab, including a high-speed computer for parallel and other advanced data processing.

Laboratory equipment includes an integrated virtual instrumentation circuit board, with circuits, microelectronics and embedded systems, which can be plugged into a computer, so students can directly collect display data on a laptop.

CBU owns two full-body humanoid NAO research robots that can be programmed to stand, talk, move their hands, and even make intelligent decisions. In addition, the College is in the process of purchasing four upper torso robots, which can be programmed for speech, eye movement and other actions.

Other laboratory equipment includes model air conditioning, refrigeration, solar photovoltaic and solar thermal systems, as well as heat transfer equipment, a computer-driven CNC mill, a tensile testing machine, and standard machine shop equipment.

Future Directions

The CBU College of Engineering is growing rapidly. Enrollment in is expected to rise from 230 students in the fall of 2012 to 800 by the year 2020.

Future plans include adding full BS degree programs in new areas, such as biomedical, environmental, architectural and chemical engineering, as well as MS degrees in environmental engineering, software engineering, and technology innovation, and a PhD program in engineering education.

A new engineering building on campus by 2025 is planned that would increase total laboratory and classroom space from the current 21,000 square feet to 75,000 square feet.

Recent Senior (Capstone) Engineering Projects

- Integrate tactical sensors into a research robot that allow it to determine the hardness or softness of an object and adjust its grip accordingly.

- Design software for tuning a hearing aid at home, without the need for a professional audiologist and laboratory equipment.

- Develop a prototype of the modified external hardware, external magnetic coupler, and carrying case for a home-programmable hearing aid.

- Design a 6-story, partially underground parking structure for the 2025 CBU Campus Development project, to house 1200 vehicles.

- Develop a solar radiation chamber that uses the ultraviolet and infrared rays from the sun to disinfect tainted water.

- Design and implement a portable solar system to power a laptop or printer to be used in the field in Indonesia, Papua New Guinea and Cameroon.