

University of Notre Dame

Grand Challenge Scholars Program

College of Engineering

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University of Notre Dame Grand Challenge Scholar Proposal

1. 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.

2. 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 (>2.0 GPA). It is expected that 20-30 new students will start the program each year.

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 sophomore, or higher, enrolled in either the College of Engineering or Science in "good standing" (GPA >2.0).
2. Submit an application to the Grand Challenge Scholar Director no later than the 2 weeks after the start of the classes in the fall and spring semesters. The application will consist of:
 - a. Personal essay (no more than 1 page) on motivation to complete Grand Challenge Scholar program and the specific challenge they want to address.
 - b. Recommendations from at least one faculty member
 - c. A proposed Grand Challenges Faculty mentor
Initially, the program director will serve as an "interim" mentor for all students interested in the program to help guide them and to help identify a mentor that is linked to their project interest area. Every effort will be made to find a faculty mentor that is well suited for working with undergraduate students.
 - d. A proposed Grand Challenge Curricular Plan that:

- i. Outlines how the student plans to fulfill each of the five components (Interdisciplinary curriculum, research, entrepreneurship, global experience, and service learning) to their plan of study. Any subsequent changes to this plan will require a formal approval from the director.
- 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 1 faculty member from each of the 5 engineering disciplines appointed by the Dean of the College of Engineering), will review all submitted applications and every attempt will be made to accommodate all students that are interested in participating in the program, but the selection criteria include:

1. Strength of the proposal – in particular well thought out plans for addressing each of the elements of the program (and linking them together)
2. Good academic standing with the university, GPA >2.0 (but priority to students above a 2.7 GPA)
3. Academic Progress – rising sophomores and rising junior level students will be given priority for selection into the program (students will not be selected to begin their program during their senior year)

Once admitted, each scholar is expected to remain in “good academic standing” (>2.0 GPA) 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. No later than December 1 for the fall semester or May 1 for the spring semester, each student will submit a written report to the Director that details the progress made during the current semester and the planned accomplishment for the next semester.

Grand Challenge Apprentices should work to complete their curricular plan no later than the 4th week of their graduation semester. Once a student has completed all portions of the curricular plan, they, in coordination with their faculty mentor, will notify the Director of completion. The student will then work with the Director to schedule a capstone presentation providing a synopsis of their experiences. Capstone presentations should be attended by members of the Steering Committee, GC Faculty mentor, other faculty members, and other GC scholars/apprentices.

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.

3. Grand Challenge Curricular Components

Each curricular plan must address the five components required by the GC Scholar program. An earned grade of a “C” or better is required for it to count towards GCSP program requirements:

1. Interdisciplinary Curriculum.
 - 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 Director
2. Research or Project Experience. Each GC apprentice will participate in a research or project-based experience that addresses one of the fourteen Grand Challenges. 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.
3. Entrepreneurship. Each GC apprentice will participate in one of the following components:
 - a. Four Horsemen Entrepreneurial Program (minimum 2 semester participation) (http://mind.nd.edu/team/entrepreneur_ND.htm)
 - b. McCloskey Business Plan Competition (<http://nd.pitchburner.com/>)
 - c. 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)
 - iv. Integrated EG and Business Fundamentals II (EG 40422)
 - v. Case Studies In Computing-Based Entrepreneur (CSE 40923)
 - 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 the Director.
 - e. Participation in the College of Engineering Leadership Training Program
 - f. Internship (must be approved by the Director)
4. Global Dimension. Each GC apprentice will complete one of the following programs and demonstrate leadership initiative related to the Grand Challenges:
 - a. Participate in a 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 domestic or international project (<http://ewbnotredame.weebly.com/>). This involves the student's participation in planning and traveling to implement this project.
- h. Participate in other global experience approved by the Director

Many of our engineering students participate in a 6 week engineering study abroad program for which financial aid is available. Additionally, **the global component will be defined more broadly in terms of an immersion experience that extends the perspective of the student beyond their prior experiences** (this could be an international trip, an urban plunge, or Appalachia cultural program experience)

5. Engineering Service Learning. Each GC apprentice will participate in:
 - a. Notre Dame has a diverse mix of service learning experiences on campus and more are added each year. The student can select from this mix, or create a new one, and present it to the Director for approval.
 - b. Participation will be defined as the equivalent of 40 or more hours

Each student bears the responsibility for crafting and developing their own curricular plan. 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.

4. 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. These events would include:

- Speaker Series that highlight the Grand Challenges. Receptions for the students and speakers would follow each lecture.
- Field trips during school breaks to explore specific Grand Challenges
- Student sponsored presentations on their work in the Grand Challenge

Each student would be expected to participate in at least one non-curricular event per semester.

5. Recruiting Grand Challenge Scholars and Faculty Mentors

Grand Challenge Scholar recruiting will begin with the Admissions process. The Director will work with Admission counselors to advertise the GC program to prospective engineering students interested in a “challenging” honors type program. Materials and information promoting the Grand Challenge Scholar program will be posted on the College website. Once the Academic year begins, the college will sponsor guest lecturers to discuss and encourage deeper investigation of the challenges and provide students ideas for pathway to become a Grand Challenge Scholar. Consideration to recruitment of a diverse group of participants will be given; specifically presentations will be given each year through the First-Year Engineering Program, Women in Engineering Program, the Minority Engineering Programs. The First-Year Engineering Program will link all the spring semester design projects to the engineering grand challenges.

Faculty Mentors for Grand Challenge Scholars will be recommended by the Director and approved by the Dean. Once selected, the Director will provide training and familiarization of the GC Program requirements to each mentor. The faculty mentor will meet on a regular basis with each assigned apprentice to discuss progress on the curricular plan.

Each year will begin with a kick-off event that includes all students in GCSP and an invitation will be extended to all faculty as well.

Additional Faculty Training:

1. All faculty will be provided the program documentation that outlines program requirements and processes.
2. All faculty will be invited to an information session offered each year
3. All faculty will have the opportunity to take part in a Design Thinking Seminar developed by SAP to further develop their program and costs for attendance will be covered by the program.

6. 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. Stipends for the GCSP Director or Faculty mentors

3. Logistic support for GCSP meetings (food, drinks, etc)
4. Guest Speaker travel expenses
5. Funds for GCSP apprentices to participate in service learning or study abroad

With this in mind, the College will allocate \$750 per student per year (not to exceed a total of \$1500 per student) to cover these costs. At the discretion of the Dean, additional funds may be provided depending on specific events requested by the Director.

7. Program Assessment

On an annual basis the Engineering Grand Challenges Scholars Program will be assessed:

- (1) The Grand Challenge Program Director will report to the Steering Committee, Dean, and Executive Staff the program status including number of students, progress towards graduation, progress towards program completion, and the plans to meet the continued needs of scholars for the upcoming school year.
- (2) The Grand Challenge Scholars Apprentices will be asked to complete a survey each year providing anonymous feedback on the program. Additionally, qualitative feedback will be sought from apprentices during their meeting with the program director each year (students will be asked to prepare a reflection on their experience that year prior to that meeting). This will be used for the benefit of both the students participating and also for the program organizers for continuous improvement.

Notional Timeline for a Grand Challenge Scholar

First-Year

- The spring semester of the First-Year Engineering Program will involve projects that are all linked to the engineering grand challenges in some way. This will serve as a lead in for all students to have some exposure to the program.
- As part of the First-Year Engineering Course Sequence, there will be presentations to learn more about the Grand Challenges

Sophomore Year

- Choose a Grand Challenge to pursue
- Select a Faculty mentor (GCSP Director can provide a list of mentors. The Director can approve names off the list on an individual basis).
- 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 to the Director
- Attend at least one GCSP Social Event each semester

Junior Year

- Meet with your GC mentor on regular agreed upon basis to discuss progress towards completing the curricular plan.
- Provide semester updates to program Director on curricular plan progress
- Attend at least one GCSP Social Event each semester

Senior Year

- Meet with your GC mentor on regular agreed upon basis to discuss progress towards completing the curricular plan.
- Provide semester updates to program Director on curricular plan progress
- Schedule and complete a Capstone Presentation that highlights your experiences and discoveries as it relates to your selected Grand Challenge.
- Attend at least one GCSP Social Event each semester