
AC 2011-1154: SCHOLARS OF EXCELLENCE IN ENGINEERING AND COMPUTER SCIENCE PROGRAM PHASE I: DEVELOPMENT AND IMPLEMENTATION

Karina M Vernaza, Gannon University

Karina Vernaza joined Gannon University in 2003 and she is currently an Associate Professor in the Mechanical Engineering Department. She earned her PhD and MS in Mechanical Engineering from the University of Notre Dame. Her BS is in Marine Systems Engineering from the U.S. Merchant Marine Academy. Her primary teaching responsibilities are in the Solid Mechanics and Materials area. She consults for GE Transportation and does research in the area of alternative fuels (Biodiesel), engineering education (active learning techniques), high strain deformation of materials, and reliability for design. She is actively involved in outreach activities that introduce middle school students to engineering.

Dr. Theresa Vitolo, Gannon University

Scott Steinbrink, Gannon University

Associate Professor and Chair, Mechanical Engineering Department, Gannon University.

Barry J Brinkman, Gannon University

Scholars of Excellence in Engineering and Computer Science Program Phase I: Development and Implementation

The Scholars of Excellence in Engineering and Computer Science (SEECs) program initiated its first cohort of 20 students in fall 2009. Funded through an NSF S-STEM grant, the interdisciplinary, multi-year, mixed academic-level offering awards scholarships to students based on academic merit and financial need. SEECs is an opportunity for students in certain STEM majors at Gannon University, Erie, PA, in the School of Engineering and Computer Science. The goals of the scholarship program are (1) to increase the number of academically talented, but financially disadvantaged students in the stated majors, (2) to assist students to be successful in their undergraduate education, and (3) to foster professional development for careers or graduate education. These goals are realized through the students shared interactions within the SEECs seminar.

Students awarded SEECs scholarships are required to attend a seminar where specific development and learning outcomes are realized in a team-based, project-based approach. The challenging and engaging aspect of the SEECs program is a zero-credit seminar. The SEECs seminar encompasses three components: engineering design, professional development, and personal development. Through workshops, university support services, lectures, and invited speakers, the facets of professional and personal development are addressed. Each academic level, that is seniors, juniors, sophomores and freshmen, has different professional and personal development objectives realized each semester.

While the two development facets follow more typical seminar activities, the engineering design component is the pivotal experience connecting and building not only engineering competency but also personal confidence. The design projects benefit regional service organizations. The design activities pair the freshmen cohort with the seniors; the sophomores with the juniors. Through these pairings, seniors mentor the inexperienced freshmen through thought processes and analysis questions accompanying initial understanding. The sophomore-and-junior pairings gain a similar benefit during the design and deployment phase. Juniors with more professional maturity provide insights to the design and deployment phases for the sophomores. Hence, “becoming engineers” for the scholars is a shared, fun experience as they immerse themselves in the task of realizing a contribution to the community.

The development and current success of the SEECs program partially arises from the participation provided by and the willingness of established university services and administrative units to support the program’s needs. Further, the correspondence of the SEECs program goals aligns with the university’s mission. Hence, the SEECs program embodies the university-wide commitment to establishing a worthwhile program for the scholars.

To date, the SEECS program has been successful. Two of the three initial seniors are enrolled in engineering graduate studies. The program models an holistic learning approach with a service-learning component utilizing standard processes and services of the university.

The following paper presents the evolution of the SEECS program as its goals, structure, and implementation were defined and realized. The first year of recruitment practices, seminar activities, and student evaluations of the program are related. Finally, the potential for using the SEECS program as a model for an honors-option for academically-talented students in SEECS majors is discussed.

1 Introduction

The S-STEM was established by the National Science Foundation in accordance with the American Competitiveness and Workforce Improvement Act of 1998 [1]. Gannon University was awarded an NSF S-STEM grant in 2008. The Gannon scholarship program, named the Scholars of Excellence in Engineering and Computer Science (SEECS), was designed to increase the number of financially needy and academically talented students enrolling in and graduating from Gannon's computer science and engineering programs.

The grant proposal specified three main goals of the SEECS Project:

1. Increase the number of academically talented, financially disadvantaged students enrolled in Gannon University's computer science and engineering programs, especially minority, female, and disabled students.
2. Through a program of scholarships and rigorous academic support, assist students to continue their education through graduation.
3. Foster professional development that prepares students for careers in STEM fields and graduate education.

During the four-year duration of the scholarship project, the project team indicated that it would develop a program structure and arrange activities to achieve the following objectives:

- Objective 1: Provide 20 scholarships per year for academically talented, financially disadvantaged STEM majors, especially those from underrepresented groups.
- Objective 2: Build a referral network arrangement between Gannon University, the Erie City School District, and the local U.S. Department of Education Talent Search program to identify and recruit financially disadvantaged students from underrepresented groups who meet SEECS scholarship eligibility requirements.
- Objective 3: Provide a program of academic and student service support that achieves a 90% year-to-year retention rate for SEECS scholars.
- Objective 4: Provide scholars with academic and professional development that prepares them for graduate school and/or employment in a STEM field.

The sections which follow present original plans for meeting the goals and objectives, discuss how the plans were implemented, indicate any modifications to the original plans, and outline work which remains to be completed.

2 Recruitment of Freshman

The first cohort of scholars was targeted for the 2009 -2010 academic year. It was strategized that this cohort would have an equal representation between freshmen, sophomores, juniors and seniors. Different recruitment strategies have been developed to target incoming freshman and upperclassmen. This section will describe the strategies employed 1) to raise the awareness of Gannon's STEM programs, and 2) to recruit incoming freshman for the SEecs program.

2.1 Materials Developed for Recruitment

A multitude of perspectives exist regarding the effectiveness of different types of promotional materials. After consulting with the Admissions Office, the Marketing Department and previous recipients of NSF-STEM grant [2-5], it was decided that the following marketing materials would be created and deployed:

1. Post Card: This tool is sent to prospective freshman students; both juniors and seniors in high schools are targeted. Incoming freshman are indentified through lists purchased by the Admissions Office based on students' interest in STEM majors. The postcard indicates the majors that are eligible for the scholarship and directs students to the website which contains details of the application process. Appendix 1 presents the postcard currently in use. Table 1 presents a summary of the mailings to prospective students.
2. Fact Sheet: This document is employed during all university's functions such as open houses, admissions receptions, summer camps, and prospective students' visits to advertize the program. Additionally, it is sent to high school counselors in a 150 mile radius from the university and the Columbus, Ohio metropolitan-area (i.e. these are our main recruiting zones). The package to counselors consists of a letter introducing the program and seven to nine copies of the fact sheets. The fact sheets consist of a one-page document that summarizes the program, eligibility criteria, and application process and deadlines. Appendix 2 presents a copy of the fact sheet. Table 1 presents summary of the mailings to counselors.
3. Webpage: The website (www.gannon.edu/seecs) summarizes all the scholarship information. Images of the activities performed by the scholars during the academic year are periodically added.
4. Poster: An assessment of the recruitment strategies suggested the creation of a poster that could be displayed by counselors at their respective high schools.

As part of the recruitment effort, the Marketing Director suggested that handwritten notes should be sent to prospective freshman students who had qualified for the program and received a notification from the Financial Aid Office. This practice was implemented in Spring 2010. Forty prospective students received the handwritten cards.

Table 1: Number of mailings to recruit students for the program.

	Target: 2009-2010 Cohort		Target: 2010-2011 Cohort			Target: 2011-2012 Cohort		
	October 2008	January 2009	October 2009	November 2009	January 2010 ³	March 2010	October 2010 ²	February 2011 ³
Postcards	9000		8950		1110	9690	8940	990
Fact Sheets¹		8550	8370				6550	
Posters				930			940	

¹ Fact sheets are mailed in bundles: nine (9) pieces per bundle in 2009; seven (7) pieces per bundle in 2010.

² Materials with new logo and images were mailed.

³ Mailing to “true prospects” as identified by the Admissions Office

3 Recruitment of Upperclassmen

Based on the seminar paradigm discussed below, a key component of the SEECs project is to provide interaction among scholars across all disciplines and academic levels. After the first year, seniors would graduate and the openings would be filled by the newly recruited freshman class. However, in order to provide this experience from the beginning of the program, students for all three upper level classes were recruited for the first year of the program. In order to achieve this, the Principal Investigators (PIs) looked at all students at Gannon enrolled in one of the qualifying majors. In the spring of 2009, all such majors with at least a 3.0 GPA who were identified by the Financial Aid office as having financial need were invited to apply for the scholarship for the 2009-2010 academic year. Of the applicants, three scholarships were awarded to juniors (who would be seniors in the fall of 2009), seven were awarded to sophomores, and two were awarded to freshmen. This group represented the upperclassmen for the first cohort.

4 Application Process

During the first year of implementation, prospective students were able to obtain an application form from the website or from the Financial Aid Office. Appendix 3 presents a copy of the application form. During the second year of implementation, the application was removed from the website since no official screening of the student’s financial aid and academic status occurred through that route. The current process ensures that by the time a student receives an application, he or she meets both requirements in terms of academic performance and financial need.

All recruitment materials instruct students to apply to Gannon University if they are interested in the scholarship. Once a student indicates his or her interest in one of the funded majors, the Financial Aid Office checks for his /her eligibility. This office screens the applicants based on academic performance and financial need. Two different situations can arrive based on the information provided by the eligible students. Prospective students who submit academic information (i.e. GPA, SAT and/or ACT) and financial aid information (i.e. Early Version Award or Free Application for Federal Student Aid) receive an application and a fact sheet. On the other hand, students who submit academic information only receive a fact sheet; these students are instructed to submit their financial aid information to confirm their eligibility for the scholarships.

Starting in the month of February, the Financial Aid office provides a list of eligible students to the SEECs principle investigators (PIs). This report includes the following dimensions: major of interest, high school, rank, class size, GPA, SAT, ACT, status at Gannon University (accept, deposited, or canceled), and unmet need. SEECs PIs, as mentioned in the recruitment section, send a handwritten note to those students who have not applied. This mailing takes place in early March since the deadline for applications is March 30th. The selection of the cohort takes place during the first two weeks of April. Awarded students are notified via email. These students are instructed to make a deposit as well as enroll in the seminar.

5 Demographics

Through these recruitment efforts, the cohorts have been filled with mostly regionally-based students reflecting the demographics of the School of Engineering and Computer Science at Gannon University. For the basic demographics of selected major, distance from the school, high school GPA, gender, and race, the SEECs scholars correspond to the student profile for any student entering the School of Engineering and Computer Science (ECS). Below are data showing the profile of the first two sets of applicants to the scholarship, the fall 2009 (FA 09) and fall 2010 (FA 10) groups, compared to the FA 2010 freshmen enrolled in ECS. Specifically, Table 2 shows the majors selected by the SEECs applicants compared to the majors selected by enrolled freshmen to ECS. Table 3 examines whether the SEECs applicants are geographically dispersed differently than the ECS freshmen. Table 4 and Table 5 continue to examine the characteristics of the SEECs applicants to the typical ECS freshmen. These comparisons show that SEECs applicants are not distinctly different from a typical ECS student. The grant opportunity is not attracting a different student to Gannon University, if only the dimensions of majors, geographic distance, grades, gender, or race are considered.

However, when the average expected family contribution (EFC) is examined, SEECs scholars have a much higher need than the average student in ECS. The average need for students receiving the SEECs scholarship is three times higher than the average for students in the school.

Hence, offering the NSF scholarship enables academically high-quality students to participate in Gannon’s engineering and computer science programs who might not have been able to financially.

Table 2: Selection of Majors by Students

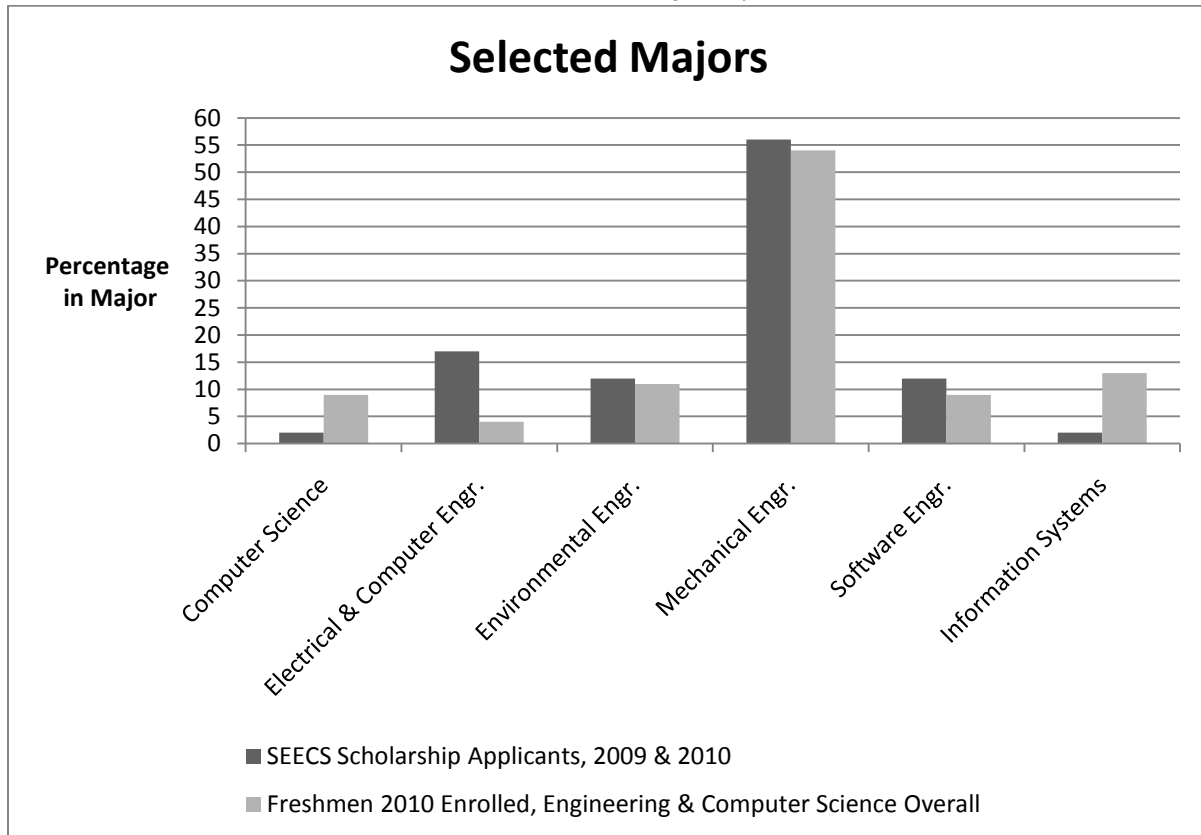


Table 3: Geographic Distribution of Program Applicants and ECS Freshmen 2010

Miles from University	Number of SEECS Applicants	Percentage of SEECS Applicants	Percentage of Freshmen 2010 Enrolled, ECS
5	10	21.74%	28.26%
15	3	6.52%	2.17%
20	2	4.35%	4.35%
100	10	21.74%	32.61%
200	17	36.96%	15.22%
300	2	4.35%	6.52%
700	2	4.35%	10.87%

Table 4: Academic Quality of Recipients: Selection Percentage and Academic Status

Semester	Number of Applicants	Acceptance Rate of Applicants	Average High School GPA of Applicants	Average High School GPA of ECS Freshmen 2010
Fall 09	18	44.44%	3.93	- n/a -
Fall 10	14	42.86%	3.95	3.56

Table 5: Gender and Race Distribution

		Gender		Race					
		Distribution of SEECs Applicants Each Year							
	Number of Freshmen Applicants	Males	Females	Caucasian	Black or African-American	Hispanic or Latino	Native American	Asian	Pacific Islander
Fall 09	18	17	1	16	2	0	0	0	0
Fall 10	14	13	1	13	1	0	0	0	0
		Distribution of SEECs Scholars in Freshmen Cohort							
	Number of Freshmen Enrollees	Males	Females	Caucasian	Black or African-American	Hispanic or Latino	Native American	Asian	Pacific Islander
Fall 09 SEECs	8	8	0	8	0	0	0	0	0
Fall 10 SEECs	6	6	0	6	0	0	0	0	0
Fall 10 ECS	46	37	9	38	3	1	0	0	0
		Distribution of SEECs Scholars in Upper-Level Classes							
	Total Number	Males	Females	Caucasian	Black or African-American	Hispanic or Latino	Native American	Asian	Pacific Islander
Fall 09	12	11	1	12	0	0	0	0	0
Fall 10	16	14	2	16	0	0	0	0	0

6 Seminar: Paradigm

The Personal and Professional Development Seminar seeks to incorporate several concurrent goals. First, it is meant to promote a sense of camaraderie among all scholarship recipients, across all academic levels and majors. Second, it is meant to provide a multi-disciplinary experience to all participants. Finally, in keeping with the mission of Gannon University, the seminar has a strong service component. Design activities are the primary tool utilized to effect the “multidisciplinary” and “service” goals. Other “just for fun” activities are used to enhance camaraderie.

The seminar design activity follows an approach that is a modified version of an idealized mentoring and learning paradigm. In the idealized paradigm, learning of skills follows a three-step process: observe, do, teach. In this paradigm, freshmen would observe a design process, sophomores would perform a design process, and juniors or seniors would teach the process. The idealized paradigm has been altered for the SEECs seminar, so that there is no pure observation. Instead, all classes are active in design at all times. Following a single academic-year cohort, the process works as follows. As freshmen, these students are mentored by senior students in conceptual design - identifying a need, identifying key stakeholders, developing appropriate specifications, and proceeding through the phase of concept selection. As sophomores, these same students are led by juniors through the embodiment phase, with the year culminating in a finished (and produced) design. In year three, these junior students mentor the class behind them in the embodiment phase, and in the final year, as seniors, these students mentor the freshmen in concept development. The entire SEECs population is thus continually engaged in design, with two design projects ongoing at any time – one in development by seniors and freshmen, the other in production by juniors and sophomores.

Note that SEECs students are segregated only by academic standing. Incorporation of all juniors (for example) into a single section of the seminar without regard to their academic major encourages multi-disciplinary thinking. This is further enhanced by the encouragement of design project choices that are likely to require knowledge drawn from all of our scholarship-eligible major fields.

Design projects are selected in accordance with the mission of Gannon University, which implicitly includes service to the world community. Non-profit and community organizations in need of engineering assistance are contacted as potential sources of projects. Gannon University serves as a secondary source of projects which, while performed nominally for Gannon, have a broader impact on the community. Specific designs undertaken to-date include a redesigned boat ramp for the Bayfront Center for Maritime Studies (www.bayfrontcenter.org) an eco-friendly bicycle-powered electric generator for Gannon University, and development of a collection system for measuring, monitoring and collecting storm water and sediment from a local stream

that has a checkered environmental past. This latest is being performed for the Sea Grant Pennsylvania organization. (<http://seagrant.psu.edu>)

The design aspect of the seminar helps students of different academic levels to bond, but has limited effect on bonding of the entire SEECS cohort. The camaraderie that is sought among the entire SEECS population is thus bolstered by inclusion of certain “just for fun” events. While these are meant to foster in students a feeling of belong to a special group, they also take advantage of professional, historic, or personal development opportunities. For example, a recent event consisted of a picnic at a local state park, with a view of the *Tall Ships Erie* event – a gathering of six sailing tall ships, held in Erie, PA (www.tallshipserie.com).

7 Use of Campus Resources

The seminar goals of professional development and personal development are satisfied by recruitment of existing campus services. Specifically, Gannon University has the “Student Organizations and Leadership Development” (SOLD) office and the “Student Success Center” (SSC) that are each available to all GU students having the desire to partake of the services offered. The SEECS seminar utilizes SOLD and the various resources of the SSC in order to provide content that job- and graduate education-seeking students may need, as well as needed education in skills required to succeed at Gannon.

The SSC houses the university Math Center and the Writing Center, each of which provides free tutoring for students choosing to use those resources. In addition, the SSC fosters Experiential Education and general career development activities. SEECS makes great use of these latter resources. In particular, we have utilized the SSC staff to provide workshops in interviewing skills, choosing a graduate school, how to prepare for the GRE, how to prepare a resume, and more. These services are, of course, available to all university students. The novel item here is their inclusion in the seminar curriculum, which thus makes use of these services mandatory for SEECS students.

Gannon takes service learning seriously, and encourages the use of service learning strategies in all courses. To support this focus on service learning, Gannon has established the Office of Service Learning, under the supervision of the Vice President for Mission and Ministry. The Service Learning office has served as a resource for the SEECS project in identification of potential projects. In particular, the head of that office has suggested working with the CHOSEN Mission of Erie, the Bayfront Center for Maritime Studies, Sea Grant Pennsylvania and the Gertrude Barber Center to identify engineering projects of immediate need within our community. Each of these potential partners has had interesting ideas that we have discussed as potential projects. Some of these projects have been selected for pursuit. Finally, the SEECS project makes extensive use of the university Financial Aid and Admissions offices, whose personnel assist in screening students as potential SEECS applicants. Admissions

personnel take the lead on sending applications to qualified students after Financial Aid personnel verify unmet need. The willingness of these two departments to assist in the SEECs project has been highly instrumental in SEECs success.

8 Seminar Activities

The seminar is built around a curriculum addressing the intellectual growth of the scholars through the design project and the professional and personal growth of the scholars through planned activities. Table 6 presents the typical schedule for the Fall semester. 50% of the time each semester is reserved for the design component. A similar distribution is followed during the spring semester.

Table 6: Typical Fall Semester Schedule of Activities

Week	Type	Class-Cohort
1	Introduction / Lecture	All scholars
2	Workshop Pers. Dev.	Individual academic levels
3	Social	All scholars
4	Design	Freshmen and Seniors / Sophomores and Juniors
5	Design	Freshmen and Seniors / Sophomores and Juniors
6	Design	Freshmen and Seniors / Sophomores and Juniors
7	Speaker	All scholars
8	Fall Break	
9	Design	Freshmen and Seniors / Sophomores and Juniors
10	Workshop Prof. Dev.	Individual academic levels
11	Design	Freshmen and Seniors / Sophomores and Juniors
12	Seminar / Social	All scholars
13	Design	Freshmen and Seniors / Sophomores and Juniors
14	Thanksgiving	
15	Design	All scholars
16	Dinner Pers. Dev.	All scholars

Approximately 75% of the seminar meetings combine two or more academic classes. For each academic class, the non-combined sessions are each taught by a single SEECs faculty member. Design activities have two of the SEECs faculty present, one from each participating class-cohort. Furthermore, in order to ensure continuity of project understanding for each two-year design sequence (refer to Table 7), two of the faculty members swap academic classes from one academic year to the next; the other two do not swap. One faculty member teaches freshman exclusively and another faculty member teaches exclusively to sophomores. The faculty members teaching juniors and seniors swap sections from year to year. In this way, the year-to-year consistency of material delivery is made as complete as possible, while each design project has one faculty member (specifically, the faculty member associated with the mentors) who

follows the project from beginning to end. It should be noted, however, that the multi-year structure of the program forces all SEECs faculty members to collaborate on material coverage so that any SEECs faculty member could teach any academic level of the seminar.

Table 7: Two-year design sequence

	First Year (Conceptual Design; Seniors mentor Freshman)	Second Year (Embodiment Phase; Juniors mentor Sophomores)
Fall	Defining a Project Gathering Project Perspective Design Perspectives Understanding Constraints Proposing Design Alternatives Measuring Risks and Success Semester Progress Presentations	Analysis of Design Alternatives Develop Models Scale Models Documentation and Testing Techniques Test Models Selection of Design Concept Semester Progress Presentations
Spring	Expectations, Change Management Freshman Design Projection Freshman Design Projection Freshman Design Projection Semester Progress Presentations	Development of Design Solution Development of Design Solution Testing in-situ Implementation of Design Solution Implementation of Design Solution Evaluation of Design Solution Semester Progress Presentations

Explicitly in its objectives, the funded grant also seeks to develop life-long, life-enriching, life-balancing skills in the scholars from the freshmen year through to the senior year. Objective 3 and Objective 4, (see Section 1, above), are realized by emphasizing professional and personal development activities each semester. The activities selected impinge on the premises of the LIFECORE, Gannon University’s approach for fostering holistic development.

LIFECORE seeks to guide students across nine lifestyle dimensions: Intellectual, Political, Spiritual, Cultural, Sexual, Emotional, Physical, Social, and Life Planning. The program is supported by various offices within Student Development and by the University Chaplain’s Office. LIFECORE is a construct embraced by the Liberal Studies Core of Discovery, the general education component required of all Gannon students. Courses with the Liberal Studies Core have a requirement to relate teaching materials to the LIFECORE structure. Faculty in other courses are also encouraged to incorporate LIFECORE experiences in academic classes to foster the holistic development of the individual as opposed to creating myopic students solely obsessed with only the intellectual dimension.

Because of the intent of Objective 3 and Objective 4, students encounter various activities in each semester to reflect the various LIFECORE dimensions. The seminar does not reach every dimension, but strives to address many of the dimensions. Table 8 captures the activities, their development dimensions, and the class-cohort experiencing the activity.

Table 8: Personal Development Activities

Personal Development Objective	Semester Activity	Development Dimension	Class-Cohort / Semester-Focus
1. Identify personal strengths and weakness influencing life choices	Learning Styles Inventory	Life-Planning	Freshman / Fall
2. Develop and test appropriate stress management strategies	Stress Management Training	Emotional, Physical	Freshman / Spring
3. Develop and test appropriate meditation techniques	Meditation Technique Training	Emotional, Physical	Sophomore / Fall
4. Refine social skills	Workshop: Emotional Intelligence	Social	Sophomore / Spring
5. Demonstrate knowledge of appropriate interpersonal behaviors	Mock Interviews	Social, Cultural	Junior / Fall
6. Develop goals to improve social habits	Workshop: You and Your Peers	Social	Junior / Spring
7. Practice techniques to enhance physical, emotional and spiritual well being	Exploration into Individual Attributes & Values	Physical, Emotional, Spiritual	Senior / Fall
8. Develop a personal philosophy for physical, emotional and spiritual well-being	LifeCore Assessment with Work-Week Visualization	Physical, Emotional, Spiritual	Senior / Spring

Each semester concludes with a group dinner where many of the behaviors of the objectives are exhibited. In order to have a combined professional and personal focus for the dinners, different aspects of etiquette and dining are addressed. The etiquette aspects cycle every two years to reduce repetition in the experiences. Since the dinners combine all class-cohorts, students entering the program as freshmen will only experience the aspect of a dinner twice in their four years within the program. The two-year cycle is described in Table 9.

Table 9: Two-Year Etiquette Focus for Dinners

	First Year	Second Year
Fall	General Dining Etiquette	Professional Attire
Spring	International Dining Etiquette	International Dining Awareness

Although the dinners do not have an explicit, planned objective, their inclusion every semester enhances the Cultural dimension of the individual as well as the Social dimension. The interactions among the students as they reflect upon the semester often support their Emotional dimension, also. Their conversations are usually about the “trials and tribulations” of the semester and their response to the situations. Ultimately, their confidence grows and the seminar’s goal to produce fully integrated, balanced engineering students is achieved.

Besides personal development, professional development is enhanced through planned, class-cohort, specific activities, as well. Table 10 captures the specific professional objectives and corresponding activities. The activities correspond to the collegiate developmental phase a student experiences as described by the Career Counseling Services Office.

Similar to the two-year cycle of personal development activities shared among the four classes, all the students experience professional development activities. Every fall and spring a technical speaker offers a colloquium and every spring an industrial tour is conducted. To date, the three speakers have focused on gear-box design for wind turbines (mechanical engineering), artificial intelligence realized as chat-bots (software engineering), and the feasibility of nuclear energy (electrical engineering and environmental engineering). The speakers are sought from the different disciplines comprising the scholarship program with topic recommendations entertained from the students.

To complete the professional scope, attendance to a professional conference is included as specified in the grant. During the first year of implementation, the PIs took advantage of the regional offering of the American Society of Mechanical Engineers Student Development Conference hosted by Gannon University and Penn State Behrend in Erie, PA. Starting with year two, only the junior class will be attending a regional professional conference as budgeted in the grant planning. Scholars attend the conferences in order to appreciate the perspective of a research career and graduate school.

Through these various activities the students appreciate the balance necessary to achieve a truly successful life composed of personal and professional aspects in harmony. The seminar does not stress one development sphere to be more important over the other. Rather, self-definition of strengths and weaknesses, and acceptance and mediation constructs are emphasized. For instance, the freshmen complete a professionally-focused “Career Assessment Inventory” to

complement the personally-focused “Learning Styles Inventory” taken. In the beginning of the seminar, they can identify their profile. With that awareness, they then can experience the following years, learning techniques to support their now-identified weaknesses.

Table 10: Professional Development Activities

Professional Development Objective	Semester Activity	Development Phase	Class-Cohort / Semester-Focus
1. Define relationships between academic disciplines and professional activities	Workshop: You and Your Academics; Career Assessment Inventory	Preparation	Freshman / Fall
2. Describe expectations of others within professional careers	4-Weeks of Co-Op Preparation Course; Resume Preparation		Freshman / Spring
3. Explore the range of professional careers	Interview of Professionals in Career Path	Exploration	Sophomore / Fall
4. Develop a professional resume for distribution in a career fair	Resume Refinement; Career Fair Attendance		Sophomore / Spring
5. Appraise the possible career paths	Interview Preparation; Mock Interview; Graduate School Fair Attendance	Interaction	Junior / Fall
6. Explain the acceptable behaviors and interactions amongst colleagues in a working environment	GRE or GMAT Practice Exams; Active Participation at Career Fair		Junior / Spring
7. Submit professional resumes to selected potential employers and/or apply to graduate school	Workshop: You and Your Job; Active Participation at Career Fair	Realization	Senior / Fall
8. Choose a graduate school to attend or a career position to accept	Workshop: Job Searching; FE or Certification Preparation Course; FE or Certification Testing		Senior / Spring

9 Survey Results

At the conclusion of the 2009-2010 academic year, SEECs scholars were given a survey and asked to rate the seminar, its experiences, and its activities. They were also asked how they found out about the scholarship so that marketing plans for future years could be adjusted if necessary. Finally, scholars were asked for any suggestions or insights. A copy of the survey appears in Appendix 4. This, of course, represents only preliminary data. Annual surveys will be taken, and results and conclusions will be more meaningful when the first class of freshmen completes its senior year.

The survey ratings were based on a seven-point scale from one (strongly agree) to seven (strongly disagree). The average scores on the questions ranged from 1.44 to 2.40, with most averages indicating a range between “agree” and “strongly agree.”

The survey indicated when rating the overall seminar experience the scholars were satisfied with the seminar, better appreciated the aspects of engineering design, and had an increased awareness of interdisciplinary interactions within the engineering field. The average scores for these questions indicate approval in the “agree” to “strongly agree” range.

The strongest scores were from upperclass students on questions relating to support for preparation materials and fees for graduate entrance examinations. The other strong average score was from all students indicating that the seminar “provided a program of industry contact through site visits, speaker series, shadowing, and / or informational interviews.”

The weaker scores (3.5 and higher) were in the section where the scholars were asked about how they heard about the scholarship. It appears that all methods of announcement were at least moderately effective, but none clearly stood out as extremely strong. Most of this only applied to the freshman scholars, since the others in this initial group were already students at Gannon and were contacted by email. As mentioned earlier, this aspect will be evaluated periodically and future results in this area will be more significant.

The PIs are pleased with the results of this initial survey since it indicates that the program is achieving several of its initial objectives.

Written comments on the survey provided suggestions and insights from the scholars which again indicated an overall satisfaction with the experience. Several scholars asked for more interaction among all four classes and the inclusion of more “group fun.” These suggestions are again seen as positive. The program is striving for a bonding and togetherness among the group of scholars. The scholars seemed to be asking for even more opportunities to develop this. More such opportunities were provided in the program for the 2010-2011 academic year.

10 Future Plans

SEECs-project faculty members have thus far been encouraged by the results we have been able to achieve. We have, however, been rather unsuccessful in use of the SEECs program to enhance minority and women representation within Gannon's school of engineering and computing sciences. How to better sell the SEECs program in order to encourage diversity is an open question, and subject for continued work.

One of the objectives of the SEECs grant has been to establish a referral network with the local school district, in order to better serve the deserving, underprivileged students of Northwest Pennsylvania. This objective has been met only loosely and informally. Inasmuch as Erie is rich in potential first-generation and minority student scholarship recipients, additional strengthening of the relationship between SEECs and school districts is a major "future work" task.

The SEECs grant has continued NSF funding through the 2012-13 academic year. The present authors intend to reapply to NSF for funding to continue the SEECs program. In the meantime, other sources of funding are under consideration, so that this project can continue.

The SEECs program is being evaluated as a potential Gannon offering, to be thought of as akin to an Engineering Honors program. Selected students (i.e., those meeting the non-economic SEECs criterion) would be encouraged to apply for admission to the proposed honors program. It is expected that the honors program would be very similar to SEECs, except for the financial component. Outside sponsorship may be solicited so that some student compensation might be arranged. Additionally, the seminar would become credit-bearing. Design work related to community-needs projects would continue, as would class-to-class mentoring, professional and personal development.

Finally, the SEECs program is being evaluated for fit with another university initiative, namely the Erie-GAINS project, the Erie-Gannon Alliance to Improve Neighborhood Sustainability. Erie-GAINS seeks to leverage university resources in order to improve lives and standard of living within a well-defined neighborhood surrounding Gannon University. The identified neighborhood contains businesses, service organizations and residences. It is foreseen that Erie-GAINS could serve as a source of design project ideas and (potentially) funding for completion of small-scale projects, and that SEECs in turn could serve as a tool for improved neighborhood prosperity.

11 Acknowledgements

This work is supported by the National Science Foundation Award DUE-0806735.

12 References

1. National Science Foundation, NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) program solicitation, <http://www.nsf.gov/pubs/2007/nsf07524/nsf07524.htm>, 2007.
2. Yue, K-B., and Hall, S.P. "Reflections on Proposal Writing and Management of a NSF STEM Scholarship Grant Program. *Journal of Computing Sciences in Colleges*, 22 (4), 244-251, April 2007.
3. Sorkin, S., Tingling, T., Beiderman, A., and Walker, J. Promoting Computer Science, Engineering, and Related Programs with Scholarships and Student Support Services. *Proceedings of the 35th ASEE/IEEE Annual Conference on Frontiers in Education*, S2C, 21-27, 2005
4. Martincic, C.J., and Carlson, D. The NSF CSEM Grant Program: Our Experience with the Proposal Process and Program Execution. Consortium for Computing Sciences in Colleges. *Journal of Computing Sciences in Colleges*, 19 (1), 73-82, October 2003.
5. Gerhardt, J. and Olsen, B. Small Colleges Can Get Big NSF Grants. *Proceedings of the 21st Annual Information Systems Education*, v21, November 2004.

Appendix 1

find the
wave
of your
future



gannon university



computer science
electrical engineering
environmental engineering
information systems
mechanical engineering
software engineering



scholars of excellence in engineering & computer science




NSF
scholarship
program




Believe in the possibilities.

find the
wave
of your
future



scholars of excellence in engineering & computer science

GANNON UNIVERSITY | Office of Admissions
109 University Square
Erie, PA 16541-0001




Do you want to...

- Become an engineer or computer scientist
- Learn professions from professionals
- Experience industrial opportunities
- Engage in one-on-one mentoring
- Participate in professional and personal enrichment courses
- Contribute to a strong cooperative community of students

Interested?
For information on the Scholars of Excellence in Engineering and Computer Science (SEECS) Program supported by the National Science Foundation (NSF) and Gannon University, visit www.gannon.edu/seeecs, email seeecs@gannon.edu or contact Miles Vida at 1-800-GANNON-U.

To apply for admissions online, to schedule your visit, or for more information about Gannon and its opportunities, go to the Admissions Web site at www.gannon.edu. **All applicants for admission are automatically reviewed for the NSF scholarship program.**



Appendix 2



scholars of excellence in engineering & computer science

Gannon University has received National Science Foundation (NSF) funding which will be used to award approximately 20 scholarships per year, each renewable for up to four years, beginning in the fall semester of 2009. The average scholarship amount will be \$6522 per year, depending on awardee's unmet financial need.

Eligibility Criteria

SEECS Scholarships will be awarded to full-time students in the following majors:

- Computer Science
- Electrical Engineering
- Environmental Engineering
- Information Systems
- Mechanical Engineering
- Software Engineering

Scholarship recipients must demonstrate unmet financial need determined by the Free Application for Federal Financial Aid (FAFSA).

Scholarship recipients must be:

- United States citizens,
- United States permanent residents, or
- Refugee alien

Professional and Personal Enrichment Seminar

Awardees must enroll in the Professional and Personal Enrichment Seminar every semester. These seminars have been specially created to foster a strong cooperative community amongst the scholars.

The series of seminars for SEECS students is built around a curriculum that addresses both the professional and personal growth of the scholars. Each semester includes a design component, a professional development component, and a personal development component. Awardees are expected to participate and complete the requirements as developed in each semester.

Type of Applicant	Criteria for Consideration	Application Deadline
Current high school senior or recent high school graduate	<ul style="list-style-type: none"> • High School GPA of 3.0 or higher • 1100 SAT (math & verbal) or 24 ACT • Apply and be accepted into Gannon University as a full-time student • Selection of one of the designated majors • Submit scholarship application 	March 30
Current Gannon University student in applicable major	<ul style="list-style-type: none"> • Cumulative GPA of 3.0 or higher • Full-time student in one of the designated majors • Submit scholarship application 	
Scholarship renewal, current recipient	<ul style="list-style-type: none"> • Maintain a GPA of 3.0 or higher • Maintain a full-time student status in one of the designated majors 	

How to Apply

Apply for admission to Gannon University, and select one of the scholarship's eligible majors. All applicants for the eligible majors are automatically reviewed for the NSF scholarship program. Scholarship application forms will be made available by Gannon University Financial Aid Office, if eligibility criteria is met.

Contact Information

SEECS / NSF Scholarship Program
College of Engineering and Business
Dean's Office
Gannon University
109 University Square
Erie, Pennsylvania 16541

seecs@gannon.edu
www.gannon.edu/seecs

For more information about Admissions and Financial Aid, contact Miles Vida at Gannon University Admissions Office **800-GANNON-U**.



GANNON
UNIVERSITY

Believe in the possibilities.

Appendix 3



APPLICATION FORM
Scholars of Excellence in Engineering and Computer Science (SEECs)
For 2011-2012 Academic Year

Due Date: March 30, 2011 for FALL 2011

(Type or print clearly)

Name: last, first middle
Application Date: month day year
Gender: Female Male
Date of Birth: month day year
Address: street apartment #
city state zip code
Phone: (home) (cell)
Email:

SEECs Scholarships are applicable to students in the following majors.

- Computer science
Electrical engineering (includes EE options)
Environmental engineering
Information systems
Mechanical engineering
Software engineering
Check your intended field of study

SEECs Scholarships applicants must meet one of the following citizenship/residency requirements. Check your citizenship status.

- United States citizen
Permanent resident alien
Refugee alien

Check applicant type:

- Current high school senior or recent high school graduate
Current Gannon University student in applicable major
Scholarship renewal, current recipient

Provide the following information to enable reporting to the National Science Foundation:

- Ethnicity: Hispanic or Latino, Not Hispanic or Latino
Race: Native American or Alaska Native, Asian, White, Black or African American, Asian or Other Pacific Islander
Disability status: Hearing, Vision, Mobility, Learning, Other

--- Program Requirements and Application Instructions Follow ---





APPLICATION FORM
Scholars of Excellence in Engineering and Computer Science (SEECs)
For 2011-2012 Academic Year

Due Date: March 30, 2011 for FALL 2011

Program Requirements and Application Instructions

1. Apply to Gannon University as a full-time undergraduate student in one of the designated majors.
2. File the Gannon University Financial Aid Early Version Award (**EVA**) Application. (If you do not complete the EVA and qualify academically for SEECs Program, you only receive a letter indicating your potential to be a candidate. You must, then, explicitly request a SEECs application from Gannon's Financial Aid Office.)
3. Complete the Free Application for Federal Student Aid (FAFSA) by March 15, 2011.
4. Receive notification of acceptance into Gannon University.
5. Receive and complete the SEECs application form.
6. Supply any or all of the optional materials listed. Consideration of these supplemental materials can occur if overall academic qualifications are borderline.
 - Write and attach an essay describing your interest in your intended major or career goals.
 - Provide copies or descriptions of evidence of achievement in science, math, or engineering fields such as participation in summer science programs, science fair projects, computer programs developed, service projects.
 - Request letters of recommendation substantiating your ability to sustain the academic expectations of the majors. Recommenders should mail the letters to the same address as the application.
7. Mail by due date to:

SEECs Scholarship Program
College of Engineering and Business, Dean's Office
Gannon University
109 University Square
Erie, PA 16541
8. Complete financial transactions and deposits with the Financial Aid Office to confirm enrollment.

I understand that as part of the scholarship terms,

- I am expected to participate and complete the requirements as developed in each semester for the "Professional and Personal Enrichment Seminar."
- I am expected to maintain at least a 3.0 overall GPA.
- I am expected to be a student in one of the applicable majors for the scholarship.
- I am expected to file an updated FAFSA form each year.
- I am able to receive the scholarship for only four academic-years of regular full-time study.

Applicant Signature: _____



Appendix 4

Scholars of Excellence in Engineering and Science AY 2009-2010 Assessment

Name: _____

Today's Date: _____

Major?

CS

ECE

EnvE

ME

SE

SECTION (1) Seminar Activities

Provide a rating for the statements below that expresses your assessment.

	Strongly Agree 1	2	3	4	5	6	Strongly Disagree 7	Not applicable
Overall, the seminar and its experiences								
... has been satisfying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... has increased my appreciation for the aspects of engineering design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... has increased my awareness of the interdisciplinary interactions of engineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... has increased my desire to be a graduate of an engineering and / or science program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The seminar and its activities....								
... provided support for graduate entrance examinations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... paid the testing fee for graduate entrance examinations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... provided a program of industry contact through site visits, speaker series, shadowing, and / or informational interviews	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... provided the opportunity for all scholars to have internship or co-op experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... enabled connections with employers through professional organizations, conferences, career fairs, and personal contacts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... arranged for workshops with the Career Development & Employment Services Center for assistance in career planning, resume preparation, and job search	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SECTION (2) Advertising, Promotional, Marketing Activities								
I was introduced to the scholarship and its opportunities through ...								
... information from my guidance counselor / adviser	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... materials displayed in my school / campus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... postcards received at my home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... materials sent from Gannon with my acceptance notice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
... word-of-mouth contacts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Revised 4-27-10

SECTION (3) Suggestions, Insights		
What suggestions do you have to build a greater sense of community among the classes?		
What suggestions do you have for enhancing interdisciplinary interactions?		
What one aspect increased your overall satisfaction with the seminar?		
What one aspect diminished your overall satisfaction with the seminar?		

Thank you for your thoughtful and timely remarks.