DUKEENGAGE IN UGANDA – EWH
This program is organized by Engineering World Health (EWH) in collaboration with DukeEngage.

Program Dates: June 4-July 30
(Dates subject to change up until the point of departure.)

Service Focus
Improving health care and facilitating the transfer of health care technology to regional hospitals through medical equipment repair and needs-based design. Note: A similar program is taking place in Tanzania.

Program Leader(s)
- Dr. Monty Reichert, professor of Biomedical Engineering, spent the 2014-15 academic year as a Fulbright Scholar at Makerere University in Kampala (MUK), Uganda where he taught BME classes and conducted a major curriculum revision to increase engineering content. Dr. Reichert started the Duke-Makerere BME Partnership to build BME capacity at MUK and in Uganda. He teaches BME 590.04: Transcontinental Design in Uganda, and will be on the ground in Uganda for a part of the program.
- Pegeen Ryan-Murray, Assistant Director, Duke-Engineering World Health (EWH) Summer Institute. Pegeen works at the DHT Lab and helps administer both the Tanzania – EWH and the Uganda – EWH programs.

Overview
Students will learn about health care technology shortcomings in the developing world and spend time directly intervening to address these challenges. Students begin by receiving four weeks of training. They will study the public health care system in Uganda; receive lectures and hands-on lab training in medical equipment repair and maintenance; and hear lectures and participate in workshops on needs-based design in the developing world. During the next four weeks, students will work groups of 3 or 4 and rotate through our partner hospitals in Kampala, repairing medical equipment, training the staff in the proper use of equipment, and conducting extensive interviews on health care technology needs. Students will be required to keep a daily log throughout the program and write a technical report before they leave Uganda, identifying a hospital-based need and designing a solution.

Ugandan biomedical engineering students from the University of Makerere will participate in this program alongside the Duke students.

Program Schedule:
Students live at the Mulago Hospital Guesthouse in Kampala for the entirety of the 8-week program.
- Four weeks dedicated to medical instrumentation preparation, group visits to local hospitals, and group discussions about health care technology needs in Uganda
- Two weeks working at Mulago National Referral Hospital, focusing on equipment repair
- Two weeks at other, smaller hospitals, focusing on equipment repair
- A one-day end-of-program meeting to debrief and present on experiences and the design reports

Student Learning Objectives/Outcomes
By the end of the course, students will improve in the following areas and will know how to:

CRITICAL THINKING & TECHNICAL TROUBLESHOOTING
- identify problems with electrical and mechanical devices, and how the end user interacts with them
- troubleshoot to uncover the root cause of a problem
- generate creative solutions to a problem, even in a low resource environment
- prevent future problems by addressing the root cause
TECHNICAL KNOWLEDGE & SKILLS
- identify various medical devices, their physiological purpose, how they work, how they commonly fail, and how to repair and test them
- solder and desolder wires and circuit board components (outside of ideal classroom conditions)
- identify electrical and mechanical components, how they work, and how to test them
- identify various tools important to technical repair work

CROSS-CULTURAL UNDERSTANDING
- listen to others to understand their values and how they affect their decisions and actions
- train others in a supportive, respectful manner
- understand constraints and promises of the Ugandan healthcare system
- work closely with Ugandan students and hospital colleagues

ACADEMIC DEVELOPMENT AND EDUCATIONAL SUCCESS
- understand how engineered devices are used, maintained, and repaired in real-life, non-ideal conditions
- apply theoretical concepts from the classroom to hands-on implementation
- predict, and design to avoid, design failures common to the developing world
- appreciate the value of educating local experts in the medical and technical fields

Service Opportunities
The primary project of EWH’s Summer Institute (SI) takes place during month two, when participants do daily work in the hospital repairing, installing and training local staff on medical equipment in resource poor hospitals. During previous SI programs, students have repaired equipment ranging from autoclaves to ultrasound machines, water purifiers to anesthesia devices. Students have also conducted training classes for hospital maintenance staff and created manuals and inventories for staff.

Students will work in hospitals in Kampala, Uganda. Our hospital partners vary in size and in capacity to repair and maintain medical equipment. The smallest is a clinic, while Mulago National Referral & Teaching Hospital is the largest hospital in Uganda. Some of our partner hospitals, even those with a technical staff, cannot keep enough medical equipment in working order to perform basic medical procedures. Recent students in the Duke-EWH Summer Institute programs were able to put over 654 pieces, about $1.3 million worth, of medical equipment back into service in 23 hospitals. They made a huge contribution, but the need in these hospitals is still great.

Program Requirements
Application Process: In addition to the DukeEngage application, students applying for this program must download and submit the EWH application available at http://www.ewh.org/apply. You must submit this application directly to EWH by the DukeEngage application deadline, Nov. 3, 2016. Applicants must also submit the DukeEngage application by that deadline. It is advised to review the EWH application packet before completing either application, as the essay questions asked by EWH may be applicable to the DukeEngage ones.

Language: English is the lingua franca in Uganda, although Luganda is the most widely spoken language. There is no language requirement and students do not study a language during the program. There will be a very short introduction to some basic Lugandan phrases.

Coursework: Applicants must have at least two semesters of physics and two semesters of calculus by May 2017. AP credit can be used for one physics and one calculus only.

Personal Qualities:
- Interest in cross-cultural collaboration – excited about learning and working with Ugandan BME students and working with local hospital staff. Students encounter new foods, perspectives, pace of work, and style of living.
• Flexibility – adapts to changes in plan or environment, makes the best of environmental discomforts and basic living situations, learns and adapts to different cultural norms.

• Problem solving, creativity and goal orientations – possesses strong analytical skills and an interest in producing deliverable end-projects. In addition to equipment repair, students are expected to complete a design proposal to address a need in the Ugandan health care system.

Program Details
Community Description: Students will live in the Mulago National Referral Hospital compound, at the Mulago Guesthouses, in Kampala. Kampala is a large, bustling urban city. Mulago is in a sprawling area outside of the center. It will be dry season in Uganda, with a mild-to-warm climate.

Housing and Meals: Students will be housed together in the guesthouses. Rooms may be shared with other students of the same gender. Each student will have their own bed and mosquito net. Breakfast is provided on the Mulago campus, but no other meals are provided. The guesthouses are equipped with kitchens, the campus has a cafeteria, and there are nearby restaurants. Funds will be provided to cover missing meals.

If you do not eat certain types of food for cultural, religious or personal reasons, please contact the DukeEngage office, dukeengage@duke.edu, to discuss whether or not your dietary needs can be reasonably accommodated at this program site.

Utilities: Electricity is intermittent; outages are common but there is electricity available to charge devices, etc. The guesthouses have running water and small hot water heaters, and modern western-style toilets. Running water may be intermittent, with containers to store water during outages. Students will have facilities to hand-wash their own laundry.

Transportation: Private van transportation is arranged for group hospital visits or when the students are working at the hospitals other than Mulago National Referral Hospital. To get around Kampala other than commuting to work, students may walk or use public mini-buses.

Communication: Each student will receive a basic (call/text only) cell phone. Free Wi-Fi and wired connections are available at the Mulago campus, though not in the guesthouses. Internet cafes are also available. Students are required to bring a laptop.

Opportunities for Reflection: Your site coordinator will lead regular reflection sessions in which you’ll be expected to participate. More details will be shared with students once they arrive on site.

More Information: During the first month, all participants, including the Ugandan BME students from University of Makerere, interact with each other daily. During the second month, participants work mainly with their hospital groups (3 to 4 people) and hospital staff, but may meet for additional evening meetings after work. Students will have free time during the week when they are not either in class or working at the hospital, and almost all weekends to pursue social activities of their choice or have some downtime. Students are encouraged to spend evenings studying or interacting with their Ugandan classmates or with hospital staff.

More Information
• Lonely Planet: Uganda (Country Guide)
• Kicking Away The Ladder: Development Strategy in Historical Perspective by Ha-Joon Chang
• Mountains Beyond Mountains: The Quest of Dr. Paul Farmer, a Man Who Would Cure the World by Tracy Kidder
• Dead Aid: Why Aid Is Not Working and How There Is a Better Way for Africa by Dambisa Moyo

Curricular Connections
BME 590.04: Transcontinental Design in Uganda

DukeEngage 2017 Program Profile – Uganda - EWH
BME 462 – Design for the Developing World
BME 290 – Medical Equipment in Developing World Pratt Fellow
DHT Lab Fellows: http://dhtlab.pratt.duke.edu/

Duke-Makerere (Duke-MUK) BME Partnership: https://sites.duke.edu/dukemuk/