GCSP Proposal Development
Working Session

GCSP Annual Meeting
November 12, 2019

GCSP Proposal Review Committee
Katie Evans, Chair (Louisiana Tech)
Theodore Endreny (SUNY ESF)
David Parish (NC State)
Yevgeniya (Zhenya) Zastavker (Olin)
Workshop Objectives (Learn, Reflect, Write)

1. Understand the Grand Challenges Scholars Program (GCSP) and its connection to solving the world’s Engineering Grand Challenges

2. Realize the required elements to create a successful GCSP in your institutions

3. Start brainstorming a GCSP proposal to be submitted to the US National Academy of Engineering
The NAE GCSP is the only student program on an international scale designed to develop future professionals to address the world’s Grand Challenges.
Sustainability

Energy
Environment
Global Warming

Security

Reducing Vulnerability to Human and Natural Threats

Health

Improve Medicine and Healthcare Delivery

Joy of Living

Expand and Enhance Human Capability
GCSP Competencies

1. **Talent/Research/Creativity**
   - Mentored research or project experience to enhance technical competence

2. **Multidisciplinarity**
   - Understanding of the multidisciplinary nature of implementable solutions

3. **Business/Entrepreneurship**
   - Understanding that viable business models are necessary for successful implementation

4. **Multiculturalism/Global Perspective**
   - Understanding different cultures to ensure cultural acceptance of proposed engineering solutions

5. **Social Consciousness**
   - Motivation to work toward engineering solutions that address societal problems

**Technical depth** | **Breadth** | **Viability** | **International mindset** | **Desirability**
Launching and Implementation

Creating an Operational Document
-- that is, drafting your GCSP proposal
Steps for developing a strong GCSP Proposal unique to your School

The Grand Challenges Scholars Program (GCSP), inspired by the NAE Grand Challenges for Engineering, reflects the rapidly evolving nature of engineering education. The GCSP calls for developing five critical competencies, namely **Talent, Multidisciplinary, Entrepreneurship, Multicultural and Social Consciousness**. The following steps will guide you as you develop a strong GCSP proposal that is unique to your school and delivers the five competencies to your students.

1) The first step to develop a new program and to get more information is to get in touch with either the GCSP Network Office – Mr. Carl Anderson at CCA@nderson@nae.edu or GCSP Proposal Review Committee Dr. Kathy Evans at KEVANS@LATECH.EDU. We will connect you to resources, assign a mentor if you wish and help you in every way as you prepare your GCSP proposal.

2) Start developing a GCSP proposal, using the operational document template as it walks you through each step of creating a GCSP and offers suggestions.


   You will find it helpful to review the operational documents of the existing programs.

   [http://www.engineeringchallenges.org/File.aspx?id=31133&v=e0e1a614](http://www.engineeringchallenges.org/File.aspx?id=31133&v=e0e1a614)

   The rubric the committee uses to evaluate proposals can be found at the following link:


3) Begin with painting the picture of your university and its unique ecosystem, the strategic vision/goals of the school and describe how it is in alignment with GCSP vision. Take full advantage of all the strengths and existing resources at your university. The uniqueness of your program should come out clearly as you articulate how you will be able to leverage existing programs, industry connections, international partnerships, etc. to deliver the 5 required competencies to the students.

4) Develop a good plan for recruiting students – it is recommended that the students start thinking about GCSP in their freshmen year. Create an infrastructure to support and advise GCSP students through all 4 years.

5) In your proposal, communicate clearly, what is expected of students to graduate as GCSP scholars. We encourage you to consider that students write a short reflection paper to describe how their activities across the 5 competencies are connected to the grand challenge theme and combine to provide a richer and more coherent educational experience.

6) We will assist you to tailor your proposal to the needs and strengths of your institution. Email your operational document proposal to Dr. Katie Evans at KEVANS@LATECH.EDU for review.

7) Once the proposal is accepted, you are officially a member of the NAE GCSP network!
Essential Characteristics of a Good GCSP

1. Selecting a **diverse cohort** of engineering students

2. Educating students with appropriately **innovative and institutionally tailored GCSP experiences** (to include **curricular**, **co-curricular** and **extra-curricular** opportunities, as well as **multiple paths** for completing requirements for each competency)

3. Building **thematic connectivity** into each student’s scholarly plan

4. Establishing a well-designed GCSP **administration**
# Checklist for Evaluating GCSP Proposals

| A. Cover Page with required endorsements |
| B. Clarity of the vision/mission of school |
| 1. Articulation of alignment between institution and proposed local GCSP goals |
| 2. Explicit mention of the four themes of the NAE grand challenges and any restriction on themes that may be pursued in the proposed GCSP |

| C. Plan for scholar recruitment and selection of a diverse cohort (including if appropriate a plan for seamless integration of students transferring from community colleges into their GCSP) |
| 2.a. Does the proposal make clear the requirements and expectations for students to demonstrate each competency? Has the institution articulated the minimum activity level required to satisfy each competency and given consideration that options are comparable in terms of student time/engagement? |
| 2.b. If applicable, detail of courses/modules/subjects that are key in supporting a scholar’s journey in the attainment of the 5 competencies. This includes the outline of the course, its assessments, associated rubrics, etc. |
| 2.c. Process for students to demonstrate how the depth and length of time of their experience(s) support fulfilling competencies. Note: Well-designed meta-curricular experiences could contain aspects that satisfy more than one of the competencies. |

| 3. Demonstration of how continuity and connectivity of the five competency areas of student activity are aligned with the grand challenge topic or theme |

| 4.a. Plan for program and student assessment |
| 4.b. Processes for tracking students and determining if students are in good standing in the program |

| 5.a. Strength of the administrative structure to support local GCSP governance (must have a director, steering committee recommended) |
| 5.b. Are there sufficient resources for program sustainability? (e.g., support for mentoring, advising, student community, research, service, annual meeting, etc.) |

| 6. Plan for mentoring GCSP students and faculty |

| 7. Plan for recognizing students upon program completion |

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### D./E. Unique Aspect and Other Information (if applicable)

| Specific Checklist Items for 2-year Colleges Only |
| Plan for dealing with the challenges of reduced time (e.g., must advertise, identify, recruit participating scholars more quickly than most 4-year programs) |
| Plan for smooth transfer of scholars to GCSP programs at receiving 4-year institutions? |
Creation of a GCSP at Your Institution

SWOT Brainstorming and Table Discussion – Exercise, 15 mins

**Strengths**

*My institution has a strong...that would support a GCSP.*

*The mission of my institution/college is..., which aligns well with a GCSP.*

**Opportunities**

*A GCSP could help my institution to...*

*Our students would like a GCSP because...*

**Weaknesses**

*My institution does not have/do...*

*At my institution, the faculty/students/curricula...*

**Threats**

*It will be hard to create a GCSP because...*

*A GCSP would have to...*

Design realistically viable and sustainable program for your institution.
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Objective: Acquire and integrate the engineering and non-engineering curricular, co-curricular and extra-curricular expertise necessary to tackle a Grand Challenge theme or specific Grand Challenge problem (Thematic Connectivity).

- The 5 competencies:
  - Each individual GC Scholar’s trajectory must be deep, broad and coherent in terms of its connection to the Grand Challenges and mechanisms should be in place to track and assess student performance on each component in each individual program.
  - Well-designed and well-documented meta-curricular activities.

- It is recommended that each GC scholar select or be assigned a GC mentor to monitor student progress and ensure thematic connectivity.
Talent/Research/Creative Experience Examples

• A project involving research or creativity that explores or contributes to solutions of a Grand Challenge
• Honors or senior thesis
• Summer research or project experience such as NSF REUs, internships, or co-ops
• Capstone design project or in-course projects that are elaborated upon by the individual

Technical depth
Multidisciplinary Examples

- Participation in a multidisciplinary student organization related to a grand challenge (90 hours minimum commitment toward furthering the organizations goals)
- An interdisciplinary course or a seminar developed exclusively for the GCSP
- Two-semester first-year engineering design sequence designed to provide a multidisciplinary experience where all engineering majors work together on multiple team-based projects
- Attending a minimum of ten seminars or presentations hosted by a diverse set of programs/departments
- Completion of a multidisciplinary internship
- Completion of an appropriate 3-credit course in another discipline (outside the student’s major) directly related to their chosen Grand Challenge topic
- Completion of two courses with a GC focus in the social sciences, arts, humanities, public policy or international affairs. It can also be fulfilled by participating on a multi-disciplinary design project at the capstone level or before
Understanding that viable business models are necessary for successful implementation, here are some examples:

- Completing a Business/Entrepreneurship minor or certificate at the university level
- Completing coursework directly related to business ventures and entrepreneurship
- Joining specific university entrepreneurs’ programs established for students’ education
- Completing an entrepreneurial project with faculty or industry and utilizing “Maker Spaces” for student entrepreneurs
- Completing internships with entrepreneurial focus
- Completing engineering classes in design interwoven with business, i.e. entrepreneurial freshman design, senior design capstone, etc.
- Competing in a business/entrepreneurship competition either on campus or externally
Multiculturalism/Global Perspective Examples

• Study abroad
• Engineers Without Borders project
• Internship with a significant global focus
• Domestic multicultural experience
• Selected coursework with an international focus
• Minors in international language, international business, global leadership
Social Consciousness Examples

- Engineering Projects in Community Service (EPICS)
- Engineers Without Borders Project (note depth of experience requirement for demonstrating multiple competencies)
- Engineering World Health
- Alternative spring break service trips
- Service learning project
Notes on Depth Experience and Assessment

• Depth levels
  • Some programs have quantified the expected amount of time, for example expecting at least 2 credits or 90 hours of effort.
  • Some programs allow for group activities, while others expect individual contributions.

• Program assessment
• Student assessment
• Rubrics
  • VALUE rubrics from American Association of Colleges and Universities
### Assessment: University of Nebraska-Lincoln

All 5 GCSP components have been met.

Student must have all 5 GCSP components approved & completed prior to the GCSP Committee uses this Assessment to determine program completion.

<table>
<thead>
<tr>
<th>1 point</th>
<th>2 points</th>
<th>3 points</th>
<th>4 points</th>
<th>5 points</th>
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<td><strong>Student actively participated in the GCSP each semester in program.</strong></td>
<td>No commitment or contributions were made to GCSP portfolio for multiple semesters.</td>
<td>No contributions were made to GCSP portfolio for a single semester.</td>
<td>No contributions were made to the GCSP portfolio for some time, less than a semester.</td>
<td>Some contributions and commitment was documented every semester.</td>
</tr>
<tr>
<td><strong>Student completed GCSP in a unique, creative fashion.</strong></td>
<td>No creative, unique, or personal elements in GCSP portfolio.</td>
<td>Creativity and uniqueness are lacking in GCSP portfolio.</td>
<td>Creativity and uniqueness is present in some GCSP components.</td>
<td>Creativity and uniqueness is present in most of the GCSP components.</td>
</tr>
<tr>
<td><strong>The student’s GC theme is apparent in all GCSP components.</strong></td>
<td>A Grand Challenge theme was not taken into account.</td>
<td>A GC theme is present in 1-2 GCSP components.</td>
<td>A GC theme is present in 3 of the GCSP components.</td>
<td>A GC theme is present in 4 of the GCSP components.</td>
</tr>
</tbody>
</table>

Circle or Highlight the area in each category that the student best represents.

For GCSP Committee to complete: TOTAL: [ ] / 15 points (max)

Signature: __________________________

Grand Challenge Committee Member: __________________________

**NOTE:**
Minimum of 12 points required to graduate from the Grand Challenge Scholars Program in addition to satisfying ALL GCSP requirements.
### Planning Your GCSP

#### Activity Options

**Brainstorming and Table Discussion—Exercise, 20 mins**

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What happens after today?

• Develop a draft proposal idea

• Share the idea and plans with deans, colleagues, and students

• Continue refining your proposal with the help of an assigned mentor (Contact Katie Evans, kevans@latech.edu for mentor)

• Follow the process outlined by the GCSP to submit your proposal
Thank You!
The UN Sustainable Development Goals

WEF 10 Biggest Global Challenges

1. Agriculture & Food Security
2. Economic Growth & Social Inclusiveness
3. Climate Change
4. Environment & Natural Resource Security
5. The World of Work
6. The Future of the Global Financial System
7. The Future of the Internet
8. Gender Parity
9. International Trade & Investment
10. Long Term Investing, Infrastructure & Development

https://www.weforum.org/agenda/2016/01/what-are-the-10-biggest-global-challenges/
Objective: Identify a diverse cohort of students that will be educated to design and create solutions to the NAE Grand Challenges and grand Challenge-like problems.

Each GCSP will determine how student selection is best accomplished within the mission and character of the individual school. In general, students selected for a GCSP should

1. be a student in good standing, (as determined by the institution)
2. be committed to the Grand Challenges, and
3. be aware of the importance of social and local & global issues.
Administration

- **Institutional level** – the Steering Committee
- Responsibilities
  - promote the GCSP
  - recruit new GCSP members (students, faculty, partners)
  - oversight of implementation, individual student and programmatic assessment
  - prepare the annual reporting to the NAE
- Each GCSP is also required to establish institutionally-tailored criteria and mechanisms for assuring that all Grand Challenge Scholars comply with the goals and spirit of the program.
Your Proposal

• Review 2-3 examples of successful proposals from the list:  
  http://www.engineeringchallenges.org/File.aspx?id=31133&v=20d87b6e

• Start drafting your proposal (digital or paper), starting with why/what, then who, when, and how

• You will have the rest of the morning to work

• We will ask a couple of teams to share the major elements of their proposal