

# GLOBAL DESIGN TEAMS



**BIOLOGICAL &  
AGRICULTURAL  
ENGINEERING**  
TEXAS A&M UNIVERSITY

THE BIOLOGICAL AND AGRICULTURAL ENGINEERING (BAEN) SENIOR  
CAPSTONE EXPERIENCE: LEARNING THROUGH GLOBAL SERVICE

## What are Global Design Teams (GDT)?

The biological and agricultural engineering capstone class spans two semesters (fall and spring), and provides students with real-world engineering challenges from the private and public sectors. Student teams of three to five members work closely with their sponsors and communities to develop solutions to the challenges posed. Students gain real-world professional experience prior to graduation. Clients benefit from practical, genuine solutions to the challenges posed. Global design teams (GDT) focus on high-impact projects that can be addressed over the course of an academic year. These real-world, full-cycle design experiences help raise global awareness, both at home and abroad. GDT is part of the BAEN Capstone course 479/480. Instructors are Prof. Rabi H. Mohtar and Assistant Professor of Practice Gregory Stark, with graduate teaching assistant Mr. Varun Gejji.

## ELEMENTS OF A GDT

- **Logistical** and engineering support provided by the partner organization (non-governmental organizations NGOs, government organizations, industry and business, or academic institutions)
- **BAEN/Texas A&M University** support, including: financial assistance, travel and logistical arrangements and contacts with the partner organization
- **Technical advisement**
- **Experiential** – hands-on learning to develop skills useful in future careers, family life and community
- **Learning through Service** – academically rigorous, meaningful service, significant, positive impact
- **Social Responsibility** – compassion, civic awareness, engagement with the community
- **Reciprocity** – students and community partners give and receive time, energy, knowledge and creativity
- **Needs-Based** – community-identified needs
- **Critical Thinking** – for creative, effective sustainable problem-solving
- **Quality control and accountability** – assessment of personal and community needs and progress

Mohtar, R.H. and A.E. Dare (2011) **Global Design Team: A Global Service-Learning Experience**. *International Journal of Engineering Education*. Vol. 28, No. 1, pp. 1-14.

## HOW TO GET INVOLVED

**Students:** Global design teams include undergraduate students from disciplines both within and outside of the college of engineering. While student recruitment is typically focused on students enrolling in their capstone projects, opportunities for involvement may be available throughout the year.

**Faculty:** Global design teams invite faculty to become involved as advisers, teachers and consultants. We welcome ideas for new global service-learning courses.

**Community:** Organizations (companies, NGOs, etc.) interested in engaging in, or sponsoring, a global design team of specific interest to them are essential to the program.

**For more information contact Professor Rabi H. Mohtar at [GDT@tamu.edu](mailto:GDT@tamu.edu)**

**Collaboration:** The Department of Biological and Agricultural Engineering works closely with academic counterparts in the host location as appropriate. Students from both locations are assigned to the project and work closely to design effective solutions to the challenge, keeping in mind the local constraints on budget, supplies and culture. The biological and agricultural engineering student teams interface with their partner students using email and video conferencing, throughout both semesters.

**What it means to be a SPONSOR for GDT:** Costs are shared by all, including the students themselves. The stakeholder community includes: the Texas A&M student's home department, partner organizations, interested corporations and academic partners in the host location. All of these work together to achieve positive, sustainable interaction while utilizing the technical skills and competencies of the students, employees and volunteers involved in the project. The goal is to address specific challenges within the community for the mutual benefit of all. All participants are fully engaged and committed to working together: Sponsors, Students, Faculty Advisors, and Community Partners comprise the team and contribute their time, financial support, and expertise toward its success.

# SAMPLE PROJECTS (2015-2016)

**AquaticsRobotics, Texas** – Provide a mobile unit capable of collecting samples from lake, stream, or river; automatically or per the client's specification. Partner: San Antonio River Authority

**AgEponics, California** – Develop an environmentally friendly, natural food-growing method that harnesses the best attributes of aquaculture and hydroponics, wasting no water and adding no chemical fertilizers.

**Brackish water desalination/ heavy metal removal, India** – Create a low cost, efficient, system, built and maintained with locally sourced parts, and off-grid energy source to improve water quality that remove heavy metals from tanneries and desalinate brackish water. Partner: Progressive Vellore.

**Community Supported Agriculture (CSA), Texas** – Provide a crop layout and irrigation installation plan, advise the community in its five and ten-year community goals. Partner: Millican Alliance

**Freshwater program, Mexico** – ensure availability of safe water in the face of a changing climate through a rainwater harvesting system and inexpensive technologies for wastewater treatment and improved water quality while safeguarding wildlife. Partners: World Wildlife Fund (WWF) and the Gonzalo Rio Arronte Foundation (FGRA).

**High Value Cardamom Products, Guatemala** – develop a streamlined process to maximize profits by constructing a

co-operative for cardamom post-harvest processing: provide process flow diagram for operations and calculate costs. Partner: Alta Verapaz farmers.

**RFID Tag System for Cotton Gins, Texas** – develop a mobile application that allows producers and ginners to easily link five digit numbers to groups of round modules. Partner: Cotton Ginners Association.

**StormWater Solutions, Texas** – design sustainable, effective, and budget-friendly storm water mitigation plan for Liberty County, a Texas Target Community (TTC). Partner: TAMU College of Architecture.

**Waste Water treatment plant, Ecuador** – evaluate the performance of a small wastewater treatment facility and offer an integral solution for improved design, operation, and maintenance. Partners: Department of Civil Engineering, Universidad de Cuenca.

**Water Distribution System, Nicaragua** – design an effective, cost-efficient water storage and distribution system that meets the demands of each household and takes into account daily flow rates of the spring, topographical barriers, type of materials (pipes) and daily water use; implement a rainwater catchment system for water storage. Partners: Las Curenas, a village in mountainous northern Nicaragua, AVODEC, a Nicaraguan NGO, and Just4Water.

## PROJECT TIMELINE

### SUMMER

Initial contact, any time prior to the beginning of the new semester, preferably over the summer months, to establish contact, present the idea's feasibility, and start the discussion. Contact the BAEN Capstone Coordinator: Dr. Rabi Mohtar at mohtar@tamu.edu or his office (marysch@tamu.edu) with your idea for a project and/or for sponsorship.

either in person in the classroom or via Skype, and is the first direct contact with students.

**Early December: In-class Student Presentation:** during which the sponsors provide feedback (in person or via Skype) to the presentation of the design plan.

### FALL SEMESTER

**Early August:** **Conceptual Design:** discussion between Sponsor and BAEN Faculty to identify the concept and confirm it as a potential project for the coming year.

**Late August:** **Draft of the Project Deliverable:** a one page description of the proposed deliverable/s will be provided to the Sponsor by the BAEN Faculty for Sponsor's approval/feedback.

**Early October:** **Project assignment:** Potential projects are present to students who will declare 1st, 2nd, and 3rd choices. Capstone Coordinator will assign students to the projects accordingly.

**Mid November:** **Meet the Team:** a preliminary discussion between Sponsor and Team. This happens

**Exams Week and Winter Break (No Classes)**

### SPRING SEMESTER

**Early January:** **Getting Started:** Literature review, brain storming for possible solutions, initiation of hands-on work

**Early April:** **Final Design Submission** to the sponsors, student visits to sponsors for this presentation

### CAPSTONE EVENT (Early May)

Poster symposium, open to the public, in which students interact with sponsors and faculty and guests presenting, explaining, and celebrating their experience.