

Grand Challenge Scholars Program



R·I·T

KATE GLEASON
College of ENGINEERING

College of LIBERAL ARTS

Table of Contents

Acknowledgements	3
1 Vision and Goals of the Grand Challenge Scholars Program at RIT	4
2 Grand Challenge Components.....	7
2.1 Overview	7
2.2 Components for Grand Challenge Scholars Program	10
2.2.1 General Education Framework	10
2.2.2 Minors	12
2.2.3 Cooperative Education (Co-op).....	12
2.2.4 Multidisciplinary Senior Design.....	13
2.2.5 Entrepreneurship	14
2.2.6 Study Abroad and Global Campuses.....	16
2.3 Unique Aspects of RIT's GCSP Program.....	17
3 Grand Challenge Scholar Recruitment and Mentoring	18
3.1 Recruiting Students	18
3.2 Application and Selection	20
4 Program Administration	20
4.1 Steering Committee and Faculty Mentorship	20
4.2 Mentorship, Support, Tracking, and Student Assessment	21
4.3 Program Assessment	22
4.4 Grand Challenge Scholar Recognition.....	22
4.5 Funding and Support	23
5 Conclusion.....	24

Acknowledgements

We would like to acknowledge a number of contributors to this proposal. From RIT, the core team of designers made up a “GCSP Task Force” during academic years 2015-16 and 2016-17. The task force included: Sarah Brownell (Industrial Systems Engineering), Juilee Decker (Museum Studies), Eric Hittinger (Public Policy), Andres Kwasinski (Computer Engineering), Wade Robison (Philosophy), and Brian Thorn (Industrial Systems Engineering). That team worked hard to develop the structure of this GCSP, and in that process demonstrated what we know to be true: when engineers and liberal arts faculty work collaboratively, amazing things can happen!

The task force was led by two exceptional administrators, Matt Marshall (Engineering) and Babak Elahi (Liberal Arts). Drs. Marshall and Elahi worked diligently to keep the process moving forward; when the bureaucratic wheels of the university became stuck in administrative muck, they got out and pushed!

Lastly, this effort would not have been possible without the support of the Teagle Foundation, and especially the insights, inspiration, and intellect of Dr. Loni Bordoloi Pazich. The Teagle Foundation had the foresight to see that support of the liberal arts should not only be relegated to liberal arts colleges. Thus, they funded a collaboration among several Association of Independent Technological Universities, including Rochester Institute of Technology, Lawrence Technological University, Worcester Polytechnic Institute, Harvey Mudd College, and Olin College of Engineering, to explore how we could better integrate liberal education into engineering and other technical curricula. The result is a concerted effort among all universities involved to stand-up GCSPs with a strong liberal arts “flavor” (with guidance from Olin College, which already has a GCSP). Members of this network will rely upon and learn from each other as we roll-out our individual GCSPs. Indeed, this network of cross-institutional and cross-disciplinary faculty and administrators may be one of the more important outcomes of this project.

Dean James Winebrake , PhD
College of Liberal Arts

Dean Doreen Edwards, PhD
Kate Gleason College of Engineering

1 Vision and Goals of the Grand Challenge Scholars Program at RIT

Rochester Institute of Technology (RIT) is pleased to submit this proposal to establish a National Academy of Engineering (NAE) Grand Challenge Scholars Program (GCSP). As one of the largest, private technological institutes in the world, we believe our GCSP will be uniquely positioned to have a transformative effect on both future engineering professionals and the non-engineers with whom our engineering workforce must engage to successfully address society's greatest problems. By intentionally integrating the liberal arts into our GCSP – and by opening our GCSP to non-engineering students from diverse programs and backgrounds – we expect our GCSP to have a significant impact on the development and delivery of integrative liberal arts and engineering curricula. Dean Winebrake has commented on this integration of engineering and the liberal arts in the *Chronicle of Higher Education*.¹

With a deep commitment to undergraduate education and one of the largest cooperative education programs in the country, RIT produces graduates who are immediate contributors in their chosen fields. Less well known is RIT's diverse and interdisciplinary offerings in the liberal arts (encompassing the humanities, social sciences, and performing arts). RIT's liberal arts' programming has grown over the past decade from only a few degrees to fourteen degree programs spanning a wide range of social science and humanities disciplines, as well as a number of interdisciplinary options (such as *Digital Humanities and Social Sciences* and *Human-Centered Computing*). Moreover, RIT revised its general education curriculum in 2010 to help broaden student preparation; thus, more than ever, engineering and other majors have the opportunity to infuse their career training with a rich complement of liberal arts, a curricular blend well-suited for the tangled challenges of the 21st century. The GCSP at RIT will increase students' awareness of these challenges and provide the experiences and curricular pathways they need to bridge disciplines, approach problems holistically, and engage across domains of knowledge and practice. Our GCSP includes structural features that will allow students and faculty to co-create curricular and co-curricular opportunities to help students develop the skills, knowledge, and awareness necessary to become innovative leaders and problem solvers.

Given our size, introducing a GCSP is a non-trivial step for RIT.² It requires generating, enhancing, and formalizing cooperation among colleges, and collaboration among faculty who may have never worked together. Integrating the GCSP into RIT will also call for a significant shift in the mindset of faculty, students, and staff about what a practicing engineer should know, and why humanistic, social scientific, and creative practices and theories are essential to that practice. The potential gains for RIT and its students are enormous. These gains include:

- A chance to play a significant role in solving the major challenges of the 21st century;

¹ See <http://www.chronicle.com/article/Bringing-the-Liberal-Arts-to/229671>.

² Note that RIT has nine "colleges" on campus: Kate Gleason College of Engineering; College of Liberal Arts; Saunders College of Business; College of Science; College of Applied Science and Technology; College of Imaging Arts and Sciences; College of Health Sciences and Technology; B. Thomas Golisano College of Computing and Information Sciences; and Golisano Institute for Sustainability. RIT also is home to the National Technical Institute for the Deaf, which also has standing as a college at RIT and provides an excellent opportunity to extend GCSP programming to deaf and hard-of-hearing students.

- Integration of skills, attitudes, behaviors, and mindsets that attune (1) engineers to the complexity of non-technical aspects of seemingly technical problems, and (2) non-engineers to the technical aspects of these problems;
- The creation of a national model for curricular integration of technical skills and “transversal skills” or “power skills”³; and,
- Graduates who are well-prepared to move into leadership positions and have a better grasp on the skills employers say graduates need, such as:
 - the ability to communicate and collaborate well,
 - the ability to think critically about multiple aspects of a problem, and
 - the capacity to think through the ethical implications of an idea.

Employers’ demand for graduates with critical skills and perspectives acquired through the liberal arts has been documented and disseminated through college and university associations.⁴ For instance, the Association of American Colleges and Universities (2015) reported that 91 percent of employers agreed that for career success, “a candidate’s demonstrated capacity to think critically, communicate clearly, and solve complex problems is *more important* than his or her undergraduate major.” This is reinforced by another statement indicating that 96 percent of employers value a candidate’s ability to “solve problems with people whose views are different than their own.” These “power skills” are really the software of any (even the most technical) education. Through the integration of the liberal arts into technical disciplines, our graduates will continue to acquire new capabilities, access counterintuitive knowledge, and develop an appreciation for life-long learning.

Led by faculty in the Kate Gleason College of Engineering (KGC OE) and the College of Liberal Arts (COLA),⁵ this proposal for a GCSP is well-aligned with the strategic direction of the university. Together, these two colleges provide the framework for the *T-shaped* graduate touted both in the popular press and in academic publications.⁶ In fact, our GCSP aligns with our new Strategic Plan (“Greatness through Difference, 2015-2025”).⁷ That plan emphasizes interdisciplinary research and curricula across the entire institute. The plan presents an ambitious set of goals, many of which reflect the underlying integrative values and philosophy of a GCSP. Most notable among these is RIT’s emphasis on linking technical expertise with innovation and the arts: ***RIT will offer opportunities for study at the***

³ Often called “soft skills,” we prefer “power skills.” This may be attributed to Anant Agarwal, who recently wrote about “power skills” being a critical art of career success. See <https://www.edsurge.com/news/2016-12-14-rethinking-credentials-the-power-of-soft-skills>. In addition, this is not only about “skills,” but also about attitudes, behaviors, and mindsets, as mentioned above.

⁴ <https://www.aacu.org/leap/public-opinion-research/2015-survey-falling-short>.

⁵ We will roll-out the GCSP at RIT with engineering and liberal arts students; however, it is our goal to include other colleges at RIT in this program. We envision rich opportunities for students in our computing programs, design and art programs, business programs, and applied science and technology programs. In fact, our ultimate goal is for GCSP at RIT to become as a deliberate, wide-reaching program that can bring many of our distinct colleges together under a single tent.

⁶ See, for example, Jeffrey J. Selingo, “The myth of the well-rounded student? It’s better to be T-shaped.” *The Washington Post* 1 June 2016, <https://www.washingtonpost.com/news/grade-point/wp/2016/06/01/the-myth-of-the-well-rounded-student-its-better-to-be-t-shaped/>.

⁷ See <https://www.rit.edu/president/strategicplan2025/>.

intersection of technology and the arts, imagination and application, and rigor and curiosity – all designed to meet the demands of future careers in the complex global economy."

Several other goals in the university’s Strategic Plan reinforce key aspects of the GCSP, including the following:

- ***"RIT will build upon its strong academic portfolio, extensive experiential learning and co-curricular offerings, and the rich diversity of its people and programs to develop ‘T-shaped’ graduates possessing both disciplinary depth and breadth across multiple skills and competencies."***
- ***"Through a blend of curricular, co-curricular, and experiential offerings, RIT will build a leadership program that will equip more graduates to become leaders in their fields."***
- ***"RIT will be a center of innovation, creativity, and entrepreneurship that serves as an important economic engine for Rochester, the region, and the nation."***
- ***"RIT students and faculty will be internationally recognized for their global experience, their mastery of intercultural competencies, and their engagement with globally relevant problems."⁸***

We summarize the goals of our GCSP and their alignment with the RIT Strategic Plan in Table 1. This table shows each of our primary GCSP goals and the “dimension” of our Strategic Plan to which these goals align. More details about each strategic plan dimension can be found at <https://www.rit.edu/president/strategicplan2025/>.

Table 1. Alignment of primary GCSP goals and elements of the RIT Strategic Plan.

<i>Strategic Plan Alignment</i>	<i>GCSP Goals</i>
<i>Dimension One: Career Education and Student Success</i>	Integrate liberal arts content, methods, skills, and mindset into engineering and other technical disciplines.
<i>Dimension One: Career Education and Student Success</i>	Increase student awareness of, appreciation for, and interest in solving grand challenge problems facing society.
<i>Dimension Two: The Student-Centered Research University</i>	Provide a flexible platform for faculty and students to co-create curricular and research opportunities.
<i>Dimension Five: Organizational Agility</i>	Encourage an interdisciplinary mindset across faculty, students, and staff within the entire institute.
<i>Dimension Three: Leveraging Difference</i>	Expand opportunities for students to engage in international learning and problem-solving activities across cultures and in diverse environments.
<i>Dimension One: Career Education and Student Success</i>	Provide students with opportunities to develop leadership and entrepreneurial capacities.
<i>Dimension One: Career Education and Student Success</i>	Reinforce the importance of community engagement and service and provide students opportunities for such engagement.

Given these explicitly articulated goals around interdisciplinarity, leadership, global awareness, diversity, and innovation, RIT has the institutional will to support and champion a GCSP. RIT’s GCSP will improve

⁸ Greatness through Difference: 2015-1025 Strategic Plan, https://www.rit.edu/president/strategicplan2025/pdfs/strategic_plan.pdf, p. 12.

and expand the educational options and outcomes available to students. GCSP Scholars will have access to a new program that equips them with the skills needed to address important grand challenges. Addressing such challenges requires reframing them not as isolated technical problems, but as interconnected challenges infused with a host of cultural, social, political, and human complexities. RIT has the faculty, the institutional will, and the integrative curricular links to build such a program. Students both in and out of the GCSP will benefit from increased interdisciplinary collaboration in courses and projects. Finally, joint activities among faculty from disparate yet complementary academic components will open up organizational boundaries and encourage collaboration inside and outside the classroom. Ultimately, the GCSP at RIT will be grounded in the notion that all grand challenges are human challenges, and that leadership in engineering requires strong grounding in the liberal arts.

2 Grand Challenge Components

2.1 Overview

To enter the program, students must submit a proposal that outlines the pathway they intend to follow to meet the GCSP requirements. Prospective GC Scholars will meet with a GCSP faculty mentor *prior* to submitting the pathway proposal. Thus, students and faculty co-create each scholar's pathway for completing the program requirements. These pathways may comprise curricular, co-curricular, and extra-curricular activities that have been pre-determined to meet program requirements; however, students are free to identify opportunities outside this list to include them in their portfolio. Proposed activities will be reviewed and approved by the Steering Committee and, if approved, will thereafter become an option for future students.

The GCSP is intended to be highly customizable and flexible to meet the diverse and evolving interests and opportunities that our students identify. For the purpose of tracking student progress in our GCSP, the activities used to satisfy the requirements will be classified by the Steering Committee as *low*, *medium*, or *high* based on the depth of experience and effort required of the student. Existing activities and aspects of the curriculum that apply to the GCSP are described in the sections that follow and are listed in Table 2, along with a preliminary classification to be finalized by the Steering Committee. Further description of these activities is given in the sections that follow.

The guiding principle of the GCSP at RIT will be the integration of liberal learning and technical fields towards the aim of contributing as a partner to developing realizable solutions to the world's Grand Challenges. Thus, the key components are integrative learning (inclusive of humanities, social science, arts, and engineering), real-world application, and collaboration. The specific ways in which these ideals are achieved will be unique to each student, but all students will share several basic elements. Students will be required to fulfill at least one activity from each of the five categories listed in the first column of Table 2. At least two activities must come from the "high" level of engagement in two distinct categories; and at least one activity from the "medium" or "high" level of engagement in a third distinct category. The list presented in Table 2 will evolve as new options are created. Note that students may not "double-count" single activities under multiple categories. For example, a student who is the team lead on an interdisciplinary, GC-related senior design project may elect to use that activity *either* in the

category of “Research/Project” *or* in the category of “Interdisciplinary,” but not both. Similarly, a student who participates in a co-op activity with an international start-up company may elect to use that co-op *either* for the “International” category *or* for the “Entrepreneurial” category, but not both.

As students identify new opportunities to fulfill the requirements of the GCSP, they are responsible for discussing these with their faculty mentor. If the faculty mentor agrees that the experience meets the GCSP requirement, the mentor is then responsible for seeking formal approval from the Steering Committee for the proposed activity. As new activities are approved, they will be added to the list in Table 2 and categorized by activity level according to the Steering Committee’s recommendations. Detailed descriptions of the components listed in Table 2 are presented in the sections that follow.

Table 2. Examples of how the required components of the GCSP will be attained. Students must complete at least one activity in each of the five component areas. At least two activities must come from the “high” level of engagement in two distinct categories; and at least one activity must come from the “medium” or “high” level of engagement in a third distinct category.

Component	Level of Engagement		
	Low	Medium	High
Research/Project	<ul style="list-style-type: none"> Course project involving GC topic 	<ul style="list-style-type: none"> Semester-long independent study involving research project on GC topic 	<ul style="list-style-type: none"> Research co-op involving GC topic Senior design project directly addressing GC topic
Interdisciplinary	<ul style="list-style-type: none"> GCSP gateway course A disciplinary Immersion related to the Grand Challenges 	<ul style="list-style-type: none"> An <i>interdisciplinary</i> Immersion related to the Grand Challenges GCSP Immersion (to be developed) 	<ul style="list-style-type: none"> GCSP minor (to be developed) Team lead on interdisciplinary senior design project
Entrepreneurial	<ul style="list-style-type: none"> Course work in entrepreneurship Participate in Idea Lab experience at entrepreneurial center 	<ul style="list-style-type: none"> Participate in RIT Shark Tank Attend RIT entrepreneurship conference 	<ul style="list-style-type: none"> Entrepreneurship minor Advance a concept through RIT business incubator Co-op with start-up company Entrepreneurship scholars program
Global	<ul style="list-style-type: none"> Course work related to global concerns 	<ul style="list-style-type: none"> Immersion in globally oriented area such as Global Studies, International Relations, Modern Languages and Cultures, etc. Participation in globally oriented local activity 	<ul style="list-style-type: none"> GCSP-designated Faculty-Led Study Abroad Co-op abroad Semester study abroad at affiliate university
Service	<ul style="list-style-type: none"> Volunteer in community Member in service-oriented student group 	<ul style="list-style-type: none"> Imagine RIT exhibit based on GCSP Leadership role in community volunteering Leader in service-oriented student group 	<ul style="list-style-type: none"> Lead on MSD project in GC tract Service internship Complete project as part of Studio 9.30 Design Consultancy at entrepreneurial center

2.2 Components for Grand Challenge Scholars Program

2.2.1 General Education Framework

All students at RIT follow a framework to meet the university's general education requirements. This framework provides the opportunity for students to choose coursework that provides a strong foundation for becoming Grand Challenge scholars. Though students must do much more than complete coursework to become a Grand Challenge scholar, leveraging the general education framework is an efficient way to expose students to many of the concepts that are critical to the Grand Challenges and that are typically taught within the liberal arts and sciences. This section provides an overview of that framework and the types of courses students will take as Grand Challenge Scholars

Grand Challenge Gateway Course: As a foundational course in general education, students in the GCSP will all be required to take the newly developed *GCSP Gateway Course*. The course was developed and approved in the Spring of 2015-16 and was offered for the first time in the Fall of 2016. The course is co-taught by one faculty member from Engineering and one from Liberal Arts. The first iteration of the course focuses on the Grand Challenge of access to clean water, but it uses this topic to introduce broader concepts such as ethical decision making, wicked problems, cultural contexts and diversity, project-based approaches to course work, collaboration, interdisciplinary research, and communication to diverse stakeholders, to name a few. While future iterations of the course might focus on different Grand Challenges, or a combination of challenges, the learning outcomes will remain the same: that students be able to analyze complex problems through interdisciplinary means, gain skills in project-based solutions, learn to work in teams, and present their work effectively to diverse audiences in ways that make their work applicable to clearly identified problems.

General Education Perspectives: All students at RIT must also choose courses to fulfill a set of *perspectives*, which provide students with preparation in fundamental forms of inquiry across a diverse set of liberal arts and science disciplines. These perspectives are *artistic, ethical, global, social, natural science inquiry, scientific principles, and mathematical*. Students at RIT take one course in each of these areas, and though a particular course may carry designation for more than one perspective, students may only use the course to fulfill a single perspective. For engineering students, three of these perspectives (mathematical, natural science inquiry, and scientific principles) are embedded in the required math and science courses, but the remaining four are based primarily in liberal arts and humanities: artistic, global, social, and ethical. Students in the GCSP may select courses that emphasize areas critical to the Grand Challenges. Table 3 presents a sample of liberal arts courses GC scholars may take to meet these perspectives while providing a general education foundation that complements the Grand Challenges.

Table 3. Sample courses that students can take to fulfill general education perspectives that may be counted toward the GCSP requirements.

<p><u>Ethical:</u></p> <ul style="list-style-type: none"> • Science, Technology, and Values • Technology, Ethics, and Global Politics • Introduction to Environmental Studies • Ethics in the Emerging Digital • Values and Public Policy 	<p><u>Global:</u></p> <ul style="list-style-type: none"> • Discovery of Sociology and Anthropology • Culture and Globalization • Sustainable Development • Technology in the Modern World • Science and Technology Policy
<p><u>Artistic:</u></p> <ul style="list-style-type: none"> • Public Speaking • Computation and Culture • Media Adaptation • Written Argument • Introduction to Visual Culture 	<p><u>Social:</u></p> <ul style="list-style-type: none"> • Information Revolution • Medicine & Public Health in American History • Critical Thinking • Contemporary Issues in Public Policy • Social Consequences of Technology

Immersion: Every student is also required to complete an *immersion* in a general education area of their choosing. The immersion is a set of courses that provides deeper exploration of a topic within or across liberal arts and science disciplines. Immersions range from the highly focused and discipline specific (for example, Philosophy, or Criminal Justice) to the interdisciplinary and thematic (for example, Legal Studies or Peace Studies). An immersion consists of three upper-level courses focused on a specific theme or falling within a specific discipline. Students in the GCSP may select an immersion that is interdisciplinary and complements one or more of the Grand Challenges. Some examples of these types of immersions are listed below (*asterisks denote that students may pursue additional coursework to complete a minor in that topic*):

- Communication*
- Cultural Anthropology
- Digital Literatures and Comparative Media*
- Environmental Studies*
- Ethics*
- Globalization Theory
- Health and Culture
- Public Policy*
- Museum Studies*
- Science and Technology Studies*

In addition to these interdisciplinary immersions (created and delivered through inter-departmental and cross-college collaborations), the GCSP Steering Committee will work in 2017-2018 to develop a special *Grand Challenges Immersion*. The immersion will have one course (yet to be designed) as a requirement for the Immersion, and two courses from a slate of options drawn from an array of courses approved for general education.

2.2.2 Minors

In some cases, students who complete the general education Immersion may choose to pursue a minor (not required) in that area of study by completing two additional upper-level courses. Areas with an asterisk from the list of topics above denote immersions for which a minor is available. Other minors closely related to the Grand Challenges are available outside of liberal arts, including the following:

- Bioinformatics Analysis
- Engineering (various disciplines)
- Computer Science
- Computing Security
- Entrepreneurship
- Environmental Modeling
- Health Communication
- Sustainable Product Development
- Urban Studies
- Water Resources

Eligibility to pursue a minor typically depends on students' majors and whether they have the necessary base prerequisites (e.g., Calculus and Physics for the engineering minors) to pursue them. Regardless, the minor offers another opportunity to fulfill some of the GCSP requirements through coursework. In the future, as the GCSP develops, it is logical that we will build on the projected immersion to create an interdisciplinary minor that focuses specifically on the GCSP.

2.2.3 Cooperative Education (Co-op)

Most degree programs at RIT, including all programs in engineering, require that students complete one year of cooperative (co-op) career experience in which they work under the supervision of a professional in the students' field of study. The required co-op program provides a unique opportunity for students to directly apply their skills and learning to real work experience. This offers the GCSP at RIT a framework upon which to build a key component of student pathways. RIT has an Office of Career Services and Cooperative Education (OCSE) dedicated to identifying co-op opportunities for our students and providing students with the preparatory training to obtain a job and maintain professional behavior in the workplace.

Since companies hire our students to work on projects that are current, many of the existing co-op experiences are already related in some way to one or more of the Grand Challenges. The GCSP will encourage students to pursue job opportunities that have strong connection to the Grand Challenges. Below are some excerpts of job descriptions for recent co-op positions aligned with the Grand Challenge to which they relate:

- Engineer Better Medicines: "(Company) is an early stage developer of a new form of Photodynamic Therapy (PDT) and has developed a wearable medical device to enhance the use of existing photosensitizer drugs while reducing collateral damage on patients for improved cancer therapeutic outcomes."
- Secure Cyberspace: "We are a leading and growing global provider of payment processing and information management solutions. We are passionate about providing payment solutions with unparalleled security and control for corporate purchasing and transaction monitoring needs. We hire people who share the same passion for continuous innovation and client service that is unparalleled in our industry."

- Make Solar Energy Economical: “Perform site-specific engineering analysis, design, evaluation, or review of third party designs for grid connected solar photovoltaic systems applying knowledge of structural energy requirements, local climates, solar technology, thermodynamics, and national and local codes.”
- Provide Access to Clean Water: “(Company) is a Non-Governmental Organization (NGO) devoted to improving the standard of living for those that live in some of the most poverty stricken communities of the world. Our focus is to provide communities with access to medical treatment, medication, nutritional security, clean water, and health education.”
- Advance Health Informatics: “We develop innovative, noninvasive monitoring technologies that save, extend and improve the lives of people of all ages, in all walks of life. These revolutionary technologies are helping to solve "unsolvable" problems that have plagued the healthcare industry, while taking the pain and discomfort out of blood monitoring.”
- Engineer the Tools of Scientific Discovery: “(Company) engineering interns play a significant role in the design, development, testing, and manufacturing of spaceflight hardware.”

2.2.4 Multidisciplinary Senior Design

Nearly every undergraduate program at RIT requires its students to complete a senior capstone activity. Students in engineering programs complete a multidisciplinary senior design (MSD) experience during their fifth year of study in which they work on multidisciplinary teams of four to eight students to complete a project over the course of two semesters. The MSD program coordinator determines the necessary disciplinary composition of the team based on the project demands. This often includes students who are in programs that reside in colleges outside of engineering, including liberal arts, business, and imaging arts and sciences.

The MSD experience takes place within the framework of two courses. In the first course, student teams work with the project sponsor (customer) to identify the customer needs, specify engineering requirements, develop and evaluate concepts, and create a detailed design. In the second course, students systematically build and test their prototypes or implement their processes, beginning at the subsystem level and culminating with fully integrated system testing and customer handoff. This MSD experience offers a tremendous opportunity not only for students to address aspects of the Grand Challenges directly through their assigned project, but to work on teams that are truly multidisciplinary.

One goal of the GCSP at RIT is to broaden these potential experiences to include liberal arts and science skills, and to challenge students to think beyond the instrumentalist terms of the “customer” and to consider the design project in its broader socio-cultural and environmental impacts as much as possible. The term “multidisciplinary” has traditionally been used narrowly in the context of the MSD course to signify that multiple types of engineers were assigned to a single project. However, we know from over ten years of running the program that many projects would benefit greatly from either having students on the team who are outside of engineering or having engineering students with a deeper appreciation for the social and cultural factors that need to be considered to fully address the problems they are asked to solve. Modifying the traditional approach to educating engineers by more completely integrating the liberal arts will begin to prepare students to address these problems that tangle technical

demands with the many other factors that influence how we must approach solving the Grand Challenges.

As an example, a current MSD project involves a team of students developing an imaging drone for an archaeologist who wants to produce high-resolution photographs of potential dig sites in difficult-to-reach areas prior to visiting the locations in person. Typically, a project like this would be taken on by a team of engineering students who would eagerly address the technical challenges of developing the drone to meet the client's needs, without having full awareness about the other non-engineering factors that are relevant to the project. For example, a student with an archaeology background could enhance client interaction and help the team better understand how the needs an archaeologist has for a drone may differ from what a hobbyist may need. More significantly, since the drone is likely to be used in regions of the world where drone technology is foreign and perhaps threatening, the team needs people who are prepared to incorporate social and cultural considerations into the project design, or perhaps develop an approach to introduce a drone to the community in which it might fly. This project and the outcomes it produces would benefit strongly if it was truly multidimensional and interdisciplinary, and included students from the sociology and anthropology program to work with the engineering students. Ultimately, our goal is that the GCSP, through its careful integration of liberal arts and sciences, will produce students who have the full set of academic preparation and experience to be able to address both the technical challenges of the project and their impact on the critical social and cultural considerations to fully address the problem.

Another example of a current senior design project that is truly multidisciplinary is sponsored by the Cary Graphic Arts collection at RIT in which a team of students is working on the reproduction of an historically accurate printing press that would have existed in the period from 1640 to 1750. Since historical accuracy is such a critical aspect of this project, the team includes students and faculty advisors from the museum studies program at RIT to provide background and expertise that engineering students lack. Though this project isn't directly aligned with any of the Grand Challenges, it is an example of how we are making effort to work collaboratively across colleges and programs to ensure we match the needs of senior design projects with the students who have the academic background to contribute in meaningful ways to the project (<https://www.youtube.com/watch?v=gVbGoQVDYjk>). Efforts are already underway across the university to break away from the silo approach that predominates among capstone design projects in all disciplines. A task force has been established to explore how these isolated experiences could become more interdisciplinary, which has already led to the college of engineering including students from several other colleges, including liberal arts, on student projects.

2.2.5 Entrepreneurship

In 2007, RIT created The Albert J. Simone Center for Student Innovation and Entrepreneurship to foster innovation and entrepreneurship in the RIT community. The Simone Center has become an integral part of RIT's commitment to innovation and will also be a valuable resource for students in the GCSP. The Simone Center employs a multidisciplinary team of faculty and industrial professionals to provide the teaching and coaching expertise necessary to support the Simone Center's mission. Students may engage with the Simone Center through a variety of programs and events that are flexible enough to

enable students across multiple programs to incorporate them into their plans of study. Some of the programs and events that are particularly well-aligned with the GCSP are the following:

- **The Idea Lab** – Students spend one weekend working intensely on multidisciplinary teams to develop innovative solutions to a set of specific problems identified by the customer who also participates in the event. Groups are advised by a faculty member and Simone Center coach and then present their innovative approaches at the end of the event. Successful projects may then be further developed using a number of different pathways that contribute to the students' plan of study (<https://www.youtube.com/watch?v=ExD6yPigYMI>).
- **Innovation Challenge Grant** – Annual solicitation to provide seed grants to student teams to advance innovation-related projects that are in the early-stages and have the potential to develop into long-term projects.
- **Entrepreneurship Scholars Program** – A competitive program for upper level students to be immersed in a holistic entrepreneurship program that involves a residential community, entrepreneurship coursework, unique entrepreneurial co-ops, and 24/7 access to the student incubator. Students who complete the program receive a minor in entrepreneurship and have the opportunity to earn course credit for maturing a business concept.
- **Studio 9.30 RIT Design Consultancy** - A multidisciplinary studio focused on the production of access and health technologies products. This group focuses on helping people with disabilities in the Rochester community.
- **Tiger Tank Competition** – Similar to the television show *Shark Tank*, this competition gives student teams the opportunity to pitch their business ideas to judges to win cash prizes.

Along with this list of activities, students may take traditional coursework on entrepreneurial topics, including courses in *Applied Entrepreneurship and Commercialization* as well as *Applied Venture Creation*. Through the Simone Center and in conjunction with their home program, students may also receive independent study credit for working on advancement and realization of entrepreneurial ideas. The Simone Center also is home to a student led club called *Innovators Hour*, which promotes innovative and entrepreneurial thinking through weekly activities and events.

The programs and activities described above are intended to enhance a student's RIT education by providing the resources that students need to transform their innovative thinking into advanced stages of product realization. The center addresses the challenges of finding the space within a student's plan of study for entrepreneurial experience by making the program highly adaptable based on the inherent curricular constraints of the wide variety of students at RIT. For students in engineering programs, for example, the co-op and senior design requirements are ideal opportunities for leveraging the offerings of the Simone Center. The themes chosen as the problems that students address are adaptable to the needs of the stakeholders; so it would be possible to focus some of these projects and events on issues related to the NAE Grand Challenges. As an example, the previous Idea Lab events have focused on addressing needs in health care and needs for individuals with disabilities. While these themes already have a connection to some of the Grand Challenges, future versions of the Idea Lab could be scaled to focus on one or more Grand Challenges.

2.2.6 Study Abroad and Global Campuses

Although RIT offers a wide range of study abroad opportunities and assistance to our students to pursue these opportunities, the GCSP pathway will focus on what Dr. James Myers, Associate Provost of International Education and Global Programs describes as intentional, interdisciplinary, tailored, and high-impact experiences abroad in which student and faculty research interests are integrated into usable outcomes. GCSP at RIT will work directly with faculty and programs to develop faculty-led study-abroad experiences that tie directly into the fourteen Grand Challenges.

RIT provides a supportive context for study abroad into which we can integrate GCSP goals. First, every undergraduate program at RIT is required to identify one semester as a study abroad “pathway” – that is, a semester that the student’s home department has designated as amenable to an international experience. This makes the university’s commitment to study abroad intentional at the program level. Students can use this, or other semesters, to take advantage of four options for study abroad comprising 400 programs across 50 countries. These four options are Gateways, Global Campuses, Faculty-Led Experiences Abroad, and Affiliate programs.

- **Gateways:** Gateways are customized programs in partnership with a host university and are usually major specific. Students earn RIT credit with pass/fail grading, and pay RIT tuition.
- **Global Campus Programs:** RIT has established four international location campuses in Dubrovnik and Zagreb, Croatia; Dubai, United Arab Emirates; and Pristina, Kosovo. These locations align their curricula and academic calendar to RIT, delivering a handful of RIT degrees, and allowing all RIT students a study abroad option. Classes are in session year-round, but course offerings vary depending on campus and semester. These international locations offer a study abroad opportunity that earns students direct RIT credit at RIT tuition. Students are assigned letter grades. Each of these locations allows for integration of Grand Challenges into a student’s global component of the GCSP.
- **Affiliate Programs:** These programs are facilitated by partner universities or organizations, and help to broaden the possible variety of international experience options for Grand Challenge Scholars at RIT. Tuition is aligned with the partner institutions, and credits are transferred to RIT. Existing affiliates currently operate across the globe, from Japan to Latin America to the EU.
- **Faculty-Led Programs:** These programs are the most promising for Grand Challenge Scholars because they emerge organically from faculty interest, and sometimes from mutual faculty-student interests. These experiences are often research-intensive and outcomes-oriented. Current faculty-led programs include a disaster-risk reduction research trip to Bonn, Germany, and a social justice pair of courses for the summer session in Ireland. Current exploratory trips are underway in Cuba and Peru.

Within these four study options, faculty-led experiences allow for a more targeted approach to research and/or service. One indication of the ways in which study abroad at RIT can produce high-impact interdisciplinary outcomes emphasizing research or service is RIT’s impressive track-record of innovative undergraduate Fulbright fellows. Last year, three RIT students garnered this honor, working on a range of challenges. One student focused on the complex problems of public health and HIV treatment in

Dakar, another double-majoring in international studies and ASL interpreting helped develop a sign-language interpreting program in collaboration with the National Association of the Deaf in the Dominican Republic, and another helped produce a remote sensing protocol for identifying vulnerabilities and problems surrounding the Hekla Volcano in Iceland. Faculty and students are already working on these types of problems that align with the Grand Challenge framework. In addition, many other students have worked directly with faculty to participate in faculty-led experiences in Sweden, Ghana, China, Japan, Italy and elsewhere. These usually interdisciplinary, research and application intensive experiences comprise the model upon which GCSP will build as we establish the program here.

Each year, RIT faculty produce a number of proposals for faculty-led experiences abroad. Once established, GCSP at RIT will work closely with our Office of International Education and Global Programs to identify study-abroad programs that align with the goals of GCSP as an interdisciplinary approach to global problems. We are confident that each year we can identify a number of experiences that students will be able to count towards their pathway to becoming a Grand Challenge Scholar.

2.3 Unique Aspects of RIT's GCSP Program

The RIT GCSP leverages a number of unique aspects of our institution, including but not limited to our exceptional Co-op Program; our Multidisciplinary Senior Design Program; our Ethics across the Curriculum Program; our Dual Degree in Engineering/Public Policy; our Imagine RIT festival; and other activities. Many of these aspects have been highlighted already, but are described below as well.

Co-op Program: Unlike students at other universities enrolled in four-year programs who may only have the opportunity to complete internships in the summer months, RIT students in co-op programs are scheduled to co-op during the academic year as well as in the summer, providing a greater level of flexibility for each student.

GCSP Immersion: RIT's general education requirements include an "immersion," or 3-course cluster or concentration of courses either within a discipline or across disciplines. Some existing interdisciplinary immersions suitable for GC Scholars include Global Justice and Peace Studies, Ethics, Health and Culture, STS, to name only a few.

GCSP Minor: At RIT, students are not required, but have the option of completing a minor. GC Scholars can gain the highest level of GC curricular preparation by taking two additional courses from the slate of GCSP approved courses to complete a GCSP minor. Currently, there are a number of minors that are well-aligned with aspects of the Grand Challenges (e.g., sustainable product development, public policy, and science, technology, and society). In the future, as the GCSP develops, we may create an interdisciplinary minor that focuses specifically on the GCSP.

Multidisciplinary Senior Design (MSD): Students in engineering programs at RIT complete a multidisciplinary senior design experience during their fifth year of study in which they work on multidisciplinary teams of four to eight students to complete a project over the course of two semesters. In the first course, student teams work with the project sponsor (customer) to identify the customer needs, specify engineering requirements, develop and evaluate concepts, and create a

detailed design. In the second course, students methodically build and test their prototypes or implement their processes, beginning at the subsystem level and culminating with full integrated system testing and customer handoff.

The nature of the KGCOE capstone experience can naturally support a wide variety of projects. While a small percentage of projects only require skills from a single discipline, >90% require the skills of at least one additional discipline. Some projects also include students from other colleges. In 2015-16 alone, some MSD teams included students from Industrial Design, Business, Biomedical Technology, Furniture Design, and Museum Studies. Members of the MSD core faculty are actively seeking collaborations with faculty in other colleges at RIT in order to produce higher quality outcomes and project opportunities that more closely represent real-world interactions. We expect that the interdisciplinary efforts will expand when the GCSP program is established. Current projects can be reviewed at:

<http://edge.rit.edu/edge/Senior%20Design%20I/public/Home>.

Ethics Across the Curriculum: One of the members of the GCSP implementation task force is RIT's Hale Endowed Chair in Ethics, Dr. Wade Robison. In 2014, Dr. Robison initiated an interdisciplinary ethics program in which faculty participants developed courses to satisfy RIT's General Education requirement that all students complete an "Ethical Perspective" course. Thus, an intentional inclusion of ethical thinking as a part of all students' education is grounded in the RIT mission. Ethics will inform not only the gateway course (which serves as a foundational step), but will infuse at least one other general education course in the Grand Challenge Scholar's career at RIT.

Dual Degree in Engineering and Public Policy: Every undergraduate program in the College of Engineering has an option for students to simultaneously pursue a Master of Science degree in "Science, Technology, and Public Policy" while pursuing the BS degree in their engineering discipline. This program is a natural fit with the GCSP program that will enable qualified students enrolled in a technical BS program but interested in public policy issues to pursue a graduate level degree in a field that combines their technical and policy interests. Likewise, the requirements of both degrees offer a rich set of opportunities to meet the requirements of the GCSP.

Imagine RIT: *Imagine RIT Innovation and Creativity Festival* is a campus-wide event that showcases the innovative and creative spirit of RIT students, faculty and staff. Visitors experience the breadth and depth of RIT through interactive presentations, hands-on demonstrations, exhibitions, and research projects set up throughout campus. Multiple performance stages with live music and entertainment are also a hit with visitors of all ages. Held annually each spring, Imagine RIT is the kickoff to Rochester's rich festival season. The festival offers an excellent opportunity for students in the GCSP to showcase the various projects that they complete as part of their program.

3 Grand Challenge Scholar Recruitment and Mentoring

3.1 Recruiting Students

The overall aim of recruitment efforts will be to ensure that diverse cohorts of students are exposed to each other and to different ways of thinking, and that these students are given the opportunity to work

in collaborative teams on problem-based assignments with potential real-world impact. In academic year 2016-17, we enrolled one cohort of students into a Grand Challenges gateway course (described previously) both as a way to pilot a key piece of the curriculum, and as a way of beginning to establish a presence of GCSP both for faculty and for students. In subsequent years, students from any and all programs at RIT who express interest will be enrolled in the first-year Grand Challenges Course as part of their first semester schedule of courses in their respective degree programs. Enrollment in this course is neither necessary nor sufficient for a student to be in the GCSP. Rather, this course functions as an introduction to GCSP concepts: students will learn more about the GCSP and can choose to continue or not in the program, while students who missed the opportunity may enter the program at a later point. Those students who enter at a later date still have the option (and will be encouraged) to take the Grand Challenges Course, although they may obtain GCSP status through other means (see Table 2).⁹

Once established, beginning in 2017-18, the GCSP will be highlighted as part of the portfolio of degree pathways available to our students. From the perspective of KGCOE, we anticipate that the GCSP will be an attractive addition for engineering students who recognize the importance of a broad education and who are looking for something beyond a “traditional” engineering education. The program will complement other efforts at RIT, including our Women in Engineering (WE@RIT) Program and our Engineers for a Sustainable World (ESW) Program; and therefore, we envision leveraging these existing programs to increase the diversity of our engineering student body. From the COLA perspective, and, indeed, any college or program on campus, the GCSP will afford students the opportunity to apply their skills and knowledge within any field to the world’s most pressing problems while working with the mix of technical, entrepreneurial, policy, research and other types of professionals with whom they will have to engage in their careers. We expect to attract students in the liberal arts, in computing, and across the university who see their education as a means of both achieving their own personal goals, and improving the world in which they live.

Importantly, we will work with admissions and with programs across all colleges to disseminate information about the program, and draw students in as participants. In particular, promotion to prospective students will come in the form of web presence, printed literature and electronic mailings sent to prospective and admitted students, and presentations given at recruiting events and Open Houses. We will also welcome the opportunity to promote the RIT GCSP through the NAE website. For students admitted to RIT, the GCSP will be promoted through first-year orientation events, on-campus messaging, club and organization fairs, and academic advising sessions that take place throughout the year. We are unsure how student demand for the program will align with program resources, and we will be assessing this balance as we move forward with the program. We will assess student participation after the third year of the program (2018-19) to determine whether a program cap will be necessary and how to implement such limits.

⁹ In the case where a student enters the program without having taken the gateway course, the faculty mentor/advisor will be instrumental in helping the student determine whether the student has the breadth of knowledge and understanding to proceed in the GCSP without the gateway course. In some cases, students may be advised or required to take the gateway course before proceeding as a GCSP.

3.2 Application and Selection

Students interested in participating in the GCSP will apply to enter the program after their first semester, but no later than their fifth semester, at RIT. Interested students will submit an application that includes a short essay about which Grand Challenge they most want to address and why, as well as a preliminary plan for how they will complete the required components of the program. (A formal application form is under development and will be finalized prior to 2017-18 academic year.) The Steering Committee will assess applications at a fixed time each semester based on the application materials. We are developing a more formal application assessment rubric that can be implemented during our pilot phase.

Although it is essential that the Grand Challenge Scholars have and maintain good standing in their home programs and at the institute, we wish the program to be as inclusive as possible, and to offer students opportunities to thrive in ways that are not always easily measured with a single number such as a GPA. Since it is anticipated that many students will apply to be Grand Challenge Scholars in their first year of study (and because we wish to distinguish both the aims of GCSP from those of an honors program), an initial grade point average requirement may not be appropriate. Although we are not currently establishing a GPA minimum for program entry, we will assess whether such a minimum needs to be implemented.

4 Program Administration

4.1 Steering Committee and Faculty Mentorship

Faculty will have direct oversight of the curriculum, advising, and overall evolution of the GCSP at RIT, with support from the deans' offices of the KGCOE and COLA. In the first year of the program, a faculty director will be appointed from the GCSP Taskforce that has been working on the program. Along with the director, a Steering Committee will be formed, with ultimate appointment coming from the respective deans of KGCOE and COLA. The Steering Committee will consist of two faculty from each college, and one associate dean from KGCOE and COLA, respectively. Initially, the Steering Committee will include representation from KGCOE and COLA, but this will expand as other colleges begin to participate. Initial terms will be 2 or 3 years, then shift to 3-year staggered terms after the first 2 years the program is in place. The role of the Steering Committee consists of the following responsibilities:

1. Review student applications to GCSP and assess applications for program entry;
2. Oversee curricular development and work with faculty advisors on student progress;
3. Identify and characterize fit of new, co-curricular and extra-curricular activities and experiential learning opportunities that support GCSP objectives; and,
4. Review and approve changes to the structure of the GCSP program (see program assessment in following sections).

Ultimately, the Steering Committee is the body that reviews an application and grants "Grand Challenge Scholar" status on a student and "certifies" that the student has met all requirements of the GCSP. That

certification would be facilitated by input from the faculty mentor/advisor, who would assess whether required activities found in Table 2 are met.

4.2 Mentorship, Support, Tracking, and Student Assessment

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

In addition, GCSP mentors will be supported as follows:

1. Mentors will attend an annual "GCSP Mentor Workshop" at RIT that will include discussions of "best practices" for mentoring; guest speakers; new GCSP project ideas; and social networking, to name a few possible topics. That workshop will be coordinated with our Wallace Library's Faculty Institute for Teaching and Learning, which has extensive experience in hosting similar types of workshops for faculty at RIT.
2. Mentors will have access to a RIT GCSP wiki and/or listserv where ideas, problems, and solutions can be shared.
3. Mentors will be contacted by each student's individual "professional advisor" at least once per semester. The professional advisor will alert the GCSP mentor to any problems or concerns related to each student's progress.¹⁰

Mentors will also be networked with other faculty from the group of AITU universities who are collectively working on GCSPs through a grant from the Teagle Foundation (see above). We will create a community of faculty from this group to share ideas and discuss barriers and successes related to each of their GCSPs. This may be done electronically or in person through an annual meeting.

Students will be required to maintain a portfolio that documents their progress through the GCSP. In the near term, this will consist of a relatively simple, web-based fileshare system, whereby each student will have a "folder" on an accessible fileshare to place their portfolio of work. That fileshare would also be accessible by their faculty mentors and the Steering Committee. In the longer term, we expect to develop a more elaborate web-based system that allows for easy uploads of material by students; review and comment of materials by faculty mentors; sharing of information among faculty and students; and even current news feeds and videos on Grand Challenge problems. Each student portfolio will include the student's existing plan for completing the GCSP requirements and will be reviewed annually by the faculty mentor/advisor (with oversight from the Steering Committee) to ensure the

¹⁰ Each student at RIT has a "professional advisor." The professional advisor is an advising staff person who assists the student in everything from registration to course issues.

student is adhering to their plan. Naturally, as students encounter new opportunities and as their academic and career plans evolve, they may need to modify the original plan. Their GCSP faculty mentors will be responsible for verifying that their students have a current plan for completion and that they are making appropriate progress towards it. The portfolio may contain a variety of documents, images, design work, and videos (among others), but will include at a minimum the following:

- A summary of GCSP related experiences (curricular or co-curricular);
- An annual personal reflection on how these experiences relate to one or more grand challenges;
- A plan for the upcoming year (spring, summer, next fall) and relation to GCSP criteria;
- A plan or adjustments to their plan for meeting all GCSP criteria by graduation; and,
- A personal statement about long-term personal goals.

4.3 Program Assessment

We recognize the importance of assessment in continually improving the RIT GCSP as well as evaluating the impact that the program has on the students who complete it. The Steering Committee will develop a detailed assessment plan to monitor key aspects of the GCSP to ensure that the program is achieving its intended objectives. For formative assessment during the early implementation of the program, we will leverage many of the assessment tools that are already in place, including online course evaluations for the Grand Challenge gateway course, student and employer co-op questionnaires, and customized on-line surveys developed specifically to survey GCSP students about their experience in the program. This information will especially be used to make changes in the early implementation of the program.

In collaboration with the group of universities that are participating in the Teagle Foundation project (described above), we will develop and share ideas and best practices for assessment. As each GCSP is unique, not every approach to program assessment will be the same for the participating universities, but we will identify opportunities to commonly assess the benefits of integrating liberal education into the GC programs. This will allow us to pool data across multiple universities to evaluate GCSP impact but will require careful planning. Since the universities involved are at different stages of GCSP proposal development, our discussions on assessment have only been preliminary. However, we will likely employ a pre/post survey approach to evaluate the program impact and we anticipate the survey will focus on student attitudes regarding the importance of liberal education in their preparation of becoming a Grand Challenge Scholar. (For comparison purposes, we would also assess a “control group” of non-GCSP students.) Along with the pre- and post-surveys that will take place at the beginning and the end of their academic programs, we anticipate also implementing an alumni survey to assess the impact of the GCSP on alumni once they have had some experience as full-time professionals and the opportunity to reflect on how their GCSP preparation has prepared them for their career.

4.4 Grand Challenge Scholar Recognition

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

- Every year a GCSP Scholars display will be featured at *Imagine RIT*, the annual innovation festival held on campus in early May (<http://www.rit.edu/imagine/>). At this festival, GCSP Scholars at all levels will have the option to publicly present some of their accomplishments and experiences in the program.
- An annual “GCSP Celebration” will be held at the end of each spring semester to recognize the graduating scholars.
- Scholars will receive a medal and be recognized in the RIT Commencement bulletin as being a Grand Challenge Scholar.

4.5 Funding and Support

The sustainability of this program is an important consideration for RIT. We are realistic that these programs cannot succeed without sustained commitments and resources by university administration. Based on our analysis of existing programs at other universities, we believe there are a number of resources required for sustainability. These will include a stipend plus course release for a director, staffing needs, a marketing budget, support for student projects, and stipends for mentors, a key component of the program. As other needs are identified after the first year, the budget will be supplemented as needed. However, these costs listed in Table 4 mark the necessary starting point.

Table 4. Fixed and variable costs for GCSP at RIT for the initial three years of the program.

Fixed Costs	
Director Stipend/Course release	\$15,000
Staff @ 20% plus benefits	\$15,000
Marketing, PR, Outreach	\$10,000
Subtotal fixed costs	\$40,000
Variable Costs	
Project funding for 20 program students*	\$10,000
Mentoring Support (travel, stipend, etc.)	\$20,000
Subtotal variable costs	\$30,000
Total Annual Budget	\$70,000

*Note that additional support for students is available through other opportunities within individual colleges and across the institute. For example, the College of Liberal Arts has a Student Research Fund by which students can apply for research funding. Such funding could be used for GCSP projects.

We have identified internal permanent resources and endowments that will help cover these costs. Additionally, we will be working with our Development Office to identify companies and donors who may want to sponsor a grand challenge and provide additional funding to support students and faculty. We also believe we can leverage other funding (sponsored research or development) to help support our GCSP.

5 Conclusion

The overall objective of the Grand Challenge Scholars Program at RIT can be summed up in a few words: an integrative learning experience with diverse partners and stakeholders focused on making a meaningful difference in the world. In this brief summary, integrative learning has multiple meanings. It refers to the integration of GCSP into the life of the university. It also means integrating technical training with the bedrock skills of critical thinking, communication, awareness of and respect for diversity, and the ability to work as part of a team. Integrative learning also means linking the classroom to the world. And by “making a meaningful difference in the world” we mean that students will leave RIT not only with a sense of personal and professional purpose, but with a deep sense of themselves as citizens and members of a global community. In a sense, this notion of citizenship is also integrative in that it encourages all our students to see themselves as part of a bigger picture. The ultimate objective, then, is to prepare students to be part of global solutions to our most pressing human problems.

[END]