The University of Texas at Austin
Cockrell School of Engineering

Longhorn Grand Challenges Scholars Program
&
K12 Partners Program Proposal

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*Longhorn Grand Challenges Scholars Program*

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The University of Texas
Longhorn Grand Challenge Scholar Program Proposal

Longhorn Grand Challenge Scholar Program Vision:
"The Longhorn GCSP will attract, engage, retain, and graduate leaders that have the complex innovative 21st century skill set and mindset to face the Engineering Grand Challenges. GC Scholars will develop as I-engineers through supported design-based learning experiences and will have sustainable, interdisciplinary fortitude to lead innovative design teams in academics and industry internationally.”

From natural disasters to overcrowded cities, from pandemics to more than a billion people without access to safe water, ours is a world filled with affliction and catastrophe – yet it is a world of possibilities and opportunities for hope and solutions. Our UT community is comprised of international scholars striving with hope in this challenging time. UT does more than hope for a better, safer, and more accessible world for our global citizens because, as agents of change, we put that hope into action with the work and research that we conduct. Margaret Mead once wisely advised, "Never doubt that a small group of people can change the world. Indeed, it is the only thing that ever has." Commensurate with her notion, by developing the Longhorn GCSP, UT faces the Grand Challenges locally with student-facilitated projects and globally as a network of activists who are I-engineers (Fig. 1).

Figure 1. I-engineers

Imagine the I-shaped engineer whose strength is built on Interdisciplinary connections. I-beams are Integral parts of sustainable, strong structural designs because of the Interactions between the parallel flanges and connecting web. In recent engineering education discourse, there is vast discussion of the T-shaped engineer to provide a metaphor for describing an ideal engineer: broadly learning and weaving across disciplines (top of the T) and going deeply into understanding engineering concepts (vertical branch of the T). We want to introduce this new metaphor in response to the T-

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shaped engineer that is inspired by the unique strengths of the I-beam to share a vision of an I-shaped engineer.

We believe that through interdisciplinary engineering education, the Longhorn GCSP will facilitate learning experiences that a) contextualize design within local, national, and global economies, b) integrate engineering and technical innovation skills, and c) relate to humanities and policies prompting individual and collective action. With the sustainable strength of this approach to engineering education, I-shaped GC Scholars are able to understand and integrate viability, feasibility, and desirability into design that translates into successful innovation.

The Longhorn GCSP empowers students to take steps to affect change in an effort to systematically advance the field of engineering education. As an academic leader, the world turns to the research and practices at UT’s Cockrell School to shape the landscape of innovative engineering education and technological research. The Longhorn GCSP will provide opportunities for higher education students to develop as I-engineers who have a sense of belonging, will honor the multiple ways of knowing and communicating in engineering, and will find solutions to the world’s most pressing societal and technical issues.

**Selection of Longhorn GC Scholar Candidates:**

By the very nature of the Grand Challenges and the five components of the GCSP, The University of Texas at Austin believes that scholars from all disciplines will have to work together to effectively solve our world’s most complex and multivalent problems. It will take a diverse team of scholars to positively impact our world by addressing these problems... a design team led by engineers and joined by policy makers, economists, educators, and other key stakeholders. The Longhorn GCSP is housed in the Cockrell School of Engineering yet is a university-wide program offered to all candidates with competitive applications. We anticipate that most of the Longhorn GC Scholars will be engineers but expect other highly qualified and motivated students from colleges across campus to participate.

Whether the student is a first year or third year, the Longhorn GCSP is available to every student with a compelling application. Each GC Scholar Candidate will have a program tailor-made for her/his academic journey. If a student has completed certain components before being accepted into the program, then the GC Review Committee will indicate those levels of completion on the corresponding rubric(s).

Regardless of where a student is in her/his degree plan, each GC Scholar Candidate will take a GC Seminar as entrance into the program. This 3 credit hour course is listed as Engineering Studies 377 and provides students with opportunities for delving into the five components of the GCSP with design-based learning. The GCSP leadership team (Drs. White, Crawford, and Wood) will design and teach the interdisciplinary course. Professors from other disciplines, such as McCombs School of Business, will also help design modules for the five components and will guest lecture. This course facilitates development of the innovative skill set and mindset that distinguishes a GC Scholar. It also is an opportunity for those students who do not have a GC design project in progress to team with other students in the program. An interdisciplinary GC team will offer a comprehensive final
product because it will include perspectives and knowledge from different vantage points in addressing the GC. For example, an engineering major may have research focused on the technology development of photovoltaic cells whereas a business major may extensively research energy policies and economies. Both students, although in different majors, will experience deep and rich learning and will produce a final reflective report about all five of the GCSP components framed within one of the GCs. Whether a GC Scholar Candidate works independently or chooses to collaborate on a team, all GC Scholar Candidates will have to show a rigor on each of the five rubrics that correspond with the five program components.

To apply for the Longhorn Grand Challenge Scholar Program at The University of Texas at Austin, students must submit the following required materials to the GC Director by the required date each semester:

1) evidence of being a student in good standing; 
2) completed on-line application form (responding to open-ended questions, including a resume, and at least one letter of recommendation); AND
3) proposed GC Program Plan which encompasses the required five curricular components.

The GC Review Committee will review all applications each semester and recommend students for admission to the program, based on space. A maximum of 30 students can be enrolled in the GC course ES 377 at any time.
To remain in the program, a GC Scholar Candidate must:

- maintain standing as a good student and meet with the GC Director and/or advisor at least once a semester to present and assess project progress and address program plan with action steps that are submitted for review to the GC Director and Associate Directors.
- present a “design wall” as a progress report to the GC Seminar for critical review by the Director, fellow GC Scholar Candidates, and invited faculty and/or industry at least once a year. The design wall is a multi-media presentation that includes exemplary representations of the phases of progress in the five components of the GCSP. It illustrates ideation to invention and details the approaches to facing the GC by engaging in each of the five program components. The design wall can be presented at the national summit and other forums.
- submit a progress report by the third week of April to their GC Mentor and GC Director to be forwarded to the NAE GC Steering Committee, outlining their accomplishments for the past academic year and a detailed plan for the upcoming academic year.

During the first week of the final semester of program completion, the GC Scholar Candidate must schedule a meeting with the Director to review each of the components described below as an audit of the progress of the Program Plan. Action plans to ensure that the GC Scholar Candidate has a defined plan and will be supported to complete the program during that semester will be put into place during that meeting. At the completion of all activities outlined in her/his Program Plan and required by the GC Program, each GC Scholar Candidate must:

- submit a final reflective report to the GC Director, Associate Directors, and Review Committee verifying the completion of their Plan;
- include self-assessment on rubrics for each of the five GCSP components;
- have a letter of recommendation from her/his GC Mentor to the GC Director and Review Committee outlining satisfactory completion of the program requirements;
- schedule a capstone presentation (to take place no later than the third week of their final quarter) to present and share information about their scholarship and project experiences (to be attended by the Review Committee, GC Mentor, other GC Scholar Candidates, and others); AND
- satisfy each of the five GCSP with rigor as described by the rubrics that are assessed by the GC Director, Associate Directors, and Review Committee.

Upon successful completion of these activities, the GC Scholar Candidate will be named a University of Texas Longhorn Grand Challenges Scholar and recognized as such on their official transcript and during graduation.
Five GC Curricular Components:
Each of the requirements described are suggestions for how a Longhorn GC Scholar Candidate may fulfill the standards of the GCSP. There is room for consideration of modifications to fulfilling the requirements with justification and representation of rigor to be approved by the Director and UT GCSP Review Committee. Each GC Scholar Candidate must develop a Program Plan which satisfactorily addresses each of the following components:

1) **GC Themed Projects and Research Experience** – Each GC Scholar Candidate engages in a design project or independent research related to a GC. The GC seminar, coursework, and other program experiences will all inform the design and research. The research will become more enriched across multiple courses and program experiences. A GC Scholar Candidate must participate in one of the following:

- an approved team or independent senior capstone research or design project and course(s) relating to a Grand Challenge theme or specific Grand Challenge problem;

Grand Challenge themed research projects in at least one of the following courses:

- UGS 302: *The Engineered World: Innovation, Products, and Systems*
- ME 302: *Introduction to Engineering Design and Graphics*
- ARE 320K or L: *Introduction to Design I or II*
- CE 369L: *Air Pollution Engineering*
- BME 370: *Principles in Engineering Design*
- EE 374K: *Biomedical Electronic Instrument Design*
- ME 374S: *Solar Energy Systems Design*
- CHE 341: *Design for the Environment*
- ARE 465: *Integrated Design Project*
- EE 374L: *Applications of Biomedical Engineering*
- ASE, BME, CE, CHE, EE, ME, PGE 333T: *Engineering Communication*
- ME 366J: *Mechanical Engineering Design Methodology*
- CHE 341: *Design for Environment*
- ASE 327K: *Space Systems Engineering Design*
- CE 364: *Design of Wastewater and Water Treatment Facilities*
- BME 371: *Biomedical Engineering Design Project*
- CE 341: *Introduction to Environmental Engineering*
- ARE 370: *Design of Energy Efficient and Healthy Buildings*
- ME 266K/266P: *Engineering Design Project (Capstone)*
- CHE 357: *Technology and Its Impact on the Environment*
- EE 464: *Corporate/Multidisciplinary/Honors Senior Design Project*;
Independent Grand Challenge-themed research;

Summer research experience or internship carrying a Grand Challenge theme.

2) **Interdisciplinary Curriculum** – Learning across different disciplines develops a breadth of knowledge about the GC. This will foster different and new ways of thinking and communicating about the complexities of the GC. Each GC Scholar Candidate must satisfactorily complete three of the following approved UT courses or others that connect to the GCs:

**Social and Behavioral Science:**
- **ALD 327**: Sociocultural Influences on Learning
- **ANT 324L/URB 354**: Urban Anthropology
- **ANT 302**: Cultural Anthropology
- **ANT 305**: Expressive Culture
- **ANT 307**: Culture & Communication
- **ANT 309L**: The American Public Sphere
- **ANT 316L**: Gender in the African American Community
- **ANT 318L**: Mexican American Culture
- **ANT 324L**: Activist Research Practicum
- **ANT 324L/R S 373M**: Biomedicine, Ethics & Culture
- **AMS 370**: American Disasters
- **AMS 370/GOV 370L/WGS 345**: Leadership in America
- **BA 321L**: Contemporary Leadership Issues
- **CTI 302**: Classics of Socl/Polit Thought
- **CTI 303**: Competing Visions of Good Life
- **ECO 301**: Introduction to Economics
- **ECO 304K**: Intro. to Microeconomics
- **ECO 304L**: Intro. To Macroeconomics
- **FR 374D/ANT 324L**: Science, Technology & Race
- **GRG 305**: This Human World
- **GRG 306C**: Conservation
- **GRG 307C**: Introduction to Urban Studies
- **GRG 319**: Geography of Latin America
- **HDF 340**: Ethics/Philosophy/Professional Development Issues
- **LAH 350/T C 357**: Technology Change & Financial Crisis
- **LIN 306**: Introduction to the Study of Language
- **MAN 337**: Strategic Change & Innovation
- **MAN 337**: Women in Management
- **PHL 304**: Contemporary moral problems
- **PHL 325C**: Environmental Ethics
- **PHL 325M**: Medicine, Ethics, & Society
PHL 325M: **Interprofessional Ethics**
PSY 301: **Introduction to Psychology**
RS 310: **Introduction to the Study of Religion**
SOC 302: **Introduction to the Study of Society**
SOC 308C: **Peace and Conflict**
SOC 308D: **Ethnicity and Gender: La Chicana**
SOC 309: **Chicanos in American Society**
SOC 319: **Introduction to Social Demography**
SS 301: **Honors Social Science**
TC 357: **1962: Year of Creativity/Cultures/Crisis**
TC 357: **History of American Medicine**
UGS 303: **Creative Problem Solving**

**Visual and Performing Arts:**
AMS 330: **American Studies**
ARC 308/318K/318L: **Architecture**
ARH 301/302/303: **Art History**
CC 301/302/302K/303/307C/307D/317: **Classical Civilization**
FA 310/320: **Fine Arts**
PHL 317K/346: **Philosophy**
3) **Entrepreneurship** – GC Scholar Candidates translate invention to innovation and develop market ventures that scale to global solutions. To understand and apply local and global economics in design, each GC Scholar Candidate must participate in one of the following entrepreneurship components:

Choose one of the following:
- CE 171P: **Engineering Professionalism**
- MAN 337/SOC 321K: **Entrepreneurship & Innovation**
- MAN 337: **Strategic Change & Innovation**

Submit a design to one of the following:
- United States Patent & Trademark Office (USPTO)
- (Inter)national design competitions
- A museum for exhibition
- A business plan to a venture capital;

4) **Global Dimension** – The GCSP cultivates an enhanced global awareness. The GC Scholar Candidate celebrates multiple perspectives to invent strategies for our world’s growth and development. Each Candidate must satisfactorily complete one of the following:

- Study abroad;
- Internship with a significant global focus;
- ANS 372/ANT 324L: **Global Markets & Local Cultures**
- TC 357: **Energy and Society**
- MAN 337: **Global Strategy & Translational Management**;

For each of these options, Candidates justify how the proposed study program/internship/research experience/courses will: a) cultivate an enhanced global awareness, b) foster sensitivity to multiple perspectives, c) improve communication skills, and d) facilitate community development.

5) **Service-Learning** – Service-learning is a teaching and learning strategy that integrates meaningful experiences that emphasizes both community service AND learning. This happens by integrating thoughtful planning and guided reflections. These service-learning experiences: enrich learning, teach civic responsibility, and strengthens communities. The GC Scholar Candidate service-learning experiences will be framed within the Grand Challenges. Each GC Scholar Candidate must satisfactorily participate for **one or more years** by:
Mentoring for an approved service club or program for at least one year such as: Beyond Blackboards, DTEACH, PALs, GLUE

Participating in programs such as: Projects for Underserved Communities, Engineers for a Sustainable World, Student Engineers Educating Kids, Engineers Without Borders, Habitat for Humanity, GC-aligned projects within the Volunteer & Service Learning Center

Tutoring in a STEM subject

Curricular Connectivity – It is the GC Scholar Candidate’s responsibility to document how their GC Program Plan demonstrates intellectual and thematic connectivity across the five curricular components within the framework of a Grand Challenge and represented on the five rubrics.

GC Mentorship – Each GC Scholar Candidate must engage a GC Mentor and/or Director or Associate Director to counsel and direct the completion of their Program Plan. A GC Mentor is chosen by a Candidate to provide support throughout the program. The GC Mentor is a professional at UT Austin whose work connects to the GC. If the Candidate chooses not to have an external GC Mentor, then the Director or an Associate Director will provide mentorship. At the completion of the Plan, the Mentor must write a letter of recommendation to the GC Director and Review Committee, to accompany the Candidate’s final reflective report, in support of their application to be recognized as a University of Texas Grand Challenge Scholar.
# GCSP Requirements

<table>
<thead>
<tr>
<th>Theme</th>
<th>Requirements</th>
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<tr>
<td>Each of the requirements described are suggestions for how a Longhorn GC Scholar Candidate may fulfill the standards of the GCSP. There is room for consideration of modifications to fulfilling the requirements with justification and representation of rigor to be approved by the Director and UT GCSP Review Committee.</td>
<td>All GC Scholar Candidates must: &lt;br&gt; - attend the GCSP Course ES 377 for one semester at the beginning of their program [note: recognizing that students can complete other program elements before being accepted into the GCSP] &lt;br&gt; - present a design wall on project at least once a year in the GCSP seminar for critical feedback from Director and fellow GC Scholars (and invited faculty and/or industry) &lt;br&gt; - meet with the GC Director and/or advisor at least once a semester to present and assess project progress and address program plan with action steps that are submitted for review to the GC Director and Asso. Directors</td>
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| GC-themed projects and research | Grand Challenge-themed research projects in the following: <br> - an approved team or independent senior capstone research or design project and course(s) relating to a Grand Challenge theme or specific Grand Challenge problem; <br> - Grand Challenge-themed research projects in at least one of the following courses: <br> - UGS 302: The Engineered World: Innovation, Products, and Systems <br> - ME 302: Introduction to Engineering Design and Graphics <br> - ARE 320K or L: Introduction to Design I or II <br> - CE 369L: Air Pollution Engineering <br> - BME 370: Principles in Engineering Design <br> - EE 374K: Biomedical Electronic Instrument Design <br> - ME 374S: Solar Energy Systems Design <br> - CHE 341: Design for the Environment <br> - ARE 465: Integrated Design Project <br> - EE 374L: Applications of Biomedical Engineering <br> - ASE, BME, CE, CHE, EE, ME, PGE 333T: Engineering Communication <br> - ME 366J: Mechanical Engineering Design Methodology <br> - CHE 341: Design for Environment <br> - ASE 327K: Space Systems Engineering Design <br> - CE 364: Design of Wastewater and Water Treatment Facilities <br> - BME 371: Biomedical Engineering Design Project <br> - CE 341: Introduction to Environmental Engineering <br> - ARE 370: Design of Energy Efficient and Healthy Buildings <br> - ME 266K/266P: Engineering Design Project (Capstone) <br> - CHE 357: Technology and Its Impact on the Environment <br> - EE 464: Corporate/Multidisciplinary/Honors Senior Design Project; <br> - Independent Grand Challenge-themed research; <br> - Summer research experience or internship carrying a Grand Challenge theme; |
Interdisciplinary curricula

Choose three of the following (other courses will be considered upon request):

Social and Behavioral Science:
- ALD 327: Sociocultural Influences on Learning
- ANT 324L/URB 354: Urban Anthropology
- ANT 302: Cultural Anthropology
- ANT 305: Expressive Culture
- ANT 307: Culture & Communication
- ANT 309L: The American Public Sphere
- ANT 316L: Gender in the African American Community
- ANT 318L: Mexican American Culture
- ANT 324L: Activist Research Practicum
- ANT 324L/R S 373M: Biomedicine, Ethics & Culture
- AMS 370: American Disasters
- AMS 370/GOV 370L/WGS 345: Leadership in America
- BA 321L: Contemporary Leadership Issues
- CTI 302: Classics of Socl/Polit Thought
- CTI 303: Competing Visions of Good Life
- ECO 301: Introduction to Economics
- ECO 304K: Intro. to Microeconomics
- ECO 304L: Intro. To Macroeconomics
- FR 374D/ANT 324L: Science, Technology & Race
- GRG 305: This Human World
- GRG 306C: Conservation
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- PSY 301: Introduction to Psychology
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- SOC 302: Introduction to the Study of Society
- SOC 308C: Peace and Conflict
- SOC 308D: Ethnicity and Gender: La Chicana
- SOC 309: Chicanos in American Society
- SOC 319: Introduction to Social Demography
- SS 301: Honors Social Science
- TC 357: 1962:Year of Creativity/Cultures/Crisis
- TC 357: History of American Medicine
- UGS 303: Creative Problem Solving

Visual and Performing Arts:
- AMS 330: American Studies
- ARC 308/318K/318L: Architecture
- ARH 301/302/303: Art History
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<th>Longhorn Grand Challenges Scholars Program</th>
<th>2011</th>
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<tr>
<th>FA 310/320: Fine Arts</th>
<th>PHL 317K/346: Philosophy</th>
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### Entrepreneurship
Choose one of the following courses:
- CE 171P: Engineering Professionalism
- MAN 337/SOC 321K: Entrepreneurship & Innovation
- MAN 337: Strategic Change & Innovation;
  - OR

Submit a design to one of the following:
- United States Patent and Trademark Office (USPTO)
- Design competitions with (inter)national focus
- A museum for exhibition
- A business plan to a venture capital

### Global dimension
Choose one of the following courses:
- ANS 372/ANT 324L: Global Markets & Local Cultures
- TC 357: Energy and Society
- MAN 337: Global Strategy & Translational Management;
  - OR
- Study abroad;
  - OR
- An internship with a significant global focus;

### Service-learning
Engage for at least one year:
- Mentoring for an approved service club or program such as: Beyond Blackboards, DTEAch, PALs, GLUE
  - OR
- Participating in programs such as: Projects for Underserved Communities, Engineers for a Sustainable World, Student Engineers Educating Kids, Engineers Without Borders, Habitat for Humanity, GC-aligned projects within the Volunteer & Service Learning Center
  - OR
- Tutoring in a STEM subject
Summary of five GC Curricular Component Options and Requirements

Assessment and Tracking of GC Scholar Candidates:
   a) National Level – The GC Director will participate in the electronic community and, as budgets permit, workshops and GCSP summits, as well as submit an annual report of programmatic accomplishments to the GCSP.
   b) Institutional Level – The GC Director and Associate Directors will establish the GC Curriculum. The GC Directors and Review Committee will select students each semester to become GC Scholar Candidates. The GC Director and Associate Directors will:
      1) communicate with students each semester (one required meeting and e-mails);
      2) monitor student progress with the support of GC Mentors each academic year; and
      3) recognize Scholars who successfully complete the program during their graduation check. In addition, the GC Director will compile the names and accomplishments of those who receive the Grand Challenge Scholar designation upon graduation and convey the information to the national steering committee as part of the required annual report. The GC Director and Associate Directors will also assist with longitudinal tracking of GC Scholars in cooperation with the national steering committee and NAE through web-based surveys.

Promotion of Early Student Engagement in GC-Related Activities:
   The Longhorn GSCP approach to GC Scholar selection will be strategic and multi-phased. The strategy, initially, is to garner and tap into the wide range of diverse and successful programs currently being implemented in the UT Cockrell School of Engineering and university-wide. Many student-led and student-managed engineering groups at UT are already pursuing the design, creation, and implementation of sub-problems related to the Grand Challenges. We will partner with these groups and recruit students directly from their memberships through a competitive application process. Examples of the student groups include the UT Student Engineering Council Alternative Energy Challenge (AEC) Committee, Projects for Underserved Communities (PUC), UT Solar Car Team, Society of Automotive Engineering (SAE - alternative energy), the Biomedical Engineering Society, the American Society of Mechanical Engineering (ASME), Society of Women Engineers (SWE), UT Equal Opportunities in Engineering (EOE) program, Engineers for a Sustainable World (ESW), and the Institute of Electrical and Electronics Engineers (IEEE). The GC Program will be advertised to all students. Moreover, recruiting materials for future and current students will be developed for dissemination and web-publication on the Longhorn Grand Challenge Scholars Program website.
The Longhorn Challenge for Developing Communities is an annual competition at The University of Texas in which undergraduate and graduate students across disciplines are invited to submit a developed and sustainable system or product for either domestic (U.S.) or international communities. This competition, sponsored by Afren Plc and run through the Longhorn Grand Challenges Scholars Program, will be announced across UT at the beginning of each Fall semester. As part of the announcement, a process will be described for student interdisciplinary teams, as part of organized courses, student societies, or extracurricular efforts, to submit documentation of their system or product design, prototype testing, evidence of sustainability, and a plan to further the marketability and impact of the system or product.

Submissions will be received through the Spring semester of the same academic year. At the end of the Spring semester, a set of judges, chosen by the leadership of the GCSP, will review and deliberate over the submission packages. One of the judges will be chosen from the sponsoring company of the award, Afren Plc. The review and deliberation will be based on a set of evaluation and assessment criteria and rubric announced as part of the competition.

A winner will be chosen from each of two categories: (1) system or product for domestic developing communities, and (2) system or product for international developing communities. Each winning team will receive a symbolic award for each team member and a monetary award of $5,000. In addition, the winning teams will work with Afren Plc to update, revise, and execute their plans for further marketing, evolution, and implementation of their system or product in chosen developing communities. Winning teams will be announced during the graduation proceedings of the Spring semester.

The University of Texas (UT) community is comprised of international scholars striving towards hope in this challenging time. UT does more than hope for a better, safer, and more accessible world for our global citizens because we put that hope into action as we are agents of change with the work and research that we conduct. Margaret Mead once wisely advised, “Never doubt that a small group of people can change the world. Indeed, it is the only thing that ever has.” Commensurate with her notion, the Longhorn Challenge for Developing Communities, in coordination with the Longhorn GCSP, will provide students with a motivation, infrastructure, and mechanism to locally facilitate student projects and to globally provide a change agent for developing communities.

We plan to create and announce the inaugural competition in the Fall of 2011. In preparation, the leadership of the GCSP will work with Afren Plc and Dr. Janet Ellzey, Vice Provost for
International Programs, to develop the inaugural announcement, submission process, evaluation criteria, and competition schedule. A draft submission for the competition materials will be sent to Afren Plc and Dr. Ellzey during the early Fall semester of 2011.

Publicity:

A key component of the UT Longhorn Challenge for Developing Countries is publicity. Publicity includes two primary areas: (1) informing and recruiting student groups to participate and submit competitive designs in one of the two challenge categories, and (2) advertise the results and winners of the challenge within the UT community, across Texas, and at the national level. To address both areas, Maria McGivney Arrellaga, Director of Communications with the Cockrell School, has been contacted to strategize approaches for the publicity. Maria has agreed to assist us, in all facets, to publicize the challenge throughout the academic year, beginning the first week of classes. She has also agreed to have her staff participate in the end-of-school-year presentations of the teams, documenting the challenge participants and winners. Through this participation, news stories will be developed for the challenge and disseminated on the Cockrell and Grand Challenge Scholar’s web sites, published in campus news outlets, such as the UT newspaper, Alumni magazine, and Engineering Advisory Board notifications, and distributed to news outlets.

We are currently searching for $500 beyond the $10,000 in prizes for the challenge. The extra funds will assist us in advertising the challenge and maintain a web site for recruitment, student team applications, information update, documentation of the team results, and announcement of challenge winners this year and years to come. We would appreciate it if Afren would consider funding this effort for a total funding request of $10,500.
Entrepreneurship Component Expectations Overview
This component provides opportunities for GC Scholar Candidates to translate invention to innovation and develop market ventures that scale to global solutions.

<table>
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<tr>
<th>Performance Description</th>
<th>Emerging</th>
<th>Proficient</th>
<th>Exemplary</th>
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<tbody>
<tr>
<td><strong>Opportunity Identification</strong></td>
<td>- Relies on one or two strategies to identify opportunities with limited novelty, diversity and business potential</td>
<td>- Draws on several strategies to identify opportunities exhibiting an element of novelty and/or potential customer value</td>
<td>- Draws on diverse range of strategies to identify opportunities exhibiting elements of novelty, potential customer value and potential market attractiveness</td>
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<tr>
<td><strong>Start-up Process</strong></td>
<td>- Omits key steps in the start-up process</td>
<td>- Addresses key steps in the start-up process</td>
<td>- Addresses key steps in the start-up process</td>
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<td></td>
<td>- Provides limited support for plans/diagnoses/recommendation</td>
<td>- Plans/diagnoses/recommendations are moderately supported and doable but not necessarily the most effective approach</td>
<td>- Plans/diagnoses/recommendations are well-supported and appropriate</td>
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<tr>
<td><strong>Goals &amp; Objectives</strong></td>
<td>- Goals need clarification or has listed goals which are already in place</td>
<td>- Set adequate goals for business development or engagement in policy</td>
<td>- Showed a broad understanding of goals and set forth a measurable series of reasonable, yet challenging goals related to the project</td>
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<tr>
<td><strong>Advantages &amp; Disadvantages</strong></td>
<td>- Did not address advantages or disadvantages completely</td>
<td>- Thoroughly identified advantages and/or disadvantages that s/he may have encountered, but have not identified how these impact the project</td>
<td>- Made a thoughtful effort to identify advantages as well as disadvantages that s/he encountered, or may encounter, and has indicated the influence of these on the project</td>
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<td></td>
<td>- Unclear connections of advantages and disadvantages to the success or limitations of her/his project</td>
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<td><strong>Marketing</strong></td>
<td>- Generated limited or unclear plan and/or efforts towards marketing</td>
<td>- Had a plan but may not show basing all decisions on sound marketing practices, or show evidence of considering marketing practices important</td>
<td>- Identified a complete plan for marketing product(s) showing consideration of supply and demand, market availability and advertising</td>
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<td></td>
<td>- Marketing of product is left to chance</td>
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<tr>
<td><strong>Opportunity Assessment</strong></td>
<td>- Provides a limited and/or biased analysis of opportunities</td>
<td>- Provides a systematic, unbiased analysis of opportunities</td>
<td>- Provides a comprehensive, thorough analysis of opportunities</td>
</tr>
<tr>
<td><strong>Future Goals</strong></td>
<td>- Did not communicate future goals, goals are unrelated to GCSP project, or goals did not set a foundation for future success in industry</td>
<td>- Addressed goals completely</td>
<td>- Addressed future goals in areas of education/professional development and career success as well as personal and financial stability and sustainability</td>
</tr>
<tr>
<td></td>
<td>- Did not communicate future goals, goals are unrelated to GCSP project, or goals did not set a foundation for future success in industry</td>
<td>- Explores part of the spectrum of areas for success</td>
<td>- Goals are related to current experiences and continue to challenge the student</td>
</tr>
<tr>
<td><strong>Skills, Competencies &amp; Knowledge</strong></td>
<td>- Did not completely identify skills, did not take the opportunity to identify skills normally associated with the industry and/or did not identify relationships between the skills and the management decisions or efficiencies</td>
<td>- Identifies different skills and draws relationships between these skills and management decision making or improved efficiencies</td>
<td>- Identifies many different skills related to GCSP project and contributions to success which support decisions made and improvement in financial and/or production efficiencies consistent with those in industry</td>
</tr>
<tr>
<td>Scope</td>
<td>Scope 1</td>
<td>Scope 2</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Takes limited advantage of expansion opportunities and/or project changes have not mirrored opportunities reflective of the industry</td>
<td>Consistently expanded, without regard for industry trends and consideration of financial trends and opportunities in the industry</td>
<td>Showed a consistent expansion into the industry taking into consideration the opportunity and management decisions consistent with potential returns/economic situations in said industry</td>
<td></td>
</tr>
<tr>
<td>Consistently expanded, without regard for industry trends and consideration of financial trends and opportunities in the industry</td>
<td>Expansion was highly supported by outside influences and student’s own efforts were not clearly evident</td>
<td>Expansion was by student’s own efforts</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Budget</th>
<th>Budget 1</th>
<th>Budget 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creates broad budget</td>
<td>Generates budget that corresponds to scope of project</td>
<td>Generates budget that corresponds to scope of project</td>
</tr>
<tr>
<td>Does not include contingency plan</td>
<td>Includes contingency plan</td>
<td>Includes contingency plan</td>
</tr>
<tr>
<td>Inaccurate budgeting and money management</td>
<td>Accurate budgeting and money management</td>
<td>Accurate budgeting and money management</td>
</tr>
<tr>
<td>Generates budget that corresponds to scope of project</td>
<td>Includes contingency plan</td>
<td>Includes contingency plan</td>
</tr>
<tr>
<td>Inaccurate budgeting and money management</td>
<td>Accurate budgeting and money management</td>
<td>Accurate budgeting and money management</td>
</tr>
<tr>
<td>Generates budget that corresponds to scope of project</td>
<td>Includes contingency plan</td>
<td>Includes contingency plan</td>
</tr>
<tr>
<td>Inaccurate budgeting and money management</td>
<td>Accurate budgeting and money management</td>
<td>Accurate budgeting and money management</td>
</tr>
<tr>
<td>Generates budget for future plans</td>
<td>Generates budget for future plans</td>
<td>Generates budget for future plans</td>
</tr>
</tbody>
</table>
Global Awareness Component Expectations Overview
GC Scholars Candidates will develop cultural literacy through opportunities to explore the ways that cultures and histories impact behaviors, beliefs, and human interactions in a transcultural world. This program component will cultivate an enhanced global awareness and celebrate multiple perspectives to invent strategies for our world’s growth and development.

<table>
<thead>
<tr>
<th>Performance Description</th>
<th>Emerging</th>
<th>Proficient</th>
<th>Exemplary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Awareness of Culture</strong></td>
<td>• Exhibits awareness that culture impacts behaviors</td>
<td>• Exhibits knowledge of complex beliefs, values, and sensibilities that contribute to the way that s/he and others behave</td>
<td>• Exhibits deep knowledgeable about complex cultural beliefs, values, and sensibilities that might affect the way that s/he and others think or behave</td>
</tr>
<tr>
<td></td>
<td>• Understandings of complex beliefs and value systems is limited</td>
<td>• Represents multiple points of view</td>
<td>• Represents multiple and critical points of view from diverse stakeholders</td>
</tr>
<tr>
<td><strong>Stereotyping and Bias</strong></td>
<td>• At a general level understands that stereotyping and other biases are not acceptable; however, s/he is not sensitive to the impact of prejudice or to biased messages about other cultural groups</td>
<td>• Understands the dangers of stereotyping and other biases; s/he is aware of and sensitive to issues of racism and prejudice, and sometimes recognizes biased messages about other cultural groups</td>
<td>• Understands the dangers of stereotyping and other biases, is sensitive to issues of racism and prejudice, and highly cognizant of biased messages about other cultural groups</td>
</tr>
<tr>
<td><strong>Celebrating Culture</strong></td>
<td>• Limited recognition of similarities and between his/her own culture and other cultures.</td>
<td>• Is cognizant, with guidance, of similarities between his/her own culture and other cultures</td>
<td>• Understands that individuals from diverse cultures share some fundamental beliefs</td>
</tr>
<tr>
<td></td>
<td>• Although not negative about differences in behavior or lifestyle, only occasionally associates with individuals from different cultures</td>
<td>• S/he appreciates and accepts individuals with diverse beliefs, appearances, and lifestyles</td>
<td>• S/he appreciates and celebrates diversity, and seeks opportunities to learn about and interact with different cultures</td>
</tr>
<tr>
<td></td>
<td>• Occasional celebration of uniqueness, diversity, and fluidity in cultures</td>
<td>• Celebrates uniqueness, diversity, and fluidity in cultures</td>
<td>• Celebrates and nurtures uniqueness, diversity, and fluidity in cultures</td>
</tr>
<tr>
<td><strong>Interactions with Individuals from Different Cultures</strong></td>
<td>• Communicate, interact, and work positively with individuals from other cultural groups</td>
<td>• Usually communicates, interacts, and works positively with individuals from other cultural groups</td>
<td>• Almost always communicates, interacts, and works positively with individuals from other cultural groups and seeks opportunities to learn from diverse perspectives</td>
</tr>
<tr>
<td><strong>Use of Resources from Different Cultures</strong></td>
<td>• Is willing, with substantial guidance, to use technology to gain access to individuals or resources from other cultures; however, these efforts are generally motivated by program requirements</td>
<td>• Integrates technology and resources from to prompt community relations and sustainability</td>
<td>• Deeply integrates technology and resources from to prompt community relations and sustainability</td>
</tr>
<tr>
<td></td>
<td>• Develops and implements strategies for our world’s growth and development</td>
<td>• Self-initiated and intrinsically motivated efforts for diverse community development</td>
<td>• Self-initiated and intrinsically motivated efforts for strong relationships throughout diverse community development</td>
</tr>
<tr>
<td><strong>Awareness of the Way that Technology Differs</strong></td>
<td>• Represents basic knowledge about the culture of technology outside her/his own</td>
<td>• Reasonably fluent in the technological culture of different communities</td>
<td>• Exhibits substantial and sophisticated knowledge about the technological culture of different communities</td>
</tr>
<tr>
<td>in Other Cultures</td>
<td>environment.</td>
<td>• Effort is taken to understand how and why technology can be used in different ways in other cultures</td>
<td>communities</td>
</tr>
</tbody>
</table>
Longhorn Grand Challenges Scholars Program

Interdisciplinary Curriculum Rubric

Interdisciplinary Curriculum Component Expectations Overview
This component fosters understandings about different and new ways of thinking and communicating the complexities of the Grand Challenges across disciplines.

<table>
<thead>
<tr>
<th>Performance Description</th>
<th>Emerging</th>
<th>Proficient</th>
<th>Exemplary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage in Perspective-Taking</td>
<td>• Relies on one or two strategies to identify opportunities with limited novelty, diversity and business potential</td>
<td>• Draws on several strategies to identify opportunities exhibiting an element of novelty and/or potential customer value</td>
<td>• Draws on diverse range of strategies to identify opportunities exhibiting elements of novelty, potential customer value and potential market attractiveness</td>
</tr>
</tbody>
</table>
| Structural Knowledge Pertaining to Grand Challenge | • Omits key steps in the start-up process  
• Provides limited support for plans/diagnoses/recommendation | • Addresses key steps in the start-up process  
• Plans/diagnoses/recommendations are moderately supported and doable but not necessarily the most effective approach  
• May contain some minor errors or omissions | • Addresses key steps in the start-up process  
• Plans/diagnoses/recommendations are well-supported and appropriate  
• Identifies appropriate strategies for risk reduction  
• No significant errors or omissions |
| Integration of Knowledge and Modes of Thinking from Other Disciplines | • Did not list goals, or has listed goals which are already in place | • Set adequate goals for business development or engagement in policy  
• Objectives adequately meet the customer needs and goals of the project | • Showed a broad understanding of goals and set forth a measurable series of reasonable, yet challenging goals related to the project |
| Explore Conflicting Disciplinary Insights and Vantage Points | • Did not address advantages or disadvantages completely  
• Unclear connections of advantages and disadvantages to the success or limitations of her/his project | • Thoroughly identified advantages and/or disadvantages that s/he may have encountered, but have not identified how these impact the project | • Made a thoughtful effort to identify advantages as well as disadvantages that s/he encountered, or may encounter, and has indicated the influence of these on the project |
| Produce Understandings about the Complexities of the Grand Challenge | • Generated limited or unclear plan and/or efforts towards marketing  
• Marketing of product is left to chance | • Had a plan but may not show basing all decisions on sound marketing practices, or show evidence of considering marketing practices important | • Identified a complete plan for marketing product(s) showing consideration of supply and demand, market availability and advertising |
**Grand Challenge Research Component Expectations Overview**

This component engages GC Scholar Candidates in a design project &/or research related to a specific Grand Challenge. The research about the identified GC will be integrated across all 5 program components.

<table>
<thead>
<tr>
<th>PERFORMANCE DESCRIPTION</th>
<th>EMERGING</th>
<th>COMPONENT EXPECTATION</th>
<th>EXEMPLARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of Area of Research for A Grand Challenge</td>
<td>● Formulates a question with a plan for inquiry that identifies skills, knowledge, people, tools or other resources associated with aspects of the GC</td>
<td>● Formulates a question with a plan for inquiry that details the skills, knowledge, people, tools and other resources from one disciplinary perspective</td>
<td>● Formulates a compelling question with a plan for inquiry that details the skills, knowledge, people, tools, and other resources from two or more disciplinary perspectives</td>
</tr>
<tr>
<td>Mission Statement</td>
<td>● States the problem</td>
<td>● States the problem well</td>
<td>● States the problem well</td>
</tr>
<tr>
<td></td>
<td>● Shows some understanding the problem</td>
<td>● Understands the problem</td>
<td>● Shows understanding of the problem on multiple levels</td>
</tr>
<tr>
<td></td>
<td>● Identifies how the concept will address the problem in relation to the customer needs</td>
<td>● Clearly identifies how the concept will address the problem in relation to the customer needs and the GC</td>
<td>● Clearly identifies how the concept will address the problem in relation to the customer needs and the GC</td>
</tr>
<tr>
<td>Concept Development</td>
<td>● Uses invention journal to log ideas about GC that spark concepts</td>
<td>● Uses invention journal to log ideas about GC that spark multiple concepts</td>
<td>● Uses invention journal to log ideas about GC that spark many novel concepts</td>
</tr>
<tr>
<td></td>
<td>● Somewhat able to articulate how a problem can be solved with an engineering concept</td>
<td>● Able to articulate how a problem can be solved with an engineering concept and includes technical vocabulary</td>
<td>● Able to articulate how a problem can be solved with an engineering concept and includes technical vocabulary</td>
</tr>
<tr>
<td>Concept Relevance</td>
<td>● Describes how and why the concept is relevant/important to inventor and relates to a GC</td>
<td>● Describes how and why the concept is relevant/important to inventor and to others</td>
<td>● Describes in detail how and why the concept is relevant/important to inventor and to diverse populations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Able to clearly connect to GC contexts other than just engineering (i.e. economics, social, environmental)</td>
<td>● Able to clearly connect to multiple contexts and the 21st Century Engineering Grand Challenges</td>
</tr>
<tr>
<td>Concept Realization</td>
<td>● Shows some consideration of the feasibility, viability, &amp; desirability needed for concept design &amp; prototyping</td>
<td>● Considers the feasibility, viability, &amp; desirability needed for concept design &amp; prototyping</td>
<td>● Considers the feasibility, viability, &amp; desirability needed for concept design &amp; prototyping and articulates each one specifically</td>
</tr>
<tr>
<td>Black Box</td>
<td>● Identifies about half of the system inputs &amp; outputs &amp;/or diagrams incorrectly</td>
<td>● Identifies almost all of the system inputs &amp; outputs &amp; diagrams correctly</td>
<td>● Identifies all possible system inputs &amp; outputs &amp; diagrams correctly</td>
</tr>
<tr>
<td>Customer Needs</td>
<td>● Asks questions to parse out specific user requirements &amp; some desires for product</td>
<td>● Asks meaningful &amp; appropriate questions to parse out specific user requirements &amp; desires for product</td>
<td>● Asks meaningful &amp; appropriate questions to parse out specific user requirements &amp; diverse desires for product</td>
</tr>
<tr>
<td>Activity Diagram</td>
<td>● Creates path from product birth to product death</td>
<td>● Creates path from product birth to product death with more than one perspective</td>
<td>● Creates path from product birth to product death with unique &amp; multiple perspectives</td>
</tr>
<tr>
<td>Concept Generation Techniques</td>
<td>Concept Selection</td>
<td>Prototype/Concept Model</td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------</td>
<td>-------------------------</td>
<td></td>
</tr>
<tr>
<td>● Engages in a few strategies that facilitate concept generation</td>
<td>● Engages in multiple strategies that facilitate concept generation</td>
<td>● Engages in strategies that facilitate concept generation and shows close connections to those strategies throughout the design process</td>
<td></td>
</tr>
<tr>
<td>● Articulates how &amp; why concept was chosen</td>
<td>● Clearly articulates how &amp; why concept was chosen</td>
<td>● Clearly articulates how &amp; why concept was chosen</td>
<td></td>
</tr>
<tr>
<td>● Physical model represents concept by addressing the problem &amp; customer needs</td>
<td>● Physical model represents concept by addressing the problem &amp; customer needs</td>
<td>● Physical model represents concept by addressing the problem &amp; customer needs</td>
<td></td>
</tr>
<tr>
<td>● Model is complete &amp; robust</td>
<td>● Model is complete &amp; robust</td>
<td>● Model is complete, robust, &amp; meets multiple customer needs</td>
<td></td>
</tr>
<tr>
<td>● Materials are carefully incorporated into design</td>
<td>● Materials are carefully incorporated into design and used in unique ways to enhance function &amp;/or aesthetics</td>
<td>● Materials are carefully incorporated into design and used in unique ways to enhance function &amp;/or aesthetics</td>
<td></td>
</tr>
</tbody>
</table>

**RESEARCH PROCESS**

<table>
<thead>
<tr>
<th>Variety of Sources</th>
<th>Data Collection</th>
<th>Validity of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Uses technology to identify and collect qualitative or quantitative information from primary and secondary sources</td>
<td>● Records, interprets, and/or references relevant observations, concepts and details from primary and secondary sources</td>
<td>● Information is current and recognized as fact, opinion or generalization</td>
</tr>
<tr>
<td>● Uses technology to identify and collect quantitative and/or qualitative information from a variety of primary and secondary sources (i.e. print, archival, observation, survey, focus group, and/or interviews)</td>
<td>● Applies standards to properly record, interpret, and reference relevant observations, concepts and details from primary and secondary sources</td>
<td>● Information is current and accurate and differentiated by fact, bias, opinion or generalization</td>
</tr>
<tr>
<td>● Uses technology to identify and collect qualitative and quantitative information across a variety of disciplines from a variety of primary and secondary sources (i.e. print, archival, observation, focus group, survey, and/or interview)</td>
<td>● Consistently applies standards to properly record, interpret, and reference relevant observations, concepts and details from primary and secondary sources across a variety of disciplines</td>
<td>● Information across a variety of sources is current and trustworthy and differentiated by fact, bias, opinion or generalization</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Representing Data</th>
<th>Verify and Evaluate Information</th>
<th>Draw Conclusions and Make Appropriate Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Data is represented in written or graphic form using appropriate technical terms</td>
<td>● Evaluates some resources and data or evaluates data and resources but draws incomplete conclusions</td>
<td>● Draws some conclusions that are relevant to the project and/or uses some of the information appropriately in planning and carrying out activities</td>
</tr>
<tr>
<td>● Data is summarized in written and graphic form using technical terms appropriate to the field of study</td>
<td>● Evaluates resources and data accurately, considering credibility of sources, verification of findings, and reasonableness</td>
<td>● Draws conclusions that are relevant to the project from research or data analysis and uses the information appropriately in planning and carrying out activities</td>
</tr>
<tr>
<td>● Data across a variety of disciplines is synthesized in written and graphic form using technical terms appropriate to the fields of study</td>
<td>● Evaluates and verifies resources and data by generating original data to compare with others’ findings or by locating additional primary sources</td>
<td>● Draws relevant conclusions from research or data analysis and applies them in an insightful or sophisticated way in planning and carrying out activities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Justify and Support Decisions, Strategies,</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>● Explanation used to justify and explain decisions, strategies, findings, and/or solutions</td>
<td>● Explanation used to justify and explain decisions, strategies, findings, and/or solutions is complete and is</td>
<td>● Explanation used to justify and explain decisions, strategies, and findings, and/or</td>
</tr>
</tbody>
</table>

**Longhorn Grand Challenges Scholars Program**
| **and Finding and Solutions** | **is not connected to information gathered while completing the project or is incomplete** | **supported by evidence gathered while completing the project** | **solutions is complete and is supported by evidence gathered while completing the project and include relevant information from the student’s experience beyond the requirements of the project** |
## Longhorn Grand Challenges Scholars Program

### Service-Learning Rubric

**Service Learning Component Expectations Overview**

Service-learning is a teaching and learning strategy that integrates meaningful experiences that emphasizes both community service AND learning by integrating thoughtful planning and guided reflections. Through this program component, GC Scholar Candidates will deepen social consciousness and motivation by bringing technical expertise to bear on societal problems. These service-learning experiences: enrich learning, teach civic responsibility, and strengthens communities. The GC Scholar Candidate service-learning experiences will be framed within the Grand Challenges.

<table>
<thead>
<tr>
<th>Performance Description</th>
<th>Emerging</th>
<th>Component Expectation</th>
<th>Exemplary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meeting Community Needs</strong></td>
<td>• Determined by taking a guess at perceiving community needs</td>
<td>• Informed by past research about a specific community or culture</td>
<td>• Determined by current research conducted by the GCSP Scholar Candidate</td>
</tr>
<tr>
<td></td>
<td>• Creativity is taken into creating a meaningful and innovative project that will impact the targeted community</td>
<td>• Much thought is put into creating a meaningful and innovative project that will impact the targeted community</td>
<td></td>
</tr>
<tr>
<td><strong>Fosters Community Coordination &amp; Development</strong></td>
<td>• Community members are informed of the project directly</td>
<td>• Community members act as consultants in the project development and implementation</td>
<td>• Active, direct collaboration with community and GCSP Scholar Candidate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Symbiotic relationship with all stakeholders</td>
</tr>
<tr>
<td><strong>Initiates Academic Integration &amp; Fuses Service with Learning</strong></td>
<td>• Little application of new skills or knowledge about the GC is represented in service experience</td>
<td>• Several connections between service and learning about GC are clearly represented in GC Scholar Candidate’s design wall and reflective report</td>
<td>• Project balances and incorporates theories from courses and research with motivation to teach, learn, and collaborate with others</td>
</tr>
<tr>
<td></td>
<td>• GC Scholar Candidate does not connect service and learning in a meaningful way</td>
<td>• GC Scholar Candidate and community members learn about the GC through the service experience</td>
<td>• GC Scholar Candidate and community members cooperatively teach and learn from each other through the service experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Some active application of new skills or knowledge is visible, but not necessarily deeply integrated throughout the service experience</td>
<td>• Direct application of new skills or knowledge is visible and deeply integrated throughout the service experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Project is unevenly distributed between service and learning</td>
<td>• Equal consideration for service and learning drives her/his project</td>
</tr>
<tr>
<td><strong>Facilitates Reflection</strong></td>
<td>• Shares limited individual and group reflection</td>
<td>• Produces reflection in a group setting only</td>
<td>• Produces thought, sharing, and reflections individually and as part of a group</td>
</tr>
<tr>
<td></td>
<td>• Limited creativity in reflection</td>
<td>• Some creativity is put into her/his reflection style</td>
<td>• Student is creative in the forms in which they reflect (i.e. videos, poems, art)</td>
</tr>
<tr>
<td><strong>Develops Caring</strong></td>
<td>• Reflections restricted to pros and cons of particular service project regarding the community</td>
<td>• Reflections show generic growth regarding the importance of community service</td>
<td>• Reflections show affective growth regarding self in community and the importance of service</td>
</tr>
<tr>
<td><strong>Improves Quality of Life</strong></td>
<td>• Sparks discussion about change but limited long term impact on community</td>
<td>• Fosters improvements in quality of life</td>
<td>• Prompts civic responsibility as agent of change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Prompts civic responsibility as agent of change</td>
<td>• Meets a need or addresses an issue</td>
</tr>
</tbody>
</table>