

**University of Notre Dame**  
**Engineering Grand Challenge Scholar Program**

**Grand Challenge Scholar Program Vision:**

Our mission is founded on the principle that the creation and transfer of knowledge should reflect a profound and complete respect for the dignity of all persons and for the greater common good of humanity. This mission is borne out of Notre Dame's Catholic identity and its commitment to Christian anthropology. As such, the College's vision is to encourage students to engage in transformational passionate learning and research activities that address the important needs of humanity, to inspire students to the highest levels of scholarship and service, and to enrich our students with Christian ideals and virtues. The National Academy of Engineering's fourteen grand challenges serve to identify issues that, if solved, will greatly benefit humanity. Our Grand Challenge (GC) Scholar program will provide our students the opportunity to engage, understand and help address solutions to those challenges.

## Selection of Grand Challenge Scholar Apprentices:

The GC Program is designed to attract students who are excited about pursuing answers to challenges that face humanity and making the world a better place for all. In this spirit, the Notre Dame GC program is open to all students in good academic standing. Criteria for selection are founded upon a student's demonstrated willingness to work towards their passion and to commit themselves to the elements of the GC Scholars Program. Specifically, the student must meet the following:

1. Be a rising sophomore, or higher, enrolled in either the College of Engineering or Science in "good standing".
2. Submit an application on-line to the Steering Committee. The application will consist of:
  - a. Personal essay (no more than 2 pages) on motivation to complete Grand Challenge Scholar program and the specific challenge they want to address.
  - b. Recommendation from a faculty member
  - c. A proposed Grand Challenges Faculty mentor
  - d. A proposed Grand Challenge Curricular Plan that:
    - i. Incorporates the five components (Interdisciplinary curriculum, research, entrepreneurship, global experience, and service learning)
    - ii. Is feasibly completed in the time remaining prior to the student's graduation (no less than 3 semesters).

The Global Challenges Steering committee (consisting of the director and 5 faculty mentors – 1 from each department), will review all submitted applications and approve program deviations.

<b>Steering Committee Members:</b>	<b>Role</b>	<b>Email</b>	<b>Phone</b>	<b>Office Location</b>
Dr. Kerry Meyers	Program Director	kmeyers1@nd.edu	(574) 631-1229	208 Cushing Hall
Dr. Bill Goodwine	Aerospace and Mechanical	billgoodwine@nd.edu	(574) 631-3283	376 Fitzpatrick Hall
Dr. Troy Vogel	Chemical and Biomolecular	tvogel1@nd.edu	(574) 631-1688	179 Fitzpatrick Hall
Dr. Alexandros Taflanidis	Civil and Environmental Engineering and Earth Sciences	a.taflanidis@nd.edu	(574) 631-5696	158 Fitzpatrick Hall
Dr. Aaron Striegel	Computer Science and Engineering	striegel@nd.edu	(574) 631-6896	384C Fitzpatrick Hall
Dr. Doug Hall	Electrical Engineering	dhall@nd.edu	(574) 631-8631	260 Fitzpatrick Hall

Once admitted, each scholar is expected to remain in “good standing” while a member of the program. To do this, the student shall work with their mentor to make steady progress towards completing each portion of the program as set forth in their curricular plan. Each semester, participants will present their program progress to the committee (1 slide per competency in the template provided) submitted through a Google Form. During that presentation, participants can indicate when they have completed a competency for the committee’s final approval.

Grand Challenge apprentices should work to complete their curricular plan no later than the 4<sup>th</sup> week of their graduation semester. Once a student has completed all portions of the curricular plan, they will notify the GCSP Program Director of completion. In the semester a student is graduating (or has completed all program requirements), the student must:

- **Give an oral presentation to the committee**
- **Give a written summary of the competencies and when / how they were completed (submitted 1 week prior to the oral presentation)**

Upon completion of the capstone project, the apprentice will be named a GC Scholar. Each year, GC scholars will be recognized at departmental graduation ceremonies, be issued a special graduation cord, and be specifically noted in the University graduation program and graduation transcript.

### **Grand Challenge Curricular Components**

Each curricular plan must address the five components required by the GC Scholar program:

1. Research or Project Experience. Each GC apprentice will participate in a research or project-based experience that addresses one of the fourteen Grand Challenges <https://engineering.nd.edu/gcsp>. Research and projects can be individual or team based with a scope that is commensurate to the number of scholars involved. Each research or project-based experience must be approved by the Director.
2. Interdisciplinary Curriculum: Must complete at least 2 courses that look at your Grand Challenge from “another perspective” such as economics, public policy, human behavior, etc.
  - a. Each GC apprentice must complete the University Core Curriculum (Fine Arts, Social Science, Theology, Philosophy, Science, Mathematics, History, Moreau First Year Course).
  - b. Each GC apprentice should complete 2 courses or modules related to: public policy, business, law, ethics, human behavior, risk, or medicine approved by the Steering Committee

3. Business / Entrepreneurship. Each GC apprentice will participate in one of the following components and relate experiences to Grand Challenge:
  - a. IDEA Center <https://ideacenter.nd.edu/>
  - b. Coursework – take two of the following courses:
    - i. Entrepreneurial Insights (BAUG 20500)
    - ii. Boardroom Insights (BAUG 30209)
    - iii. Integrated EG and Business Fundamentals I (EG 40421) – Reverse Engineer a Public Company Assignment must relate to your Grand Challenge Project
    - iv. Integrated EG and Business Fundamentals II (EG 40422) – Individual Presentation must be related to your Grand Challenge Project
    - v. Case Studies in Computing Based Entrepreneurship (CSE 40923)
  - c. College of Engineering Leadership Training Program
  - d. Participate in a research or project based experience that involves innovation and entrepreneurship (e.g. Notre Dame ESTEEM Program, Notre Dame California Initiative, etc.) (must be approved by steering committee).
  - e. A summer internship can be used to fulfil this competency if it is related to the engineering Grand Challenge (must be approved by director)
  
4. Multicultural / Global Dimension. Each GC apprentice will complete one of the following programs and use the knowledge gained from working on your Grand Challenge to understand the problem from another / global perspective where other related work is being completed. Note that for a study abroad program to fulfill this competency, it must be related to the engineering grand challenge:
  - a. Participate in an Engineering Summer Study Abroad program
  - b. Participate in a Notre Dame International (NDI) Study Abroad program
  - c. Participate in NDI UG Research project (<http://international.nd.edu/education-abroad/other-opportunities-abroad/#Indy%20Research>)
  - d. Participate in a Center for Social Concerns Overseas Service Learning Opportunity (<http://socialconcerns.nd.edu/global>)
  - e. Participate in an overseas internship experience
  - f. Participate in NDSEED International experience (<http://ndseed.nd.edu/>)
  - g. Participate in ND Engineers without Borders (<http://ewbnotredame.weebly.com/>)
  - h. Participate in Bowman Creek (<https://www.bce2.org/>)

- i. Participate in other global experience approved by the Director, note it does NOT need to be international (anything that brings students to experience a new cultural situation is the goal)
5. Social Consciousness / Community Engagement. Each GC apprentice will participate in and relate this competency to their Grand Challenge:  
Notre Dame has a diverse mix of service learning experiences on campus and more are added each year (<http://engagement.nd.edu/>). The student can select from this mix, or create a new one, and present it to the Steering Committee for approval.

Each student bears the responsibility for crafting and developing their own curricular plan and showing the connection between each competency and the chosen Grand Challenge. Each plan should provide sufficient detail how each of the activities in the 5 areas will contribute to the better understanding of their chosen grand challenge.

### **Grand Challenge Non-Curricular Component**

Notre Dame places a high value on the learning community. As such, the GC Scholar program will be focused on developing camaraderie within the cohort. This will be accomplished by sponsoring “social learning events” that bring the community of GC scholars together throughout the semester. GC apprentices will work with 1-2 other participant to schedule 1 social activity for the group each year (this could be a casual lunch, or something more). Students are expected to attend at least 60% of the events offered to remain in good standing.

### **Funding and Support for the Program**

Due to the many aspects of this program it is likely that the College, GC apprentices, and faculty mentors may require funding to support execution of portions of the GC program or individual curricular plans. Such items include but are not limited to:

1. Travel expenses to GCSP events
2. Logistic support for GCSP meetings (food, drinks, etc)
3. Logistic support for participation in research activities
4. Supplies needed to conduct research
5. Funds for GCSP apprentices to participate in: service learning, study abroad, or conferences related to GCSP work

With this in mind, the College will allocate \$1500 to cover these costs. At the discretion of the Dean, additional funds may be provided depending on specific events requested by the Director.

## **Notional Timeline for a Grand Challenge Scholar**

### First-Year

- GCSP will be introduced during the First-Year Engineering Course Sequence through a writing reflection and outside of class information sessions.
- Attend Grand Challenge Scholar information session (Offered 1x per semester)
- Student can apply at the end of their First-Year if they have a plan in place (or more typically during the sophomore year)

### Sophomore Year

- Choose a Grand Challenge to pursue
- Select a Faculty mentor
- In consultation with your advisor, develop a curricular plan that incorporates the five components (interdisciplinary curriculum, research, entrepreneurship, global dimension, and service learning)
- Identify a particular part of the Grand Challenge on which you intend to focus
- Submit your Grand Challenges application
- Plan and participate in GCSP social activities

### Junior Year

- Meet with your GC mentor or Director each semester to discuss progress towards completing the program elements
- Provide semester updates to program to the Steering Committee on their progress
- Plan and participate in GCSP social activities

### Senior Year

- Meet with your GC mentor or director each semester to discuss progress towards completing the program elements
- Provide semester updates to program the Steering Committee on curricular plan progress
- Schedule and complete a Capstone Presentation and written document that highlights your experiences and discoveries as it relates to your selected Grand Challenge.
- Plan and participate in GCSP social activities