

# Integrating Science, Engineering & Liberal Arts through the Grand Challenge Scholars Program

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## Fall of 2015

Teagle Grant Awarded to WPI and three other AITU Schools

## Summer of 2017

The Grand Challenge Scholars program was approved.

## January 2018

The first cohort of students entered the program.

## Since 2011

***WPI has been a SENCER Center of Innovation***

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# Why are These Programs Important ?

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I hope we can all agree

We cannot afford to invest in educating a generation that acquires knowledge without understanding how to put knowledge into practice to benefit our communities, a greater society, and help create a just nation.

As a community of practice, we must teach not only content *but the skills and values of our society* by creating many diverse and engaging opportunities for our students to practice the hard work of being an active citizen.

This isn't just about science and engineering skills, we must prepare them to participate fully in solving the world's most pressing problems.



# Setting the Stage for the National Academy of Engineering Grand Challenge Scholars (NAE-GCS) Program at WPI

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8 new modules (4 in engineering and 4 in Liberal Arts /Social Sciences) engaged 16 faculty in a two-year design and implementation cycle. This supplemented an already robust approach to interdisciplinary teaching and our problem based education.

First year **Global Problem Seminar** - 4 credit interdisciplinary courses team taught included: Feed the World, Heal the World, Power the World, Waters of the World, etc.

WPI is a **SENCER Center of Innovation**- a well established *Community of Transformation* in SCIENCE education.

WPI is mapping how faculty from the technical fields of science and engineering collaborate with the liberal arts faculty **as equal partners**.



# The 5 Elements of Grand Challenge Scholar Program

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- 1. A Research Experience:** Related to Grand Challenge. **DEPTH**
- 2. Interdisciplinary Curriculum:** Preparing engineers and scientists to put problems in social, legal and policy perspective for the good of society. **BREADTH**
- 3. Entrepreneurship:** Preparing students to translate invention to innovations that scale to global solutions (from idea to product) **Viability**
- 4. Global/Multicultural Dimensions:** Developing global perspective (of the other) necessary to address challenges that are inherently global. **Planetary Vision**
- 5. Social Consciousness:** Developing and deepening students' social responsibility and their motivation to bring their technical expertise to bear on societal problems. **Desirability**



# **BME Introduction to Biomedical Engineering & GOV Politics of Plague**

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**Designed by:**

**Profs. Zoe Reidinger in Biomedical Engineering and Patricia Stapleton in Social Sciences and Policy Studies**

**Sample Topics and Dilemmas:**

**How are vaccines manufactured?**

**How are they tested for efficacy and protective effects?**

**Who is responsible for protecting a nation's citizens and where does funding come from?**

**Politics and religion of herd vaccination: collective vs individual rights**

**The human rights to the benefits of science: are all nations giving the vaccine? Must we share?**



# Integration through Two Important National Programs

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- *Science Education for New Civic Engagements and Responsibility (SENCEER)*  
*and*
- *NAE-Grand Challenge Scholars Program*



# The SENCER Ideals

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- Connects science and civic engagement by teaching “through” complex, contested, capacious, current, and unresolved public issues “to” basic science.
  - **NAE-GCS: This is the heart of the 14 Grand challenges.**
- Invite students to put scientific knowledge and methods to immediate use on matters of interest to students and their communities.
  - **NAE-GCS: Social Consciousness**
- Reveals the elements of public issues where science does not offer a clear resolution.
  - **NAE-GCS: Interdisciplinary Learning**
- Show the power of science by identifying the dimensions of a public issue that can best be understood with certain mathematical and scientific ways of knowing.
  - **NAE-GCS: Research**



# The SENCER Ideals

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- Conceives the intellectual project as practical and engaging from the start, as opposed to a focus on abstract knowledge sequestered for a chosen few.
  - **NAE-GCS :14 Global Grand Challenges serve as an engagement**
- Seeks to extract from the immediate issues the larger, common lessons about scientific processes and methods.
  - **NAE-GCS : Interdisciplinary Course content**
- Locate the responsibilities (the burdens and the pleasures) of discovery as the work of the student.
  - **NAE-GCS: A focused mentorship in the GCSP**
- By focusing on contested issues, encourages student engagement with civic questions that require attention now.
  - **NAE-GCS: A focused mentorship in the GCSP**





# Why NAE-GCS is Important

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Both Science Education for New Civic Engagements and Responsibilities (SENCER) and Grand Challenge Scholars Programs (NAE-GCSP) fosters civic engagement by connecting basic science/engineering content to important public issues that matter to the students and to their broader communities.

Common Goals: To improve science and engineering education and in doing so improves education in general.



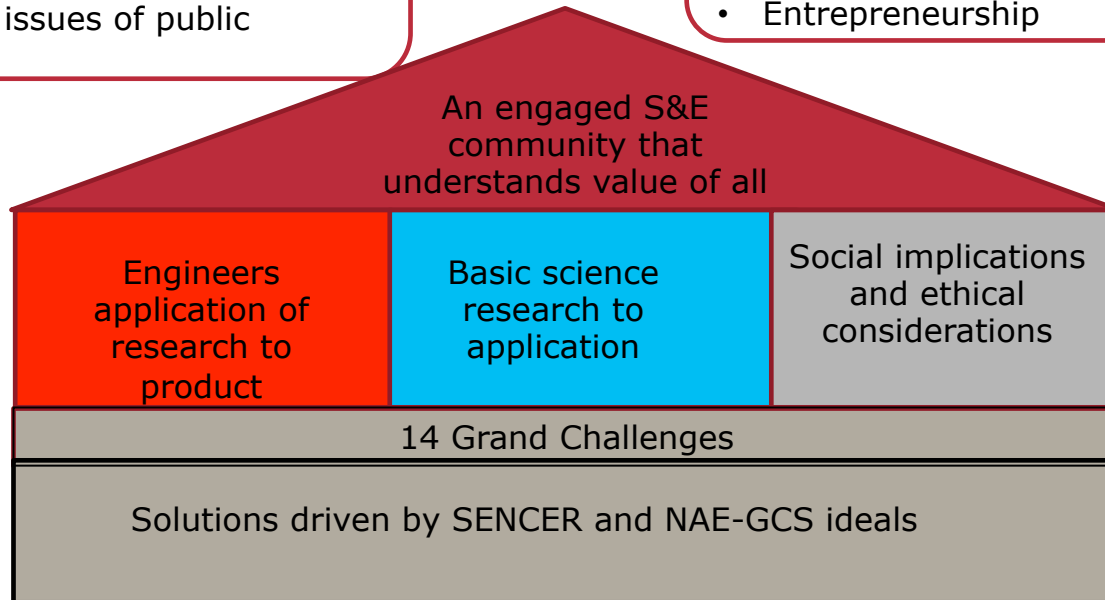
# An Emerging Engineering CoT

## Science Education for New Civic Engagements & Opportunities

- Focus contested complex issues
- Centers responsibility for student learning
- Reveals power and limits of S&E alone
- Teaches through issues of public

## National Academy of Engineering Grand Challenge Scholars Program

- Interdisciplinary
- Global perspective/multicultural perspective
- Research
- Social Consciousness
- Entrepreneurship



# As a Community of Transformation

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It is **our responsibility** to arm our students with multiple opportunities build their capacity as citizens and not just accumulate 120 credits or 45 courses. Our mission is to provide the *opportunity* for students to experience and develop their talents and use them throughout their lives for the greater good of society.

SENCER and the National Center *aim to empower citizens as responsible, lifelong learners to apply the knowledge, values, and methods of science to the complex civic challenges facing our democracy.*



# On Campus, in the Community and in the World- NAE GCSP and SENCER approach – Transforming Education



# Thank you

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- The Teagle Foundation
- National Center for Science and Civic Engagement
- SENCER- Science Education for New Civic Engagements and Responsibilities

