Detailed Workshop Learning Objectives
Sustainability Research Network
Summer Interdisciplinary Environmental Study Course & Faculty Planning Workshop
Sunday-Thursday, August 16-20, 2015
Hosted by Georgia Institute of Technology

Instructors: Anu Ramaswami (UMN), Ted Russell (GT), Nisha Botchwey (GT), Laura Bloomberg (UMN)
Course Staff: Luke Hollenkamp (UMN), Brianna Menning (UMN), Jessica Brown (GT)
Student Session Facilitators: Andrew Fang, Dana Boyer, Kang Kang Tong, Kirti Das (all UMN)

** Coffee, Tea, Drinks and Snacks will be available throughout the day. Lunch will also be served Monday through Thursday. Please eat breakfast prior to your arrival to the class sessions. **

Course Design and Format:

• 5 Days in Person
• Followed by readings and online video conference once a month on each research design
• Inverted classroom design starting with high exposure first and reflection over 5 days in person at Georgia Tech, followed by depth through targeted reading, and reconvene for discussion online.

OVERARCHING WORKSHOP LEARNING OBJECTIVES:

- Learn how to design interdisciplinary environmental studies, focusing on sustainable and healthy cities.
- Share best practices to work together across disciplines
- Explore the use of models, experiments, quasi experiments, case studies, and meta-analysis to address the overarching policy challenge of developing sustainable cities
- Engage with students and professors from a network of 9 universities leading in sustainability research to learn key concepts and issues important for study of sustainable, healthy and livable cities
- Learn about ways and best practices to translate science to action, working across sectors of academia, private sector, government and Non-Governmental Organizations (NGOs)

NOTE: Please bring your laptop to this workshop. If you do not have ready access to one, please email back to this thread and we will make arrangements.

THINGS TO READ BEFORE SUNDAY August 16

Please read through the 2 articles and visit the 2 web sites noted below.
**The papers are written for a general audience and are not overly technical**

1. Grand Challenges (White House)  
   [https://www.whitehouse.gov/administration/eop/ostp/grand-challenges](https://www.whitehouse.gov/administration/eop/ostp/grand-challenges)
2. Explore our project’s website: [http://www.sustainablehealthycities.org/](http://www.sustainablehealthycities.org/)
   [https://www.nae.edu/Publications/Bridge/119585/119589.aspx](https://www.nae.edu/Publications/Bridge/119585/119589.aspx)

**Assignments and Due Dates:**

- August 16-21: During the in-person training period, students will complete one team assignment outside of the session. All other assignments during this period will be completed in the sessions.
- Due by end of day September 7: Following the in person training August 16-21, to promote deep learning, students will do further reading and write a synthesis reflection paper. The reflection paper will be due September 7.
- On-Line Discussions Once a Month September to December: Assignments for deep learning/targeted reading continue into Fall 2015 (with one monthly online group discussion session each in September, October, November, December) will be discussed on August 21.
Sunday, August 16, 2015

- Location: ES&T L1 Atrium and Auditorium (L1255)
- **Instructors: Anu Ramaswami, Nisha Botchwey, Laura Bloomberg and Ted Russell**
- Participants: Students and select faculty.

**12:00-5:00pm**

Students of the SRN are oriented to interdisciplinary study of sustainable urban systems.

Instructors: Anu, Nisha, Ted, Laura

12-12:30pm: Class, Instructor, & Student Introductions (Nisha)
12:30-1:00pm: Grand Challenges and Wicked Problems (Laura)
1-1:30pm: Need for “New Science” that combines analysis with multi-sector democratic deliberation (Anu)
1:30-2:30pm: Group Exercise to introduce research design across disciplines (Anu Ramaswami)
2:45-3:30pm: Introducing Urban Sustainability & Health as the “Grand Challenge” and our SRN’s Inter-disciplinary research framework (Anu Ramaswami; Ted Russell)
3:30-4:45pm: Break out into groups by Testbed (Energy & Water, Transportation, Green Infrastructure, Food Systems)
4:45 to 5pm: Instructions for the rest fo the workshop

**Learning objectives:**
- What are Societal Grand Challenges and Wicked Problems? (Laura)
- When is there a need for “New Science” that combines analysis with multi-sector democratic deliberation? (Anu)
- What are various types of knowledge and ways to integrating knowledge? Envisioning science as a socially constructed process. (Anu)
- What are features of a “system”? An introduction to the SRN grant’s interdisciplinary framework. (Anu & Ted)

**Group Assignment:** Students break up into groups according to the testbeds – energy & water/wastewater combined, transportation, green infrastructure & food systems (& other topics proposed by students)

**Required websites/material to review:**

1. Grand Challenges (White House) [https://www.whitehouse.gov/administration/eop/ostp/grand-challenges](https://www.whitehouse.gov/administration/eop/ostp/grand-challenges)
**Additional Readings**


**Monday, August 17, 2015**

- Location: Technology Square Research Building (TSRB) – 175; Auditorium & Surrounds
- Participants: SRN Faculty, Students

**8:00am-12:00pm**
Faculty Introductions; Working in Interdisciplinary Teams, Development of SRN Operating Procedures

**Learning objectives:**
- Learning best practices and barriers for working in interdisciplinary teams.

**Required readings:**
- None- Session will prove insights from Faculty

**1:00-2:10pm**  
Key research frontiers addressed in our SRN (Anu)  
Principles for Operationalizing the SRN: Budget Allocation & Workplan (Trish & Ted)

**2:15-2:30pm**  
Review the format for Theme/Testbed Presentations and project planning activities.

**Overall Theme/Testbed Learning objectives:**
- What is the key research question being asked in each theme and testbed, and why is it so important?  
- What is the context of the work in the broader landscape of urban sustainability research?  
- What is our research plan and how does it connect disciplines and research designs to answer the key question?  
- How/do the different designs complement each other – and work toward the “Key Research Questions”?  
- When is each design used and why?  
- What are some shortcomings of each design?  
- What are the types of methods and data needs to implement the different designs?

**2:30-5:00pm**
**Theme 1- Measuring Environmental Sustainability, Health & Livability (EHL)**
  
Faculty Presentations: 2:30 to 3:50PM (Theme 1 Faculty)  
Student Reflection: 3:50 to 4:45PM (Small groups, Led by Facilitators)

**Learning objectives:**
- Learning what we mean by environmental sustainability, health and livability of cities (Anu will cover in 1PM session)  
- Learning how to measure EHL outcomes of cities, and why they are so complex to measure (Ted, Yingling).  
- Specific concepts (covered by individual Theme 1 Faculty):
  - Environmental footprints of infrastructure provision
- Infrastructure disparities, SES and health
- Environmental pollution from infrastructure and its health effects
- Extreme events in cities and health
- Ecosystem services and health
- Measuring subjective well-being
- Socio-cultural disparities and health

**Required readings/Web Sites To Browse During Discussion**
- Global City Indicator Facility
- Global Burden of Disease Heat Map
- Mercer Livability Index for Cities

*Additional readings will be provided by presenters after the workshop*
Tuesday, August 18, 2015
- Location: Student Success Center - Press Room A
- Participants: SRN Faculty, Students for the main portion of the day
- EAC members arrive in the late afternoon for a reception open to all who would like to attend.

8:00-11:00am
Theme 2 - Overview of Social Actors Studies Across Testbeds

**Learning objectives:**
- Key Concepts: Learning different ways of studying how individuals, businesses and policy actors/institutions respond to stimuli from infrastructure and the natural environment. Learn about:
  - Environmental-friendly decision-making among individuals and households, and how this SRN will advance knowledge in that area (Ben Orlove)
  - Co-evolution of infrastructure & institutions framework, and applying it to understand community-scale innovation, relationship with innovation ecosystems framework (Anu Ramaswami)
  - State of knowledge about multi-level governance (horizontal and vertical) in different sectors, and how this study will advance knowledge in that area (Rick Feiock)
- Continued Learning on Research Design: How participating faculty are using different research designs and if/how they can be connected

**Required readings:**
- Theme 2 lead faculty to provide

11am-12:30pm
Theme 2 - Energy & Water Testbed Presentations
  Faculty Presentations (11:00-11:45am)
  Student Discussion (11:45am-12:30pm)

**Learning objectives:**
- Key Sustainability Systems Concepts
- Material-Energy stocks-and-flow models, and design issues in different cities (Anu)
- Key research questions/issues in Smart Grid and District Energy – Why/How (Dan)
- Key issues in customizable water and WW system – Why/How (Paige & Lut)
- Innovation Ecosystems in Energy & Water (Jessica)
- Continuing Theme on Research Design: How participating faculty is using different research designs and if/how they can be connected

**Additional readings will be provided by presenters after the workshop**
1:30-2:55pm

**Theme 2 - Transportation and Urban Design Testbed Presentations**

Faculty Presentations (1:30-2:10pm)
Student Discussion (2:10-2:45pm)

**Learning objectives:**
- **Key Concepts:** Understanding how we could study interactions among transportation, urban form, infrastructure design, people, behavior and policy. Learning about:
  - Land use, policy & driverless vehicles
  - Land use, transit, car share & non-motorized travel
  - Bicycling and non-motorized transport
  - Land use planning, transit, green infrastructure and well being
  - Urban form, air pollution and health
- **Common Theme on Research Design:** How participating faculty are using different research designs and if/how they can be connected

*Additional readings will be provided by presenters after the workshop*

2:55-4:55pm

**Theme 3 - Modeling Approaches**

Faculty Presentations (2:55-4:15pm)
Discussion (4:15pm-4:55pm)

**Learning objectives:**
- Learning about diverse approaches to modeling coupled social, environmental, and infrastructural systems:
  - Complex Infrastructure network & systems models for Decision-making (Manu & Matteo)
  - Agent based modeling/Scenario Modeling (Kara, Trish)
  - System Dynamic models (Bhavik)
  - Sociotechnical Scenarios (Anu, if not covered earlier)
  - Types of Environmental models (Ted, Peter)

*Additional readings will be provided by presenters after the workshop*

5:30 - 8:00 pm  Reception/Social with Policy Partners, Students and Faculty, & EAC ES&T Atrium
**Wednesday, August 19, 2015**

- Location: Technology Square Research Building (TSRB) - 175 – Auditorium and Pre-Function Area
- Participants: SRN Faculty, Students & EAC.
- Faculty can leave after lunch except management team. Students stay till Thursday afternoon.

**8:00-9:15am**
**Theme 2 - Green Infrastructure & Urban Farming Testbed Presentations**

Faculty Presentations (8:00-8:30am)

Student Discussion (8:30-9:15am)

**Learning objectives:**
- Understanding green infrastructure, its benefits, and issues in operating and scaling up.
  - Learning through case studies presented
- How participating faculty is using different research designs and if/how they can be connected

**Additional readings will be provided by presenters after the workshop**

**9:30-10:45am**
Policy and Industry Partner Panel (ICLEI USA, NCL, Ecolab, City of Atlanta, 1-2 faculty members)

**Learning objectives:**
- Learning ways of translating science to action, working with stakeholders across sectors (community, businesses, government & NGOs).
- Learning about the following:
  - Modes of working across academia and communities/cities
  - Engaged Scholarship, CBPR, PAR, mediated modeling
  - Scenario Development scenarios to model future cities, and find ways that our models fit into possible future scenarios

**Required readings:**
- Cash et al., Knowledge Systems for Sustainable Development [http://www.pnas.org/content/100/14/8086.full.pdf](http://www.pnas.org/content/100/14/8086.full.pdf)

- **Additional Readings**


11:00-12:30pm
Faculty will present specific plans in Themes & Testbeds and discuss with EAC

1:30-4:30pm
Reflection session for students, led by Professor Jerry Zhao

Learning objectives:
- Reflect on modeling approaches presented the previous day
- Reflect on translating science to action

Group Work:
- Work on group projects chosen on Day 1
Thursday, August 20, 2015
- Location: Student Success Center - Press Room A
- Participants: SRN Faculty who remain, Students
- Students and remaining faculty and staff depart after 5pm

8:00-10:45am
Presentation(s) on Ethics
  Anu discusses (8:00-9:00am)
  Discussion (9:00am-9:30am)
  Presentation by Judy Curry & Discussion (9:30am-10:30am)

**Learning objectives:**
- Understanding micro and macro ethics
  - Distributional ethics
  - Procedural ethics
  - Professional ethics
  - Research ethics
  - Cross-cultural ethics
- Practical and personal experiences in negotiating (ethical) conflicts

**Required readings:**

10:45am-12:00pm
Student synthesis and time to work on the group project on their chosen test/bed

**Learning objectives:**
- Synthesizing lessons learned by coming together for group research design on the question picked on Day #1

1:30-3:30pm
Students present on their interdisciplinary research design on their chosen testbed, and discuss future plans

3:00-3:30pm
Students complete assessments

3:30-4:00pm
Plan for the rest of the course and plan to submit their written reflection in 2 weeks (Due September 7)