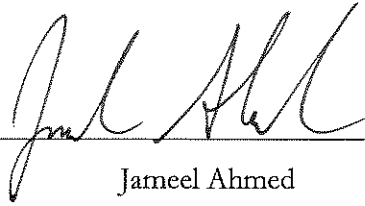


GCSP Application

for Rose-Hulman Institute of Technology

v9 3/28/2017

Dean of Faculty

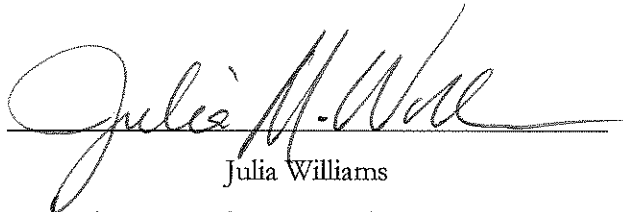


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Vision and goals

“We educate our students with the skills and experiences to address society’s greatest needs, equipping and inspiring them to positively impact the world.”

— Grand Challenges Group vision statement

The Rose-Hulman Grand Challenges Group (GCG) is an existing campus group of self-selected faculty and staff who share in the vision of the NAE Grand Challenges wish to see students educated about the impact of their degrees on the world. We have been working on raising the general campus awareness of the Grand Challenges—and related regional, national, and global concerns—through all-campus events such as film screenings, panel discussions, and invited speakers since the 2012-2013 academic year.

The Grand Challenge Scholars Program (GCSP) is a specific initiative of the GCG, building upon our past efforts and looking forward to the alumni we wish to graduate. To positively impact the world, the high-level goals of our GCSP are

- to provide opportunities for students to explore the relationship (both positive and negative) between their technical degrees and the challenges that face the world.
- to provide institutional recognition to these students—beyond listing club membership on a resume—reflecting the important skills and competencies that they have developed.

Our short-term efforts are to establish a GCSP on campus with approximately 5-10 students per year completing the program. We will work every year to present multiple opportunities for students to explore and engage with global challenges, attracting students to the GCSP through campus-wide events. Our program is structured to be flexible to the interests and opportunities of each student participant—certainly not a checklist of courses to take without reflection.

We will work to strengthen the connection between global challenges and existing curricular and co-curricular offerings. Rose-Hulman has a strong tradition of co-curricular offerings, allowing students to find their place as they pursue science, engineering, and math degrees. The GCSP will provide a recognized place for humanitarian-minded students to connect and support each other.

We also note that the goals of the GCSP are well-aligned with the Institute's Strategic Plan. Specifically, exposing students to the Grand Challenges and establishing a Grand Challenges Scholars Program is consistent with strategy 1C, 2A, 2B, 2D, 4B, and 6C of the Strategic Plan:

- Goal 1 Rose-Hulman will support and recognize excellence in teaching, learning, innovation, and intellectual growth—both in and out of the classroom.
- (1C) Increase the number of ways Rose-Hulman supports and recognizes excellence in teaching, professional development, and learning.
- Goal 2 Rose-Hulman will give students a vision of the breadth of their possible futures and will prepare them to achieve these futures.
- (2A) Convey the message to current and prospective students that a science, engineering, and mathematics education can lead to a diverse range of futures that can positively impact the world.
 - (2B) Provide students with instruction and experiences that will instill confidence in their science, engineering, and mathematics fundamentals, professional and success skills, and ability to rise to difficult challenges.
 - (2D) Empower students with the skills required to deal with complexity.
- Goal 4 Rose-Hulman will be a diverse, globally-connected, sought-after community in which to live, learn, and work.
- (4B) Provide more opportunities for community members to experience the world and its diversity.
- Goal 6 Rose-Hulman will have global name recognition for the excellence of our education.
- (6C) Encourage and support faculty, staff, and students in activities that bring recognition to Rose-Hulman, such as assuming leadership roles in national and/or international academic and professional organizations.

Steering committee

Our GCSP steering committee will consist of members of the GCG—a mix of staff and faculty from almost all academic departments on campus. At roughly twelve members, we are small enough to guide the GCSP. If the GCG membership grows too large to effectively manage the GCSP, a subset of the GCG will be chosen to focus on this task.

Steering committee members will

- form the initial group of faculty mentors for GCSP students
- support on-campus events and opportunities related to the GCSP
- guide the establishment of the GCSP by advocating on the program's behalf

Recruiting

In order to recruit students into the program, we will leverage several existing clubs and programs currently available on campus such as Engineers for a Sustainable World, Engineers Without Borders, Make It Happen, and HERE. Students in these groups are typically interested in humanitarian based projects and some of the themes of the Grand Challenges for Engineering are relevant to this passion area.

Our strongest likely partnership is with the HERE program (formally the Home for Environmentally Responsible Engineers). HERE is a cohort of students who live, learn, and work together during their first year of college—taking sustainability-themed courses and participating in co-curricular activities together as they work towards a minor. We envision a number of HERE students will also apply to join the GCSP to work on the sustainability-related grand challenges. We will directly advertise to the HERE cohort to talk about the GCSP, in addition to our informal recruiting through co-sponsoring events with HERE.

In addition to recruiting directly from these programs and clubs, we also plan to attend the student activities fair in the fall. During this fair, student programs, clubs, etc. set up a booth and talk about co-curricular opportunities available on campus. We also plan on posting recruitment fliers and posters throughout campus as well as sending out an all campus email advertising an information session.

Application and selection

Students interested in the program will submit an application to the GCSP steering committee at the end of the Spring quarter (likely at the end of their 1st or 2nd year). The application will include a short reflective essay in which the students will discuss why they would like to be admitted into the program. There will be no minimum GPA requirement except that the student is in “good” academic standing with the Institute. The late Spring deadline will allow the steering committee to vet all applications during the summer and to ensure sufficient effort was spent on submitting the application.

The GCSP steering committee will notify all students regarding their admission into the program during early July. For those who aren't accepted into the program, the committee will provide feedback regarding how to make their application package reach a satisfactory level. The student will have the chance to resubmit within a month (early August). This will allow the students to be notified of their acceptance into program prior to starting the Fall quarter

of the next academic year. We will have a welcome ceremony for all students admitted into the program at the start of the school year. Then, during their first quarter in the program, the students will be placed with a mentor—with the goal of soon submitting a plan of study to achieve the goals set forth by the program.

We expect to admit approximately 10 students per year with majors ranging from engineers, scientists, and mathematicians due to our small institute size. We will not restrict the number of students admitted into the program. If we notice that we don't have a diverse cohort with all of these majors represented, we can directly encourage department heads of those programs not represented to actively recruit students and/or inform us who they think might be a good candidate for the program. While we expect many applications to be submitted at the end of the student's first year, submissions during subsequent years are welcome.

Faculty mentors

Faculty mentors for the GCSP will initially come from the GCG. If additional faculty are needed to support a growing number of students in the GCSP, we will recruit faculty whose areas of expertise overlap with the goals of the Grand Challenges, or who have a shared interest in its goals. Funding will be sought to support faculty travel to conferences or workshops related to the Grand Challenges, either individually or as a group. These opportunities are intended to provide professional development for faculty to help them address the Grand Challenges and to mentor students who will address these challenges.

Faculty members of the Grand Challenge Scholars Program will be expected to mentor one or more active GCSP students. Assignments to GCSP students will be based on student preference, and availability, with students encouraged to select faculty mentors who share their area of interest. A limit will be placed on the number of active GCSP students a faculty member will mentor. This limit may initially be set to two to even the load, but may grow over time as the number of GCSP students expands. A collection of GCG members might serve in this capacity as a mentoring team.

Faculty mentors will be expected to help students in developing a GCSP plan, meet with mentees regularly, and provide guidance in progressing toward completion of their plan. This role will constitute as service to the institute, which is one criteria considered for promotion

and tenure. A letter will be provided to faculty mentors in the program in support of applications for promotion or tenure.

Funding and support

Our funding and support will be pursued primarily through the Cross-Cutting Programs and Emerging Opportunities office on campus. Other funding and support will be pursued in partnership with the Development office. The initial request for funds is given here and will be modified as the program develops.

Item	Initial request
<p>Course Development & Support</p> <ul style="list-style-type: none"> - funds to support faculty who develop a cross-disciplinary course that aligns with the GCs and other big-picture applications of engineering/math/science to the world's/region's needs - funds to support the existing Grand Challenges Summer mega-course—supplies, fact-finding travel 	<p>\$5,000 each course x3</p> <p>\$10,000</p>
<p>Professional Expertise</p> <ul style="list-style-type: none"> - travel funds for faculty/staff to gain professional expertise by attending workshops or conferences (related to GCs or humanitarian engineering) they otherwise wouldn't be able to attend 	<p>\$2,000 each</p>
<p>On-campus Events</p> <ul style="list-style-type: none"> - advertisement, food, and supplies for on-campus events to highlight the connections between math/science/engineering topics, the humanities and social sciences, and current issues and challenges facing the world 	<p>\$500 each year (one event per quarter)</p>

Unique aspects

Unique to our campus is the HERE program, a 1st-year living/learning community organized around sustainability and environmental responsibility that works towards a minor. HERE will provide a parallel path that overlaps with the GCSP. Students who begin in HERE but are uninterested or unable to pursue the minor might transition into the GCSP, as our requirements are broadly written and do not require specific classes. We also co-sponsor events throughout the year to promote each other's programs. There is overlap between the two programs, but it is supportive and not adversarial.

Another unique program on our campus is a summer-only "Grand Challenges Mega-Course" that combines a technical elective and science elective with our required technical

communication course in an intensive studio-based project experience. Past offerings have focused on solar reflectors and repurposing plastic bags into building materials. We have received media attention for this course and believe that a strong GCSP will increase demand for it to be offered more regularly.

The student organizations listed earlier can help with aspects of the GCSP. Engineers for a Sustainable World is a student club that conducts events throughout the year to raise awareness of sustainability issues. Engineers Without Borders is our local chapter of the national network, which has conducted infrastructure projects in developing countries. Make It Happen is a student organization that connects with charitable causes to offer students the chance to work on independent study projects with a humanitarian focus. The Maker Lab is a student club that provides training, tools, and guidance for students to engage their “maker” mindset through hands-on construction of things. Finally, we have student organizations dedicated to entrepreneurship, RISE and ESCALATE, that can support the entrepreneurial aspect of the GCSP.

5 GCSP components

We will assess student completion of the 5 GCSP components by requiring students to assemble a portfolio at the end of their experience that supplies evidence of how they have met each component’s requirements. Our expectations for the necessary effort for each component are detailed below, based on an institute definition of 2 credits hours equaling 60 hours of work. Assessment rubrics for each component are provided in an appendix.

Research Component: A project or research effort that involves a GC theme, specific challenge, or related big-picture problem is required. At least 2 credits or equivalent of effort is expected. Scholars may reach this 2 credit threshold by drawing on a single effort or multiple separate efforts that add together. Both primary and secondary research is valued, or some combination of the two. Examples: capstone design project, IP/ROP project, GC summer mega course, in-course projects that are taken beyond the course requirement, internship or co-op experience that involves a research component, REUs.

Entrepreneurship Component: Education or experience putting into practice an entrepreneurial mindset focused on opportunity recognition, developing innovative solutions, and creating value no matter what the setting. Traditional work of translating invention and innovation into market ventures (either for-profit or not-for-profit) is one way to demonstrate entrepreneurial mindset. At least 2 credits or equivalent of effort is expected. Scholars may reach this 2 credit threshold by drawing on a single effort or multiple separate efforts that add together. Examples: ESCALATE-branded course, KEEN-branded course with significant entrepreneurial mindset component, founding a start-up or business, filing a patent, partnership with an NGO or non-profit organization to address a pressing business concern, significant involvement in an entrepreneurship student group (RISE or the Finance Club).

Service Learning Component: Actual involvement in a real-world implementation of a project that brings technical expertise to bear on a societal problem is required. Significant effort to understand the social context of the problem is expected. Examples: Involvement with EWB, coursework with a strong service-learning component, EPICS work, extended volunteer work with reflection.

Global Dimension: Students will have meaningful interactions with members of other cultural backgrounds, or study of the global context of engineering or science work. At least 2 credits or equivalent of effort is expected. Examples: international internships or study abroad, EWB involvement, three consecutive foreign language courses, a foreign language minor, a course devoted to the global context of engineering or science work, GS course with a travel and reflection component.

Interdisciplinary Component: The previous four components will be conducted in an interdisciplinary way. Disciplines other than engineering and natural science (such as public policy, international relations, business, law, ethics, human behavior, risk, social sciences such as medicine, etc.) should be drawn from throughout the work. In addition, GC scholars are expected to attend panels and events sponsored by the GCG, reflecting on how the different disciplines present contributed to the exchange of ideas. Students are encouraged to take courses co-taught by faculty from different disciplinary backgrounds.

These five components are not checklist items to complete consecutively, but elements of a well-thought-out GCS plan. A significant effort might incorporate multiple elements simultaneously. In preparing the portfolio, students will reflect on their experiences and tie together their efforts in a holistic way.

Mentorship, support, tracking, and assessment

Each GCSP student will be assigned a mentor upon acceptance into the program. Within the first year of the program, students will need to develop and have approved a plan for completion of the scholars program. This plan will be developed in cooperation with their mentor or mentoring team, and reflect the student's area of interest within the NAE Grand Challenges. The plan provides flexibility in the approaches that students may take to complete the program, so that they may pursue their strongest areas of interest in a manner that best fits their academic schedule. The plan will be evaluated by the GCSP steering committee. An approved plan will serve as the criteria for assessment of successful completion.

GCSP students will meet with their mentors regularly, at least once per quarter, to discuss their progress with respect to their plan. A rubric will be established by the steering committee for mentors to use when assessing the students' progress and their ability to complete the plan prior to graduation. The student will be encouraged to develop a portfolio documenting their activities as they complete their plan.

In the student's last year in the program (by Spring Break), students will finalize and submit a portfolio to request the designation as a Grand Challenges Scholar. This portfolio will serve as a reflective exercise and a summary of the student's activities to complete their plan. The portfolio will be reviewed by a team of GCSP faculty and staff. It will be assessed based on how well the student activities meet the objectives of their plan, and the quality of the portfolio. If approved, the student will be designated as a Grand Challenges Scholar.

Recognition

The GCSP director will report all graduates of the program to the national GCSP steering committee each May; our students will be included in the national press release, as well as receive a letter from the NAE President. In addition, Rose-Hulman will provide our own certificates of completion, and a notation on student transcripts that the student has achieved

the status of Grand Challenge Scholar. Graduating Scholars will be provided with a special pin to attach to their graduation robe as well as wear in the future. We will also hold a social event such as a dinner or picnic each year in which those who have finished the certificate are recognized and mingle with those who are accepted applicants, along with faculty and staff involved in the program.

Draft rubrics for assessing student portfolios

The threshold for acceptable student work is an average score in each component of 3. These rubrics are based significantly on the American Association of Colleges and Universities VALUE rubrics. We do not claim the original documents as our own. The versions given here are modified to best fit our purposes and include independent modifications. We expect to revise these rubrics based on our experience launching our GCSP. While the wording or organization may change, the intent will remain.

Research Component

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Topic selection	Identifies a creative, focused, and manageable topic that addresses potentially significant yet previously less explored aspects of the topic.	Identifies a focused and manageable/ doable topic that appropriately addresses relevant aspects of the topic.	Identifies a topic that while manageable/ doable, is too narrowly focused and leaves out relevant aspects of the topic.	Identifies a topic that is far too general and wide-ranging as to be manageable and doable.
Existing Knowledge, Research, and/or Views	Synthesizes in-depth information from relevant sources representing various points of view/ approaches.	Presents in-depth information from relevant sources representing various points of view/ approaches.	Presents information from relevant sources representing limited points of view/ approaches.	Presents information from irrelevant sources representing limited points of view/ approaches.
Analysis	Organizes and synthesizes evidence to reveal insightful patterns, differences, or similarities related to focus.	Organizes evidence to reveal important patterns, differences, or similarities related to focus.	Organizes evidence, but the organization is not effective in revealing important patterns, differences, or similarities.	Lists evidence, but it is not organized and/ or is unrelated to focus.
Conclusions	States a conclusion that is a logical extrapolation from the inquiry findings.	States a conclusion focused solely on the inquiry findings. The conclusion arises specifically from and responds specifically to the inquiry findings.	States a general conclusion that because it is so general also applies beyond the scope of the inquiry findings.	States an ambiguous, illogical, or unsupported conclusion from inquiry findings.

Entrepreneurship Component

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Understanding stakeholders by asking questions	Deeply appreciates the nuances of different stakeholder's views. Includes unexpected, but well-justified, stakeholders in work.	Reports and respects different stakeholder's views. Includes a well-justified list of stakeholders in work.	Asks follow-up questions of stakeholders based on information gained. Seeks a broad definition of stakeholders.	Understands stakeholders only through existing knowledge. Limited definition of stakeholders.
Integrating varied sources to inform the risk and opportunity	Risk and opportunity stated in terms of multiple worldviews or lenses of understanding. Deep view of the context demonstrated.	Statements of risk and opportunity reflect more than two worldviews or lenses. Reasonable view of the context is demonstrated.	Statements of risk and opportunity reflect two worldviews or lenses. Moderate view of the context is demonstrated.	Statements of risk and opportunity reflect only one worldview or lens of understanding. Limited view of the full context.
Learns from, persists, and adapts through failure	The effort described was developed past multiple major challenges, with adaptation and persistence shown throughout. Lessons learned articulated for others to benefit from.	The effort described was developed past at least one major challenge, with some lessons learned and adaptation occurring. Moderate risk taken.	The effort described was developed past at least one moderate challenge, with some lessons learned and adaptation occurring. Minimal risk taken.	The effort described seems to have stopped at the first challenge, or it passed, but no lessons were learned and no adaptation occurred. Minimal risk taken.

Service Learning Component

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Analysis of Knowledge	Connects and extends knowledge (facts, theories, etc.) from one's own academic study/ field/ discipline to societal needs.	Analyzes knowledge (facts, theories, etc.) from one's own academic study/ field/ discipline making relevant connections to societal needs.	Begins to connect knowledge (facts, theories, etc.) from one's own academic study/ field/ discipline to societal needs.	Begins to identify knowledge (facts, theories, etc.) from one's own academic study/ field/ discipline that is relevant to societal needs.
Connections to Experience	Meaningfully synthesizes connections among experiences outside of the formal classroom to deepen understanding of fields of study and to broaden own points of view.	Effectively selects and develops examples of real-world experiences, to illuminate concepts/ theories/ frameworks of fields of study.	Compares life experiences and academic knowledge to infer differences, as well as similarities, and acknowledge perspectives other than own.	Identifies connections between life experiences and those academic texts and ideas perceived as similar and related to own interests.
Define Problem	Demonstrates the ability to construct a clear and insightful problem statement with evidence of all relevant contextual and societal factors.	Demonstrates the ability to construct a problem statement with evidence of most relevant contextual and societal factors, and problem statement is adequately detailed.	Begins to demonstrate the ability to construct a problem statement with evidence of most relevant contextual and societal factors, but problem statement is superficial.	Demonstrates a limited ability in identifying a problem statement or related contextual or societal factors.
Propose Solutions/ Hypotheses	Proposes one or more solutions/ hypotheses that indicates a deep comprehension of the problem. Solution/ hypotheses are sensitive to contextual factors as well as all of the following: ethical, logical, and cultural dimensions of the problem.	Proposes one or more solutions/ hypotheses that indicates comprehension of the problem. Solutions/ hypotheses are sensitive to contextual factors as well as one of the following: ethical, logical, or cultural dimensions of the problem.	Proposes one solution/ hypothesis that is "off the shelf" rather than individually designed to address the specific contextual factors of the problem.	Proposes a solution/ hypothesis that is difficult to evaluate because it is vague or only indirectly addresses the problem statement.
Civic Communication	Tailors communication strategies to effectively express, listen, and adapt to others to establish relationships to further civic action or address societal need.	Effectively communicates in civic context, showing ability to do all of the following: express, listen, and adapt ideas and messages based on others' perspectives.	Communicates in civic context, showing ability to do more than one of the following: express, listen, and adapt ideas and messages based on others' perspectives.	Communicates in civic context, showing ability to do one of the following: express, listen, and adapt ideas and messages based on others' perspectives.
Evaluate Outcomes	Reviews results relative to the problem defined with thorough, specific considerations of need for further work. Insightfully discusses in detail relevant and supported limitations and implications.	Reviews results relative to the problem defined with some consideration of need for further work. Discusses relevant and supported limitations and implications.	Reviews results in terms of the problem defined with little, if any, consideration of need for further work. Presents relevant and supported limitations and implications.	Reviews results superficially in terms of the problem defined with no consideration of need for further work. Presents limitations and implications, but they are possibly irrelevant and unsupported.

Global Dimension

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Knowledge <i>Cultural self awareness</i>	Articulates insights into own cultural rules and biases (e.g. seeking complexity; aware of how her/his experiences have shaped these rules, and how to recognize and respond to cultural biases, resulting in a shift in self-description.)	Recognizes new perspectives about own cultural rules and biases (e.g. not looking for sameness; comfortable with the complexities that new perspectives offer.)	Identifies own cultural rules and biases (e.g. with a strong preference for those rules shared with own cultural group and seeks the same in others.)	Shows minimal awareness of own cultural rules and biases (even those shared with own cultural group(s)) (e.g. uncomfortable with identifying possible cultural differences with others.)
Knowledge <i>Knowledge of cultural worldview frameworks</i>	Demonstrates sophisticated understanding of the complexity of elements important to members of another culture in relation to its history, values, politics, communication styles, economy, or beliefs and practices.	Demonstrates adequate understanding of the complexity of elements important to members of another culture in relation to its history, values, politics, communication styles, economy, or beliefs and practices.	Demonstrates partial understanding of the complexity of elements important to members of another culture in relation to its history, values, politics, communication styles, economy, or beliefs and practices.	Demonstrates surface understanding of the complexity of elements important to members of another culture in relation to its history, values, politics, communication styles, economy, or beliefs and practices.
Skills <i>Empathy</i>	Interprets intercultural experience from the perspectives of own and more than one worldview and demonstrates ability to act in a supportive manner that recognizes the feelings of another cultural group.	Recognizes intellectual and emotional dimensions of more than one worldview and sometimes uses more than one worldview in interactions.	Identifies components of other cultural perspectives but responds in all situations with own worldview.	Views the experience of others but does so through own cultural worldview.
Skills <i>Verbal and nonverbal communication</i>	Articulates a complex understanding of cultural differences in verbal and nonverbal communication (e.g. demonstrates understanding of the degree to which people use physical contact while communicating in different cultures or use direct/indirect and explicit/implicit meanings) and is able to skillfully negotiate a shared understanding based on those differences.	Recognizes and participates in cultural differences in verbal and nonverbal communication and begins to negotiate a shared understanding based on those differences.	Identifies some cultural differences in verbal and nonverbal communication and is aware that misunderstandings can occur based on those differences but is still unable to negotiate a shared understanding.	Has a minimal level of understanding of cultural differences in verbal and nonverbal communication; is unable to negotiate a shared understanding.
Attitudes <i>Curiosity</i>	Asks complex questions about other cultures, seeks out and articulates answers to these questions that reflect multiple cultural perspectives.	Asks deeper questions about other cultures and seeks out answers to these questions.	Asks simple or surface questions about other cultures.	States minimal interest in learning more about other cultures.
Attitudes <i>Openness</i>	Initiates and develops interactions with culturally different others. Suspends judgment in valuing her/his interactions with culturally different others.	Begins to initiate and develop interactions with culturally different others. Begins to suspend judgment in valuing her/his interactions with culturally different others.	Expresses openness to most, if not all, interactions with culturally different others. Has difficulty suspending any judgment in her/his interactions with culturally different others, and is aware of own judgment and expresses a willingness to change.	Receptive to interacting with culturally different others. Has difficulty suspending any judgment in her/his interactions with culturally different others, but is unaware of own judgment.

Interdisciplinary Component

	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
Use of other disciplines in student's own work	Non-STEM disciplinary perspectives are used to inform, influence, and guide the work the student describes in a significant and unexpected way. The outcome clearly respects the contribution and value of all disciplines.	Multiple non-STEM disciplinary perspectives are used to inform the work described in the portfolio, having been considered early in the project(s) and clearly influencing the effort's direction and outcome.	At least one non-STEM disciplinary perspective is used to inform the work described in the portfolio, but seems to have been added on at the end instead of influencing things from the start. Or the STEM perspectives are given significant primacy over other perspectives.	Multiple disciplinary perspectives are referenced in the student's portfolio, but do not inform one another. STEM disciplinary perspectives are the only ones used to inform and guide the work.
Openness to other disciplines	Non-STEM disciplinary perspectives are listened to, learned from, and used to intelligently critique and support discussion points on GC-related topics. Student shows willingness to accept critique of the STEM perspective given by other disciplines.	Non-STEM disciplinary perspectives are listened to, learned from, and used to intelligently critique and support discussion points on GC-related topics. Student shows willingness to conditionally accept critique of the STEM perspective given by other disciplines.	Non-STEM disciplinary perspectives are listened to and used to critique and support discussion points on GC-related topics, but mainly repeating back arguments of others. Minimal evidence given that shows the student has learned from the other disciplines.	Non-STEM disciplinary perspectives are listened to but not accepted as legitimate critiques of the STEM perspective.