University of Southern California
Viterbi School of Engineering
Grand Challenge Scholars Program:

The National Academy of Engineering Grand Challenge Scholars Program recognizes the completion of combined curricular and co-curricular components that are designed to introduce and prepare students to future opportunities for creating solutions to the NAE 14 Grand Challenges.

The Viterbi School encourages students to pursue their academic and co-curricular involvement keeping the Grand Challenges in mind. The USC Viterbi Grand Challenges Scholar Program (GCSP) helps you to organize your time spent focused on exploring results that benefit society.

The Grand Challenges Scholars Program is housed in the Viterbi Admission & Student Affairs office under the direction of the Senior Associate Dean and a Faculty Mentor who also has responsibility for the Viterbi Honors Program. The Viterbi Honors Program also provides the opportunity for students to begin focusing on at least three of the components of the Grand Challenge Scholars Program: research, entrepreneurship or service learning. Support staff are involved in maintaining an active database of interested students and is responsible for developing the marketing and communication plan, departmental programming and supplemental programming, including workshops to inform and recruit students to the program.

The Freshmen Academy Program, which is a required class for all incoming freshmen also focuses on the Grand Challenges in order to introduce freshmen to the challenges and provides an opportunity for students to participate in poster sessions and other competitions related to the Grand Challenges.

Each year, the top students who successfully complete the USC Viterbi GCSP areas will be named National Academy of Engineering Grand Challenges Scholars, recognized both by USC at graduation and the National Academy of Engineering.

The National Academy of Engineering identified 14 challenges that engineers of the future must solve. These challenges include:

- Making solar energy economical
- Providing energy from fusion
- Developing carbon sequestration methods
- Managing the nitrogen cycle
- Providing access to clean water
- Restoring and improving urban infrastructure
- Advancing health informatics
- Engineering better medicines
- Reverse-engineering the brain
- Preventing nuclear terror

- Securing cyberspace
- Enhancing virtual reality
- Advancing personalized learning
- Engineering the tools of scientific discovery

These challenges can be broadly grouped into four distinct areas:

Sustainability:
- Making solar energy economical
- Providing energy from fusion
- Developing carbon sequestration methods
- Managing the nitrogen cycle
- Providing access to clean water

Security:
- Securing cyberspace
- Preventing nuclear terror
- Restoring and improving urban infrastructure

Health:
- Engineering Better Medicines
- Advancing Health Informatics
- Reverse engineering the brain

Enriching Life:
- Enhancing virtual reality
- Advancing personalize learning
- Engineering the tools of scientific discovery

Students interested in being designated as Grand Challenge Scholars should demonstrate involvement related to a specific Grand Challenge and describe how they have made contributions to one or more of those topics across 5 *dimensions*:

1. **Research/Creativity**: Mentored research or project experience related to a Grand Challenge.
   Participate in an approved team project, senior capstone project, design project or research project related to one of the Grand Challenge Topics.
   Examples can include:
   - Working with faculty in a research lab focused on one of the Grand Challenges
   - Developing your own independent research and enrolling in a Directed Research course
   - Focusing a senior capstone design project on one of the Grand Challenges
   - Presenting independent research on one of the Grand Challenges at USC Undergraduate Research Symposium or other such venue
   - Participate in team project with Grand Challenge focus, such as Solar Car Team, HackSC Hackathon; etc.

2. **Multidisciplinarity**: Understanding gained through multidisciplinarity.
   Enroll in courses outside the engineering curriculum that will complement the technical curriculum such as public policy, business, law, ethics, art, sociology, cinema, natural sciences, etc.

Examples can include:

- Pursuing a minor related to the Grand Challenges
- Taking at least two courses in biotechnology; communication and the entertainment industry; ethics & moral philosophy; global health; human rights; applied computer security; social entrepreneurship; non-profits, philanthropy & volunteerism; science visualization, or other potential courses outside of your major that can potentially connect to Grand Challenge themes.

3. **Entrepreneurship**: Understanding gained through experience that viable business models are necessary.
   Students should be prepared to translate invention and innovation and to develop and understand market ventures that can potentially scale to global solutions to the Grand Challenges
   Examples can include:
   - Pursue a minor or enroll in at least two courses in digital entrepreneurship; social entrepreneurship, etc.
   - Take on a leadership role in a student organization related to entrepreneurship such as Spark SC; LavaLab; NOBE; Design for America; etc.
   - Participate in VSi2 activities or Maseeh Prize Competitions or Min Family Social Entrepreneurship Challenge by submitting a business plan related to the Grand Challenges
   - Participate in other entrepreneurial activities such as 1000 Pitches competitions, etc.

4. **Cultural Competence**: Understanding gained through global or different cultural experience.
   Participate in a curricular or co-curricular activity that develops the perspective necessary to understand global challenges or that lead to innovations in a global economy.
   Examples can include:
   - Conduct research related to global health issues, non-profit marketing or low-cost manufacturing
   - Participate in an approved study abroad program
   - Participate in iPodia, the Viterbi Tsinghua Research program, Engineers Without Borders or other USC international program
   - Participate in an international internship or the USC Global Fellows program, etc.
   - Enroll in minor or courses related to global issues such as International Health Development & Social Justice; International Relations, etc.

5. **Service Learning**: Addressing societal problems through service learning, K-12 engagement, or social entrepreneurship.
   Participate in a curricular or co-curricular activity that deepens social awareness and develops the motivation to bring technical expertise to bear on societal problems.
   Examples can include:
   - Participate in activities or conduct research in an area of focus on improving the human condition
   - Participate in Viterbi Impact, Engineers without Borders, Global Health Brigades, JEP, Volunteer Center programs and projects
   - Participate in STEM related outreach activities through Viterbi's STEM Educational Outreach office; enroll in Engineers as Teachers course, etc.

The Road to GCSP

To prepare students for the application process in the year they plan to graduate, they will submit the information on the Road to GCSP form as early as the freshmen so that they can be supported in the successfully applying for the GCSP. In addition to this application, there are several suggestions of participating in the Road to GCSP. Please see below:

- Submit revised four-year plan after feedback is received
- Spring Semester Check-in Meeting: Meet with a VASA staff member to review the progress of your four-year plan (done in March, after spring break)
- Regular communication with VASA staff or faculty mentor

Criteria for Selection of Grand Challenge Scholars

The goal of the program is to engage Viterbi undergraduate students in the Grand Challenges set forth by the National Academy of Engineers as issues that must be addressed in the immediate future in order to promote sustainability (energy, infrastructure and the environment), address vulnerability (security and prevention of nuclear terror), improve health care (from health informatics to new medicines) and enhance the human potential (from education to virtual reality). Viterbi Grand Challenges Scholars will be expected to demonstrate innovation, scholarship, and leadership in approaching their exploration of the Grand Challenges.

Selection of Grand Challenge Scholars will entail:

1. A panel of faculty and staff members will review student applicants and related materials submitted for consideration. Faculty members who review applicants should either be able to comment on any aspect of the application or can be chosen to focus on one of the five criteria. Reflecting the multidisciplinary nature of the Grand Challenges, the panel will not be restricted only to engineering faculty.
2. Eligible students would be students achieving a 3.0 GPA or higher, with preference given to students with a 3.25 GPA or higher. The goal is such that we do not eliminate students who are more actively engaged, but whose GPA may not be at the 3.25 level. Students participating in the Progressive Degree Program would also be eligible, though preference would be given to seniors.
3. Students will be encouraged to become involved in the program as early as their freshmen year through attendance at special seminars, research, workshops, co-curricular activities related to the Grand Challenge areas, or curricular activities such as the Freshmen Academy. It is believed that early exposure to the challenges will assist students in defining their respective interests in one or more of the areas as well as demonstrating future commitment to the program. Sustained involvement throughout their four years will be important to demonstrate to the GCS Committee.
4. Students can submit an application as early as their freshmen year declaring their GC focus and intent to compete as a scholar.
5. Final submission of a portfolio requesting consideration to be designated as a Grand Challenge Scholar will be required by February 1st of the senior year. That portfolio would include:

a. Completion of an application form that details their involvement in curricular, co-curricular, or undergraduate research activities within each of the five identified areas of the Grand Challenges Program. At least one of the areas must have had in-depth involvement.
b. A description of the Grand Challenge they have pursued, including a focused reflective essay indicating how they met the five components.
c. Submission of an un-official transcript or STARs report.
d. Two letters of recommendation from faculty who can confirm commitment and involvement in the components outlined.

6. Students who declare their intent to compete as a GC Scholar must also present their senior capstone design project during Senior Design Project Expo that occurs each spring. Additionally, students will be required to present information on the Grand Challenges and/or their specific involvement in the GCS program to the Freshmen Academy each fall.
7. If selected as a Grand Challenge Scholar, finalists will also be asked to submit an article or other communication material to the Viterbi on-line magazine, *Illumin*; National Academy or other organization in order to further promote and education others about the challenges and opportunities for engineers to solve these issues.