STUDENT ENGAGEMENT THROUGH ENGINEERING DESIGN CHALLENGES

AN OUTSTANDING OPPORTUNITY TO ENGAGE WITH UP TO 1000 ENGINEERING STUDENTS THROUGH INVOLVEMENT WITH AUTHENTIC DESIGN CHALLENGES

CHANGING THE FUTURE

THE UNIVERSITY OF QUEENSLAND AUSTRALIA
ENGINEERING DESIGN CHALLENGES

We know that the most effective learning takes place in authentic situations. Understanding this, UQ has developed a ground breaking engineering design program - an authentic learning experience in two stages across a whole year - for a thousand of our first-year engineering students.

As a team-based design program across two thirteen week stages, students are required to design and build working prototypes for physical testing in the final week of each stage.

These weeks of physical testing - known as “demo-days” - are exciting and extremely engaging opportunities for students to test prototypes against their peers and be judged on what they’ve achieved.

Using a combination of laboratory work, lectures, peer learning and industry engagement, the Program takes a cross-disciplinary collaborative approach to authentic, complex engineering tasks and develops in our students a much deeper understanding of professionalism and working sustainably.

Active learning, teamwork, and exposure to real engineering problems, ensures the Program emulates how engineers go about solving real engineering challenges.

The opportunity to work hand-in-glove with industry to deliver this Program is both clear and exciting.

STAGE 1

Known as ENGG1100, this Stage introduces students to their first experience of professional expectations and “messy” open ended design problems through a combination of classroom lectures and workshop activities. Students are introduced to the design process, with a focus on project management and reporting, teamwork, ethics and sustainability, as well as safety and risk through the use of hand tools, and selection of engineering materials.

This stage sees students choose one of four projects to work on, tasks them to design and develop a physical prototype:

A. **Chemical/Environmental Engineering**: in 2012 the challenge was to design a Water Purification System - a unit that can serve a household of 10 people
B. **Civil/Materials Engineering**: in 2012 the challenge was to design a Deployable Bridge - for use in emergency scenarios, such as earthquakes
C. **Mechanical/Electrical/Software Engineering**: in 2012 the challenge was to design an Automated Water Craft - able to enter hazardous environments and clean up, or recover floating debris
D. **Mining/Geotechnical Engineering**: in 2012 the challenge was to design a Surface Mining Dragline to move material from a predetermined origin to destination location and optimise cycle time

STAGE 2

Known as ENGG1200, this Stage carefully builds on the previous stage requiring student teams to engage in a semester-long major design project to develop prototype solutions to multidisciplinary design problems. Students take part in intensive weekly hands-on active learning workshops, with theory delivered via an innovative UQ developed video-based online learning system.

Students are tasked with creating both a structural (Creo CAD/CNC) and a behavioural (Matlab Simulink) model (or virtual prototype), which allows the engineering team to make predictions about the design performance, cost and quality of their proposed solution prior to making commitments to manufacture of the product. They are then tasked with building a physical prototype that utilises a component that they design and machine on one of the eight 3-axis CNC machines within the UQ Student Technology Centre.

The Program sees students choose one of four “project streams” to work on, which asks them to design and develop both a virtual and physical prototype for:

E. **Chemical/Electronic Engineering**: in 2012 the challenge was to design a Chemical Process Control System - developing an electronic control system to batch mix multiple fluids
F. **Electrical/Civil Engineering**: in 2012 the challenge was to design a Failure Aware Power Line Support - stress optimisation of a loaded power line support structure that can sense its own structural failure and cut off power prior to collapse
G. **Mechanical/Aerospace engineering**: in 2012 the challenge was to design an Aerial Deployment System - delivering an airborne “payload” over a barrier and into a specific location
H. **Mining/Materials Engineering**: in 2012 the challenge was to design a Core Drilling Strata Detection - controlling drill performance and identifying unknown material strata whilst core drilling through a multilayered block of material
THE OPPORTUNITY

In order to engage with the development, enhancement, and, ultimately, the sustainability of this unique Program, we are seeking industry sponsorship of the Program and these project streams.

Packages begin at $14,000 (plus GST) per year to sponsor a project stream in either of the Program Stages, or $25,000 (plus GST) per year to sponsor two project streams - one in each Program Stage.

As a sponsor, you will be asked to commit to a minimum term of two years.

WHAT YOU WILL RECEIVE

An invitation to build a flexible and collaborative engagement with the program, which can consist of a number of touch points including:

- Presentations (in person or online), which relate to a particular project stream and your business (eg - designing a deployable bridge or designing a failure aware power line support).

- Engage with students tackling your sponsored project stream, providing important feedback and connections between your company and the students

- An opportunity to provide feedback and judge the student projects during demo-days that relate to your sponsored project stream (around 300 students attend each demo day)

- An opportunity to offer company-branded financial prizes (included as part of the sponsorship package) to the top prototypes in each project stream. You may also wish to engage with these prize-winning teams in other ways, such as a tour of your company’s facilities etc

- An opportunity to staff a company booth during demo-days, to provide information about vacation work, scholarships, and/ or graduate opportunities

- An opportunity to take part in demo-day barbeques that relate to your sponsored project stream. The end of semester celebrations are a great way to enhance exposure to your company and people, as well as be acknowledged for your support

- Branding on Program materials and on relevant online video content, with which up to 1,000 first year students engage with weekly

THE PROGRAM LEADERS

The Program is lead by Associate Professor Lydia Kavanagh and Associate Professor Carl Reidsema. Lydia and Carl are Professional Engineers with extensive industry experience.

They are award-winning teachers who have published extensively on engineering education. They have an enviable record of developing new and successful industry-relevant programs at UQ and the University of New South Wales.

BENEFITS TO YOUR COMPANY

- Exciting, memorable and exclusive engagement opportunities, on issues directly related to your business, with the State's best young engineers

- An opportunity to position your company as a premium destination for the outstanding engineering students

- An opportunity to influence degree choice and future career pathways

- Knowledge that you are making a direct contribution to the education of a smarter, more industry-aware and complete graduate through the Program