



National Academy of Engineering Grand Challenge Scholars Program Proposal

Jagath Kaluarachchi
Dean of Engineering

Kurt Becker, Ph.D.
Professor
Department of Engineering Education
Grand Challenge Scholars Program Director
4160 Old Main Hill
Logan, Utah 84322
(435) 797-2076
kurt.becker@usu.edu

UtahStateUniversity

Grand Challenge Scholars Program at Utah State University

Grand Challenge Scholars Program Vision

This proposal from Utah State University (USU) is to establish a National Academy of Engineering (NAE) Grand Challenge Scholars Program (GCSP). The mission of Utah State University is to be one of the nation's premier student-centered, land-grant and space-grant universities by fostering the principle that academics come first; cultivating diversity of thought and culture; and serving the public through learning, discovery, and engagement.

USU produces graduates who are immediate contributors in their chosen fields. The GCSP at USU will provide student experiences and curricular pathways to bridge disciplines and engage students across domains of knowledge and practice. Our GCSP includes features that will allow students and faculty to co-create curricular activities to help students develop the skills, knowledge, and awareness necessary to become innovative leaders and problem solvers.

The College of Engineering at USU recognizes the changing needs of the engineering profession. Students from across Utah and around the world choose USU's College of Engineering because of our faculty, unique research opportunities and the chance to live the Aggie experience. We foster a creative and inclusive learning environment where students are empowered with the knowledge and experience to become the leaders in engineering and computer science. By introducing a GCSP at USU, students will be able to leverage many of the college's existing programs and activities to build their GC Scholar portfolio.

This program will help prepare our students to become more socially conscious, innovative, and engaged in the field of engineering. The GCSP will provide activities for students to expand their learning experience beyond traditional coursework. Led by faculty in the College of Engineering, this proposal for a GCSP is well-aligned with the strategic direction of the university and College of Engineering. GC Scholars will have access to a new program that equips them with the skills needed to address important grand challenges.

Essential Elements of Grand Challenge Scholars Program

The GCSP is a multi-year program and is offered to freshman and sophomore students in engineering. The College of Engineering envisions a small cohort of approximately 4 to 6 students in the first year of the program. A smaller initial cohort will allow us to gain feedback about the program, and it is anticipated that the program will grow to a yearly steady state number of 10 – 15 students. The GCSP will be promoted through ongoing recruitment and outreach efforts; the Honors Program; and first-year experience activities such as introductory engineering courses, academic advising, engineering learning communities, engineering activities, and more.

As the GCSP grows, we anticipate adding industry/corporate partnerships to provide student scholarships for the program. These collaborative partnerships will require working closely with the individual departments within the College of Engineering and will be an integral part of evaluating the effectiveness of GCSP. The College of Engineering's Director of Industrial Relations will assist with securing potential industrial/corporate donors.

The National Academy of Engineering identified fourteen Grand Challenges and suggests that they cover four cross-cutting themes: **SUSTAINABILITY, HEALTH, SECURITY, and JOY OF LIVING**. USU's GCSP will pursue student applicants that are interested in one of the 14 Grand Challenges and promotes students to work in one of the four GC themes to explore solutions to problems that face humanity.

Selection will be based primarily on their interest in the Grand Challenges, not solely on prior academic performance. Admission into the program will be open to undergraduates who are currently enrolled in engineering at USU. This may include qualified transfer students. All student applicants are required to be in good standing with the College of Engineering. To apply, students must submit the GCSP online Application Form (Appendix A), which includes a selection of the Grand Challenge they wish to pursue, an essay explaining their motivation for that challenge, and other required supplemental material. Applications will be reviewed by the GCSP Steering Committee (see Application and Selection section below).

The GCSP will be supported by engineering staff and faculty in all six college departments, and will require support from the recruitment office, advising office, undergraduate research, and graduation services. The GCSP Steering Committee consists of College of Engineering administration, faculty, and student representatives who oversee the program's development, implementation, and operation.

Initially, this program will be funded by using college resources and/or scholarship funds. As the program evolves and develops, we will pursue individual and corporate donors interested in student development and the Grand Challenge initiatives. It is our goal to have all operational costs and program scholarships covered for all GCSP participants within five years.

Structure of Program

- A College of Engineering Steering Committee will oversee all GCSP activities, and the program director will oversee the Steering Committee.
- Each of the departments in the College of Engineering will have faculty that will participate in GCSP for technical assistance. These faculty will act as mentors to the students.
- Each department in the College of Engineering will have one faculty advisor. This faculty member will act as an advisor to the technical assistance faculty and will be very familiar with the GCSP. The student will interact with a faculty mentor they feel comfortable with and have the expertise needed to assist the student through the GCSP.

This program will use a student portfolio approach as it will allow students to take advantage of

various activities. The student portfolios will be constructed to show approval and completion of the GCSP, and the Steering Committee will be able to utilize these portfolios as the mechanism to review, approve, and certify component completion. The student, faculty mentor, and the Steering Committee will be able to view the student's progress in the program.

The cost associated with reviewing each of the components will be substantial. Each conference, workshop, course, and event will be evaluated by the faculty mentor and GCSP Steering Committee. Along with the courses, the activities are pre-approved. To make the course evaluation process less time consuming for the faculty mentors and Steering Committee, a list of courses will be pre-approved and available to students and mentors. If a student would like to use a course that is not on the pre-approved list, they will need guidance from their mentor in developing their plan for the application. Procedures for each course and activities will be in place prior to implementation. The Component Approval Form is in Appendix D.

A. Grand Challenge Scholar Recruitment and Selection

To enter the program at USU, students must submit a proposal that outlines the pathway they intend to follow to meet the GCSP requirements. Prospective GC Scholars will meet with a GCSP faculty mentor prior to submitting the GCSP proposal. Thus, students and faculty work together to develop each scholar's proposal for completing the program requirements. The program may be comprised of curricular, co-curricular, and extra-curricular activities that have been pre-determined to meet program requirements and are intended to be highly customizable and flexible to meet the interests of our students. As students identify new activities to fulfill the requirements of the GCSP, they are responsible for discussing these with their faculty mentor. If the faculty mentor agrees that the experience meets the GCSP requirement, the mentor is then responsible for seeking formal approval from the Steering Committee for the proposed activity. Any new activities must be approved by the Steering Committee.

Recruiting Grand Challenge Scholars

GC Scholar recruiting will begin with the admissions process. The Director will work with the College to advertise the program to prospective engineering students interested in the program. Materials and information promoting the GCSP will be posted on the College website. USU will recruit a diverse group of participants by promoting the program to student organization such as The Society of Hispanic Professional Engineers (SHPE), Society for Women Engineers (SWE), Engineers without Borders (EWB), and Engineering Student Council (E-Council). We will also promote the program through ongoing recruitment and outreach efforts, the Honors Program, and first-year experience activities such as introductory engineering courses, academic advising, engineering learning communities, engineering activities, and more.

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. Each GC Scholar, working with their GCS Faculty Mentor, will develop a customized plan for achieving competence in each of the five GCSP curricular components, and ensure curricular connectivity across these five components of the GCSP.

Faculty Mentors

Faculty Mentors for GCSP will be recommended by the department heads and approved by the GCSP Director and Dean. Once selected, training on the GCSP requirements will be provided to each mentor. The faculty mentors will meet on a monthly basis for the first year of the program to facilitate rapid changes and improvements to the overall process. Additional faculty training will be made available and will include the following:

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.

Funding and Support for the Program

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

1. Guest speaker travel expenses
2. Travel expenses for GCSP events
3. Logistic support for GCSP meetings (food, drinks, etc.)
4. Funds for GC Scholars to participate in service learning or study abroad

The allocated funds will be sufficient to accomplish the goals and activities of the program. At the discretion of the Dean, additional funds may be provided depending on specific events requested. In addition to funding to support the execution of the program, each student accepted into the GCSP will receive a scholarship of \$1,500, to be paid \$500 each year in the program (3 years max.).

Application and Selection

Students interested in participating in the GCSP will apply to the program after their first semester, but no later than their fourth semester (see GCSP online Application Form (Appendix A)). Interested students will submit an application that includes a short essay about which Grand Challenge they want to address and why, as well as a preliminary plan for how they will complete the required components of the program. It is essential that the GS Scholars have and maintain good standing in their home engineering programs and keep a grade point average (GPA) above 3.0. The Steering Committee will assess applications at a fixed time each semester based on the application materials.

Criteria for Selection

Criteria for selection includes a commitment to the elements of the GCSP. Specifically, the student must meet the following:

1. Be a freshmen, sophomore, or transfer student, enrolled in the College of Engineering in “good standing.”

2. Submit an application to the GCSP. The application will consist of:
 - a. Personal essay (300 – 500 words) on motivation to complete the GCSP, and the specific challenge they want to address.
 - b. Select a proposed GC Faculty mentor.

Every effort will be made to find a faculty mentor that is well suited for working with undergraduate students.

- c. A proposed GC plan that:
 - i. Outlines how the student plans to fulfill each of the five components (multidisciplinary, research/creative, entrepreneurship, multicultural, and social consciousness) for their plan of study. Any subsequent changes to this plan will require a formal approval from the faculty mentor and Steering Committee.
 - ii. Feasibility of completing the program in the time remaining prior to the student's graduation (no less than 3 semesters).

Application Approval Process

GC Scholar applications will be assessed by the Steering Committee. The following steps will be followed:

1. Steering Committee receives GCSP On-line Application.
2. Each Steering Committee member uses the Application Approval Form rubric (Appendix B) to rate the applicant on a point system.
3. Once the Steering Committee makes their recommendations to approve specific applicants, students that have been accepted, and those that were not selected, will be notified by the Steering Committee. Students that apply for the GCSP, and not accepted, will receive feedback from the Steering Committee, with suggestions for improvement.

B. Grand Challenge Scholar Program Competencies

The objective of the five-component curriculum is to provide the GC Scholar with the engineering and non-engineering expertise necessary to address a Grand Challenge. The requirements and options of each of the GCSP components is identified in the **GCSP Component Requirement Approval Form** (Appendix E). Once a student selects one of the fourteen Grand Challenges in their area of interest, they will develop one of the four GC themes to explore solutions to problems that face humanity. Participants will continue to work in their selected Grand Challenge, or get Steering Committee approval to modify their approved proposal to make changes and select a different Grand Challenge.

Five GCSP Competencies

1. Research Competency

All GC Scholars must complete a research experience. This can be accomplished in a variety of ways. One potential option for the students is participation in USU's formal undergraduate research program. This opportunity to work one-on-one with a faculty research advisor on projects related to the student's Grand Challenge. For some students, a formal undergraduate research program may not be

the best option. For these students, other opportunities are available to satisfy this requirement. Senior design projects, independent study, internships, and other in-depth research experiences will all be considered for component completion.

Select one (1) option:

Undergraduate Research:

- Activity must be approved by GCSP committee prior to using the activity as a GCSP requirement.
- Must write a 2-3 page paper outlining the experience you hope to have as you approach your project.
- Following the research experience, you must write 5-8 page reflective paper on the experience and how you will apply your research to your Grand Challenge.

Internship:

- Experience must be approved by GCSP Steering Committee prior to using experience as a GCSP requirement.
- Must write 3-4 page paper outlining the experience you hope to have as you approach your internship.
- Following internship experience, must write 5-10 page reflective paper on experience and how you will apply your research to your Grand Challenge.

Other approved Research/Creative Project or activity:

- Project or activity experience, as well as all completion requirements, must be approved by GCSP Steering Committee prior to the project or activity experience.

2. Entrepreneurship Competency

Exposure to the field of entrepreneurship development is the focus of the entrepreneurship component of the GCSP. This will be satisfied by the completion of entrepreneurial coursework or other in-depth experiences. These experiences may include, but are not limited to: approved coursework, capstone project(s), business plan or other approved external entrepreneurial activities.

Select one (1) option:

Complete an approved course in the field of Entrepreneurship

- Course must be approved by engineering academic advisor and GCSP Steering Committee prior to enrollment.
- Grade of B or higher is required.
- Prior to taking course, must write 2-3 page paper outlining what you currently know about the course topic how you think you can apply it to your Grand Challenge.
- Following course completion, must write 5-8 page reflective paper on course and how you can apply it to your Grand Challenge.

Capstone/Senior Design project with paper on subject of entrepreneurship

- Project must focus on innovative design or thought in the context of one of the grand challenges.
- Some majors might not have a choice in the selection of the capstone project. In such cases, they will be asked to work with the GCSP Steering Committee to determine an alternative project.

- Must earn B or higher in capstone course.
- Prior to capstone experience, must write 2-3 page paper outlining the experience you hope to gain from the capstone as it relates to your Grand Challenge.
- Upon completion of capstone project, must write 5-8 page reflective paper on the capstone experience and how it can be applied to your Grand Challenge.

Business Plan

- Must present a business concept (whether in plan or product form) focused on one of the Grand Challenges.
- Must write 2-3 page paper outlining your goals and forecasting the anticipated feedback that you will get from the reviewers.
- Students will be required to write a 5-8 page reflective paper on the experience, which will include a critical analysis of their product/plan, overall experience, and response to the reviewer feedback.

Other approved entrepreneurship activity

- Project/activity, as well as all completion requirements, must be approved by GCSP Steering Committee prior to the project/activity taking place.

3. Multidisciplinary Competency

GC Scholars may choose courses, seminars, and programs to decide how they approach this multidisciplinary component. Other activities may be approved by the GCSP Steering Committee (see approval form). This component will be completed by the selection of non-engineering coursework and experiences throughout the student's undergraduate program.

Required:

Approved Non-Engineering Course

- Course must be approved by engineering academic advisor and GCSP Steering Committee prior to enrollment.
- Grade of B or higher is required.
- Prior to taking course, must write 2-3 page paper outlining what you currently know about the subject material and how you think you can apply it to your Grand Challenge.
- Following course completion, must write 5-8 page reflective paper on the course and how you can apply it to your grand challenge.

Additional Option: Select one (1)

Approved Professional Conferences or Meetings

- Conferences or meetings must be approved by GCSP Steering Committee prior to attending.
- Prior to attending, must write 2-3 page paper outlining what you currently know about the seminar/conference topic and how you think you can apply it to your Grand Challenge.
- Following conferences or meetings, must write 5-8 page reflective paper on the experience and how you can apply it to your Grand Challenge.

Other approved Multidisciplinary activity

- Project/activity/course, as well as all completion requirements, must be approved by GCSP Steering Committee prior to the project/activity/course taking place.

4. Multicultural Competency

Leadership and diversity are important components of the GCSP and, in order to satisfy the multicultural component, the student must successfully complete some form of diversity/awareness activity such as attending a conference, workshop, or event that extensively cover the topic of global diversity and leadership. Other activities that would satisfy this component would include some form of study abroad program with a significant global component attached to it, active participation in a multicultural or global service student organization, or other approved activities by the GCSP Steering Committee.

Required:

Approved Courses

- Course must be approved by academic advisor and GCSP Steering Committee prior to enrollment.
- Grade of B or higher is required.
- Prior to taking the course, you must write 2-3 page paper outlining what you currently know about the course topic and how you think you can apply it to your Grand Challenge.
- Following course completion, you must write 5-8 page reflective essay on course and how you can apply it to your Grand Challenge.

Additional Option: Select one (1)

Study Abroad Experience:

- Experience must be registered through university study abroad office.
- Experience must be approved by GCSP Steering Committee prior to attending.
- If courses are to be taken, all courses must be approved by academic advisor to ensure they will transfer back to the college.
- Prior to experience, student must write 2-3 page paper outlining their goals for the experience, as well as anticipate what it will be like living and learning in another culture.
- Upon completion of experience, student must write 5-8 page reflective paper on experience and how it can be applied to your pursuit of the Grand Challenges.

Participate as an active member in a Multicultural or Global Service Student Organization:

- Students will need to be verified by student organization advisor(s) as an active member for a minimum of two years to meet this requirement.
- Following requirement, must write 5-8 page paper outlining experience in the organization and the role multiculturalism will play in the solution(s) to your grand challenge.

Approved Professional Conferences or Meetings regarding global diversity:

- Conferences or meetings must be approved by GCSP Steering Committee prior to attending.
- Prior to attending, must write 2-3 page paper outlining what you currently know about the featured topic and how you think you can apply it to your Grand Challenge.
- Following conferences or meetings, must write 5-8 page reflective paper on experience and how you can apply it to your Grand Challenge.

Other approved multicultural activity:

- Project/activity/course, as well as all completion requirements, must be approved by GCSP Steering Committee prior to the project/activity/course taking place.

5. Social Consciousness Competency

Each GC Scholar must participate in a service-learning project, experience, or course. Similar to other components, this can be satisfied from a variety of different activities. Students may participate in a variety of service learning activities both on and off campus. This may include being actively involved with the Engineering Ambassadors Program, joining a University-sponsored service-learning trip, volunteering in some type of service activity documented by an established organization, participating in a service-related research experience, or becoming a mentor/tutor for other engineering students.

Required Option: Select one (1)

Participate as an active member in Engineering Ambassadors Program:

- Will need to be verified by advisor(s) as an active member for a minimum of 2 years to meet this requirement.
- Following requirement, must write 5-8 page paper outlining experience in the organization and the role service will play in the solution(s) to your Grand Challenge.

Volunteer / Service Experience:

- Experience must be approved by GCSP Steering Committee prior to volunteering.
- Letter of reference from sponsoring organization's supervisor required following completion.
- Prior to volunteering, must write 2-3 page paper outlining what you hope to gain from the experience and how you think you can apply it to your Grand Challenge.
- Following volunteer completion, must write 5-8 page reflective paper on experience and how you can apply that experience to your Grand Challenge.

Other approved social consciousness activity:

- Project/activity/course, as well as all completion requirements, must be approved by GCSP Steering Committee prior to the project/activity taking place.

Evaluation of Student Written Reflective Paper

Upon completion of each of the five-components of the GC Scholar competencies, student written reflections are assessed by the Steering Committee and Faculty Mentor to provide feedback to the GC Scholar, and to provide feedback on the reflective written products. The **Written Reflective Paper Assessment Rubrics** is used to provide feedback (Appendix C).

C. Thematic Continuity and Connectivity

To ensure that a Grand Challenge theme or a specific Grand Challenge problem is intentionally imbedded across and within each of the five GCSP competencies for each GC scholar, USU's GCSP will require participating students to illustrate that they have a well-connected program of study that is built around a GC theme. A requirement of the program is for all GC Scholars to develop all five GCSP competencies that are explicitly linked to one of the Grand Challenges. For example, interning at a company and performing research on clean water may allow a student to simultaneously develop the Research, Multicultural, and Social Consciousness competencies. All GC Scholars are expected to adhere

to responsible methods of conduct of research and professional ethics, as these are integral parts in developing all five competencies.

D. Program Assessment

Program assessment is used to continually improve the GCSP as well as evaluating the impact that the program has on the students who complete it. The assessment plan will monitor key aspects of the GCSP to ensure that the program is achieving its intended objectives. This information will especially be used to make changes in the early implementation of the program.

On an annual basis the GCSP will complete the following.

(1) The Grand Challenge Program Director will report the following to the Steering Committee and College Dean: the program status including number of students and what department they reside.

(2) The GC Scholars will be asked to complete a survey each year providing anonymous feedback on the program. Additionally, qualitative feedback will be sought from scholars during their meeting with the program director each year (students will be asked to prepare a reflection on their experience that year prior to the meeting). This will be used for the benefit of both the students participating and for the program organizers for continuous improvement.

(3) Each year, the GC Scholar will have a meeting with the program director to discuss their progress towards graduation, progress towards program completion, and plans to meet the requirements of the scholars program for the upcoming school year. If a GS Scholar is not making satisfactory progress toward completion of the program, the program director will schedule a meeting with the faculty mentor to discuss further action and possible removal from the GCSP.

Student engagement and active participation in the program assessment and evaluation is crucial for its success but, more importantly, for a successful student outcome. USU will seek to promote early student engagement through a variety of activities, meetings, and Grand Challenge events. These activities will promote networking among GC Scholars. Students will have opportunities to meet, network, and share their experiences with other GC Scholars both on-campus and at other institutions.

GC Scholars will be advised, mentored, and tracked throughout their undergraduate careers. Upon entering their last semester, the students will be assessed for overall completion of the program by the GCSP Steering Committee. This final assessment will determine whether all of the student's core components have been met and a portfolio completed. With the support from both faculty and staff, GC Scholars should always be aware of their progress in the program.

For review purposes, the GCSP **Completion Assessment Form** (Appendix F), and the **Student Portfolio** will be used. The student should use the rubric to self-report their progress, and the GCSP Steering Committee will keep an official log of student progress toward program completion. Once the GCSP is completed by the student, the GCSP Completion Assessment Form will be completed by the GCSP Steering Committee.

USU Grand Challenge Scholars will receive student recognition for their accomplishments during the program. We will be working with the Registrar's Office to implement some form of institutional recognition, similar to Honors, for graduating Grand Challenge Scholars. The College of Engineering will also supply all graduating Scholars with a certificate. All of this will be in addition to being nationally recognized through NAE upon graduation. USU will report all Grand Challenge Scholars Program graduates to the NAE annually.

E. Program Administration

Steering Committee and Faculty Mentorship

Mentor Faculty will have direct oversight of the curriculum, advising, and overall evolution of the GCSP at USU, with support from the Deans' offices. In the first year of the program, a program director will be appointed from the College Dean who has been working on the program. Along with the director, a Steering Committee will be formed, with ultimate appointment coming from the Dean of Engineering. The Steering Committee will consist of two engineering faculty members, one associate Dean from the College of Engineering and an engineering student representative. Initial terms will be 2 or 3 years, then shift to 3-year staggered terms after the first 2 years of the program. The role of the Steering Committee consists of the following responsibilities:

1. Review student applications to GCSP and assess applications for program entry;
2. Identify new, co-curricular, and extra-curricular activities and experiential learning opportunities that support GCSP objectives; and,
3. Review and approve changes to the structure of the GCSP program.

Ultimately, the Steering Committee is the body that reviews an application and grants GC Scholars status on a student and "certifies" that the student has met all requirements of the GCSP. That certification would be facilitated by input from the faculty mentor/advisor, who would assess whether required activities are met.

GCSP students will be assigned a faculty mentor who advises the scholars on their planned pathway for completing program requirements. Faculty members may or may not also be members of the Steering Committee. Mentoring GC Scholars will be factored into each faculty member's annual plan of work. Students will be required to meet with their GCSP faculty mentor at least once per semester. The purpose of these meetings is to review the students' portfolios and discuss their progress toward completing program requirements. These meetings provide an opportunity for the students to periodically share their reflections on their experiences in the GCSP and to work with faculty to plot out their future directions.

Grand Challenge Scholar Recognition

USU will recognize the GS Scholars through a variety of mechanisms. Along with receiving recognition on the NAE website, students who complete the GCSP requirements will be formally recognized as follows:

- Every year a GCSP Scholar will be featured at *E-Week*, the annual program held on campus in February. GCSP Scholars at all levels will have the option to publicly present some of their accomplishments and experiences in the program.
- An annual GCSP Celebration will be held at the end of each spring semester to recognize the graduating scholars.
- Scholars will receive a medal and be recognized in the USU Commencement bulletin as being a Grand Challenge Scholar.

Funding and Support

The sustainability of the GCSP is an important consideration for USU. This program cannot succeed without sustained commitments and resources by university administration. Based on our analysis of existing programs at other universities, we believe there are a number of resources required for sustainability. These will include a stipend for a director, staffing needs, a marketing budget, support for student projects, and stipends for faculty mentors, a key component of the program. As other needs are identified after the first year, the budget will be supplemented as needed.

APPENDIX A
GCSP Application Form

Name: _____
First M.I. Last

A#: _____ **E-Mail:** _____

Local Address: _____
Street Address / Box Number

City State Zip Code Area Code Telephone Number

Home Address: _____
Street Address / Box Number

City State Zip Code Area Code Telephone Number

Department: _____

Major: _____

Grand Challenge Preference (choose one):

- _____ **Grand Challenge you are interested in pursuing:**
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*
 6. *Restore and Improve Urban Infrastructure*
 7. *Advance Health Informatics*
 8. *Engineer Better Medicines*
 9. *Reverse-Engineer the Brain*
 10. *Prevent Nuclear Terror*
 11. *Secure Cyberspace*
 12. *Enhance Virtual Reality*
 13. *Advance Personalized Learning*
 14. *Engineer the Tools of Scientific Discovery*

Additional Documents:

Submit completed Personal Essay
*(300-500 word essay describing your motivation for
the Grand Challenge focus)*

APPENDIX B

GCSP Application Approval Form

Criteria	0 point	1 points	2 points
Online application complete	Not complete. Missing contributions were made to GCSP portfolio for multiple semesters.	_____	Application is complete
Minimum GPA (3.0)	Minimum GPA not met.	_____	Minimum GPA met
Select a proposed GC Faculty mentor.	No mentor selected	_____	Mentor Selected
Personal essay (300 – 500 words) on motivation to complete the GCSP, and the specific challenge they want to address.	No motivation to complete the GCSP, and the specific challenge to address is apparent in the personal essay.	Motivation to complete the GCSP, and the specific challenge to address is included in the personal essay.	Motivation to complete the GCSP, and the specific challenge to address is excellent.
A proposed GC plan that: Outlines how the student plans to fulfill each of the five components (multidisciplinary, research/creative, entrepreneurship, multicultural, and social consciousness) for the plan of study.	Student plan is not complete.	Student plan is complete, but missing clarity on certain aspects of the plan.	Student plan is complete
Feasibility of completing the program prior to the student's graduation (no less than 3 semesters).	Student feasibility completion plan is not complete.	Student feasibility completion plan is complete, but missing clarity on certain aspects of the plan.	Student feasibility completion plan is complete
The student's GC theme is apparent in all GCSP components	A GC theme was not taken into account.	A GC theme is present in 1-2 GCSP components.	A GC theme is present in all of the GCSP components.

APPENDIX C
GCSP Written Reflective Paper Assessment Rubric

Criteria	Fails to Meet Expectations	Needs Improvement	Meets Expectations	Exceeds Expectations	Score
	0 Points	5 Point	10 Points	20 Points	
<i>Clearly organized introduction, body, conclusion</i>	Fails to meet this criteria by obvious disregard for the expectations stated in the criteria; Disorganized and the reader can not follow the paper at any length	Disorganized, leaves reader wondering what is being said; abrupt ending	Paper has intro, body, and conclusion but may take a re-reading to understand	Easy to read, topic introduced, organization clearly evident with proper introduction, body, conclusion	
<i>Does this paper address the prompt or the topic?</i>	The topic of the paper is not addressed at all; Fails to stick to the topic therefore fails to meet this criteria	Student does not clearly identify his/her reflections about the topic; may veer from topic	The entire paper's content relates to the prompt or topic; the student explains his/her reflections about the topic but may take a rereading to understand	The student's reflection about the topic is explained in clear language; immediately interesting and supported with detail	
<i>Paragraph Organization and Writing Style: Ideas are clearly connected and make sense</i>	Fails to meet this criteria by obvious disregard for the expectations stated in the criteria	Paragraphs are disorganized; ideas are included which do not relate to the main idea; ideas are not connected and have little or no supporting details; one sentence paragraphs	Each paragraph has a central idea that is supported with details; ideas are connected and important points make sense	Each paragraph has a central idea; ideas are connected and paragraphs are developed with details; paper is easy to read and "flows" naturally in an organized pattern	
<i>Does this paper show evidence of deep thought about the topic?</i>	Fails to meet this criteria by obvious disregard for the expectations stated in the criteria	Paper is shallow and does not present detailed evaluation of reflection about the topic; little use of nursing literature to support thought	The paper shows that the student has thought about the topic although the written presentation may appear weak or lack clarity; use of nursing literature to support thought	Paper provides evidence (through the use of description, details, and use of nursing literature) that the student has examined his/her own belief systems and related this to their current views about the topic; use of nursing literature to support thought	

APPENDIX D

GCSP Component Approval Form

Approval Process:

- Student requesting approval of a course, activity, or event to satisfy a GCSP component must complete this form and submit to GCSP Steering Committee for review and approval.
- Final decision will be communicated to the student via email and will be updated on student's GCSP Portfolio.

Date: _____

Student Name: _____ Student A#: _____

Student Email: _____

Please check which component your request would satisfy, if approved:

<input type="checkbox"/>	Research
<input type="checkbox"/>	Multidisciplinary
<input type="checkbox"/>	Entrepreneurship
<input type="checkbox"/>	Multicultural
<input type="checkbox"/>	Social Consciousness

Proposed course or event for approval:

Term course will/has been taken or date of event or activity:

Please provide more information about the course/event/activity.

<p>For GCSP Steering Committee to complete:</p> <p><input type="checkbox"/> Approve <input type="checkbox"/> Denie <input type="checkbox"/> Approved, w/ changes</p> <p>_____ _____ _____</p> <p>Signature:</p> <p>Grand Challenge Director: _____</p>
--

APPENDIX E
GCSP Component Requirement Form

Component	Required	Options:
Research	One (1) of the Research Option(s)	<ul style="list-style-type: none"> a. Undergraduate research b. Internship related to GC focus c. Other approved research project or activity
Multidisciplinary	Approved non-engineering course & One (1) of the Multidisciplinary Option(s)	<ul style="list-style-type: none"> a. Attend approved seminar(s) and/or conference(s) b. Approved interdisciplinary minor c. Other approved multidisciplinary activity
Entrepreneurship	One (1) of the Entrepreneurship Option(s)	<ul style="list-style-type: none"> a. Business Plan b. Complete an approved course c. Capstone/senior design project w/ essay based on subject of entrepreneurship d. Other approved business/Entrepreneurship activity
Multicultural	Approved Course & One (1) of the Multicultural Option(s)	<ul style="list-style-type: none"> a. Study Abroad program b. Multicultural or Global Service Student Organization c. Attend approved seminar(s) and/or conference(s) regarding global diversity d. Other approved Multicultural activity
Social Consciousness	Approved Course & One (1) of the Social Consciousness Option(s)	<ul style="list-style-type: none"> a. Engineering Ambassadors b. Volunteer/service experience c. Other approved Social Consciousness activity

APPENDIX F

GCSP Completion Assessment

GC Scholar Candidate: _____

All 5 GCSP components have been met.	Student must have all 5 GCSP components approved & completed prior to the GCSP Steering Committee using this completion assessment form to determine program completion.				
	1 point	2 points	3 points	4 points	5 points
Student actively participated in the GCSP each semester in program.	No contributions were made to GCSP portfolio for multiple semesters.	No contributions were made to GCSP portfolio for a single semester.	No contributions were made to the GCSP portfolio for some time, less than a semester.	Some contributions and commitment were documented every semester.	Actively involved in GCSP in every semester.
Student completed GCSP in a unique, creative fashion.	No creative, unique, or personal elements in GCSP componen	Creativity and uniqueness are lacking in GCSP components	Creativity and uniqueness are present in some GCSP components.	Creativity and uniqueness are present in most of the GCSP components.	Creativity and uniqueness are present in all GCSP components.
The student's GC theme is apparent in all GCSP components	A GC theme was not taken into account.	A GC theme is present in 1-2 GCSP components.	A GC theme is present in 3 of the GCSP components.	A GC theme is present in 4 of the GCSP components.	A GC theme is present throughout all 5 GCSP components.

Circle the area in each category that best represents the student

NOTE: In addition to completing all GCSP requirements, a minimum of 12 points is required to complete the Grand Challenge Scholars Program.