

# Ferguson Seed Grant Proposal: Hybrid Engineering Course

## Course Title

*Urban Sustainability through the Lens of Engineering Ethics, Leadership, and Conflict Management*

### 1 NEW HYBRID COURSE OFFERING

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Engineering students currently take three one-credit, required courses in Ethics, Leadership, and Conflict Management. Due to great interest and response in a pilot course this spring semester, instructors plan to offer again a three-credit combined course in an alternate format – *a hybrid online-immersion curriculum taught in Ferguson, Missouri*. Expanding the themes currently taught in these 3 courses to encourage students to see parallels in a local community, students in this course will consider how engineers might positively impact urban sustainability.

### 2 WHY SHOULD ENGINEERS STUDY URBAN SUSTAINABILITY ISSUES?

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While natural scientists value discovery of new information for the sake of increasing knowledge, engineers are committed to using technology and science in an applied way. This distinction makes their work inseparable from social aspects of our world. Most improvements in our standard of living required medical breakthroughs through scientific understanding and technological discoveries that connected the world – whether by highways or superhighways – so that we are now interconnected more than ever before. We have witnessed the impact of Facebook to unite common people against dictators, crowd funding that has allowed indigenous women to form businesses, and educational forums like Kahn Academy to reach the far corners of the globe. We have seen cell phones repurposed as tools to expose police brutality, and email trails mounted as evidence of systemic racism, shown in the Justice Department’s probe into Ferguson police records. All of these tools to fight marginalization of populations required technology. Imagine if engineering students realized the impact that they could have on the social equation – helping issues of environmental *and urban* sustainability; that their abilities do not just move civilization forward technically, but can provide mechanisms for the most vulnerable amongst us to participate in the first place. This course could inspire students to use their engineering talents toward conscious, social directives that make some longstanding barriers inconsequential.

While it is important for engineers to understand their importance in being stewards of public safety in their profession, it is equally important to make them aware of this obligation as members of their communities as well. Many community problems – including contamination and pollution threatening public health – are understood best by engineers. Whether we look at a smoldering fire at a local landfill encroaching on nuclear reactive waste or the poisoned water system in Flint, Michigan – we not only need engineers to come up with solutions, but we need their help deciphering the risks around us.

### 3 COURSE DESCRIPTION

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Students will participate in simulated space missions, tour an organic farm, and visit “Library of the Year 2014” while exploring a local community. Ferguson, Missouri is home to the Challenger Learning Center, a NASA-styled facility, established in tribute to the astronauts who lost their lives aboard the Challenger. Students will learn about the Challenger in an ethical framework beyond an obvious technical failure – the communication, leadership, and negotiation skills required as to prevent such tragedies in the future. **Set in Ferguson, Missouri, a town similar to many lower income communities across the country yet distinct in the context that its inner battles became a very public, national encounter, students will find parallels in the decision-making that condemned the shuttle (major technical problems that were ignored) to decision-making that hinders communities (major social, economic, educational disparities that are ignored) until something dramatic and tragic occurs.** By expanding the themes of the original courses in this way, students will have an opportunity to apply their analytical and logistical mindset to modern urban challenges – questioning their origins and brainstorming actions that could impact communities. The online portion will include readings, including the Ferguson Commission Report findings; cases for debates and presentations; and assignments that will allow reflection and dialog on these topics. Teams will produce a research paper supporting an urban sustainability inventive project at the end of the semester. The instructors work within The Engineering Communication Center and will collaborate with the Engineering Research Librarian to assist the students’ efforts toward a quality final product. To further demonstrate student progress, we intend to conduct interviews and surveys at the beginning and end of the course. Starting with one community, we hope to inspire students to respond to The Challenger Learning Center mission statement: **“Build a scientifically literate public and shape our future leaders to help improve quality of life across the globe - not just through pragmatic teaching, but by the power of vision, inspiration, and innovation.”**

### 4 PARTNERS AND CONTRIBUTIONS: HIGHLIGHTS

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- The **Ferguson Library Director** will speak to the students on Leadership. Scott Bonner made the striking, controversial, and courageous decision to open the library to all area schoolchildren when the public/private schools closed during the crisis week of 2014.
- An **NPR Radio Reporter** will speak to the students about his thoughts on conflict management. Jason Rosenbaum, as an area reporter, attended the Ferguson protests, demonstrations, and gatherings from 2014 to the present.
- **The Challenger Learning Center** will tailor two half-day corporate training events to students, covering themes of Leadership and Teambuilding using an *Apollo 16-like* mock space mission in their shuttle/NASA styled facilities. The Challenger Learning Center is funded through the Ferguson-Florissant school district and provides many educational opportunities to students, thus our use of the center financially helps these programs.

Director Tasmyn Front is also working with WU engineering to encourage student participation with robotics teams for middle schoolers in Ferguson, and she will make a pitch to the students about the value of that partnership.

- **EarthDance Organic Farm** will take students on a tour and describe the emerging movement on “Food Justice”, exploring the availability and access to healthy food for all communities and why it matters.
- **Lauren Todd, the engineering reference librarian**, will meet with groups of students to help them formulate their research on an inventive urban sustainability project. She will continue to support these teams, along with the instructors, for the remainder of the semester as they complete their projects.
- **The Ferguson Community Center** is reserved as a “home base” for the students. We have a large teaching room assigned for presentations, debates, and classwork in the immersion portions of the course. We are finalizing plans for a representative from the Ferguson Commission report to be another guest speaker.
- One evening, students will stay for *dinner in Ferguson*.
- Weather dependent, we are planning a “*walking tour*” through main-street Ferguson.

## 5 TENTATIVE SCHEDULE

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This hybrid semester long course will be divided into online portions (which also require teamwork) and immersion days. In the fall semester, these immersion days will be spread out on Fridays throughout the semester. In the spring semester, these immersion days will be grouped during Spring Break. The final portion of the course will be a research project and poster presentation to be held publicly, at the end of the semester.

Immersion Day 1	Immersion Day 2	Immersion Day 3	Immersion Day 4	Immersion Day 5
Ferguson Community Center: <i>Student Presentations on Pre-assigned topics</i>	Challenger Learning Center <i>Mock space mission pre-work</i>  <i>Mock space mission</i>	Ferguson Community Center: Conflict Management Presentations, Speaker  <b>Dinner in Ferguson</b>	Earthdance Organic Farm Main Street <i>Walking Tour</i>  <b>Ferguson Library</b> Tour and Visit Speakers	Ferguson Community Center:  <i>Guest Lecturer and Group Debates</i>

## 6 TENTATIVE BUDGET

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Facilities Rental	Course Development/Materials	Library Resources	Transportation	Food/Local Activities/Tshirts
Ferguson Community Center: \$600 Challenger Learning Center: \$3000	\$2400	\$1500	\$500	\$2000
<b>Total Estimate: \$10,000</b>				

*Other funding prospect is the Gephardt Institute, with a potential to match funding.*

## 7 INSTRUCTORS AND DEVELOPMENT OF COURSE CONTENT

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**Course developers:** Sandra Matteucci, Engineering Ethics and Sustainability; Seema Dahlheimer

**Course Instructors:** Sandra Matteucci and Seema Dahlheimer

**Research Mentor:** Lauren Todd

**Intended Participants:** 20 Engineering Students per section offered

## 8 FINAL PITCH

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Due to the complexity of what engineering students must learn to be technically competent in their fields, little time is left to take courses that sightsee the human dimension – and put in context *why what they are learning matters*. Technical progress tends to move cultures forward in social ways, too (read **The Moral Arc: How Science and Reason Lead Humanity toward Truth, Justice, and Freedom**, by Michael Shermer), but that may seem to be a desirable, yet unintentional, consequence. Assignments in this course will offer students the chance to step forward in this process – identifying causes and roadblocks, debating and brainstorming potential solutions, and working toward a semester end product that could make an impact. Ultimately, this course hits at the heart of our home – St. Louis. For as much as we use the name Ferguson, Missouri – until this recent public upheaval, it did not stand out amongst our interwoven, tiny communities that make up one large whole. We also know – from the demonstrations that lit like fire across our nation directly afterwards – that these great concerns involve us all.