

# GRAND CHALLENGE SCHOLARS PROGRAM



*Taking on the 21st century's toughest engineering challenges*

Help make our world more sustainable, secure, healthy and joyful.

**Join at [uidaho.edu/grandchallenges](http://uidaho.edu/grandchallenges)**

- Gain hands-on project and research experience
- Develop entrepreneurial skills
- Expand your knowledge of issues facing our global society
- Be part of a vibrant, multidisciplinary community
- Explore human behavior and public policy

## THEMES AND CHALLENGES

### SUSTAINABILITY

1. Make solar energy economical
2. Provide energy from fusion
3. Develop carbon sequestration methods
4. Manage the nitrogen cycle
5. Provide access to clean water

### HEALTH

9. Advance health informatics
10. Engineer better medicines

### JOY OF LIVING

11. Reverse-engineer the brain
12. Enhance virtual reality
13. Advance personalized learning
14. Engineer the tools of scientific discovery

### SECURITY

6. Restore and improve urban infrastructure
7. Prevent nuclear terror
8. Secure cyberspace



# THE 14 GRAND CHALLENGES FOR ENGINEERING IN THE 21<sup>ST</sup> CENTURY

The University of Idaho College of Engineering Grand Challenge Scholars Program is the only undergraduate program of its kind in Idaho, producing the next generation of engineers who are equipped to tackle the most pressing issues of our society in the 21st century.



## Prevent Nuclear Terror



Long before 2001, defenders of national security worried about the possible immediate death of 300,000 people and the loss of thousands of square miles of land to productive use through an act of terror.



## Secure Cyberspace



Personal privacy and national security in the 21st century both depend on protecting a set of systems that didn't even exist until late in the 20th — the electronic web of information-sharing known as cyberspace.



## Provide Access to Clean Water



Today, the availability of water for drinking and other uses is a critical problem in many areas of the world.



## Restore and Improve Urban Infrastructure



In 2005, the American Society of Civil Engineers issued a report card, grading various categories of U.S. infrastructure. The average grade was D (Updated to D+ in 2013).



## Advance Health Informatics



When you dial 911 for a medical emergency, the outcome may very well depend on the 411 — the quality of the information available about your condition and ways to treat it.



## Engineer Better Medicines



Doctors have long known that people differ in susceptibility to disease and response to medicines. But, with little guidance for understanding and adjusting to individual differences, treatments have been standardized rather than individualized.



## Engineer the Tools of Scientific Discovery



In the popular mind, scientists and engineers have distinct job descriptions. Scientists explore, experiment, and discover; engineers create, design, and build.



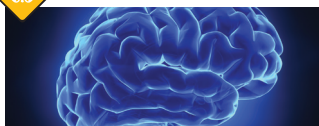
## Enhance Virtual Reality



To most people, virtual reality consists mainly of clever illusions for enhancing computer video games or thickening the plot of science fiction films.



## Reverse Engineer the Brain



For decades, some of engineering's best minds have focused their thinking skills on how to create thinking machines — computers capable of emulating human intelligence.



## Advanced Personalized Learning



For years, researchers have debated whether phonics or whole-word recognition is the best way to teach children how to read. Various experts can be found who will advocate one approach or the other.



## Energy from Fusion



If you have a laptop computer, its battery probably contains the metallic element lithium. In theory, the lithium in that battery could supply your household electricity needs for 15 years.



## Make Solar Energy Economical



As a source of energy, nothing matches the sun. Only a small fraction of the sun's power output strikes the Earth, but even that provides 10,000 times as much as all the commercial energy that humans use on the planet.



## Manage the Nitrogen Cycle



It doesn't offer as catchy a label as "global warming," but human-induced changes in the global nitrogen cycle pose engineering challenges just as critical as coping with the environmental consequences of burning fossil fuels for energy.



## Develop Carbon Sequestration Methods



The growth in emissions of carbon dioxide, implicated as a prime contributor to global warming, is a problem that can no longer be swept under the rug. But perhaps it can be buried deep underground or beneath the ocean.