

A Summer Engineering Workshop to Recruit Talented High School Women

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The Union College Division of Engineering is interested in increasing the number of women students in its engineering program. For the past seven years Union has offered its successful Summer Science Workshop (SSW) for underrepresented minority students interested in science and health professions. This past summer we adapted the model developed for the SSW to a workshop for high school women interested in engineering. Named "Educating Girls as Engineers" (EDGE), this program was a selective 12-day residential workshop for 20 high school sophomores, juniors and seniors. Participants were chosen by faculty on the basis of essays, transcripts, and letters of recommendation from high school teachers and guidance counselors. The program included three mini-courses: a module in design and bioengineering, a module in robotics for the disabled, and a module in communications. We believe that the success of our program can be attributed to several key elements:

- A dedicated team of college faculty, student-counselors, and high school science teachers.
- A unifying theme based on the application of engineering to designing tools and toys for disabled children.
- Evaluation of the program both during and after the program.
- An appropriate balance of academics, educational field trips, and recreational activities.
- Personal contact with the participants before, during, and after the program.

The workshop experience, combined with an admissions interview conducted during the summer and a reunion of students in the fall when classes are in session, have resulted in students applying to Union (some for early decision). The model which we present can be easily adapted to other institutions, disciplines, and/or target populations.

I. Introduction

The importance of establishing a workforce which is as diverse as the general population is well recognized. Even though the number of women studying engineering has slowly increased over the past 40 years (women earned fewer than one percent of the bachelor's degrees in 1966 but received 21 percent in 2000¹) they are still highly underrepresented in the workforce today - making up less than 10 percent².

As part of a self study of the Engineering Division at Union in 2000, a committee researched issues related to women in engineering. The committee concluded that while Union's environment has key elements that attract women to engineering programs such as small class

size and close contact with faculty, our enrollments continue at or slightly below the national average. Other institutions have reported that special “women in engineering” initiatives containing outreach programs, mentoring and tutoring, scholarships, and targeted advertising worked well to attract and retain women students^{3, 4, 5}.

Union has conducted a very successful outreach program, the Summer Science Workshop⁶ (SSW), for the past seven years. This program has been used to recruit minority students interested in science and health professions. Built on experience gained from SSW, a residential 12-day intensive summer workshop for talented high school girls with an interest in engineering was created and offered for the first time in 2002. Called Educating Girls as Engineers (EDGE), the program had several major goals. It was designed to encourage these girls to continue on to college to pursue engineering careers and to provide them with an intensive, real-life college learning and living experience. A unifying theme of “Designing Tools and Toys for Disabled Children” was chosen to illustrate the humanitarian aspects of engineering – that engineers solve problems to help people.

II. Institutional Background

Union College is a small liberal arts college in Schenectady, NY. Founded in 1795, it was the first liberal arts college to offer engineering as part of its curriculum. In the winter of 2003 the undergraduate student population was 2,010. Of these, 983 (48.9%) were women. Among 289 engineering majors enrolled at the time 63 (21.8%) were women.

III. Recruitment of Program Participants and Staff

A. Recruitment of Participants: EDGE was publicized in a number of ways. During the previous winter term, program descriptions and applications were mailed to individuals who had already been receiving information about SSW. These individuals included high school science and math teachers, guidance counselors, directors of special programs for underrepresented minority students, and selected Union alumni. A web site containing a program description and application was also established. Applicants were required to have completed their freshman, sophomore, or junior year and to have taken at least one year of high school science and math prior to entering the program. Twenty students were selected by faculty on the basis of essays, transcripts, and letters of recommendation from teachers and guidance counselors. Of the 20, eight were from upstate New York, eight were from downstate New York, and four were from other states (Illinois, Massachusetts, and Maryland). We were pleasantly surprised that six of the girls were from underrepresented minorities.

B. Recruitment of Faculty and Staff: We believe that one of the keys to the success of our program was having a dedicated team. We felt that it was especially important to fill staff positions with women who could serve as role models for the girls participating the program. Our team consisted of 13 individuals (10 women and three men) including: (1) the director, who oversaw the financial aspects and submitted a report to the Schenectady County Health Department which grants the permit for operating a children’s camp; (2) the coordinator, who worked with the director and staff to plan the schedule and work out all of the logistical details, distributed application materials, and communicated personally with all of the participants; (3) three Union faculty - one from mechanical engineering, one from computer science, and one

from the performing arts - who taught the mini-courses; (4) four local high school science and math teachers, who assisted with teaching in the laboratory and accompanied students on field trips (two lived in the dormitory with the students); (5) three student counselors (including one administrative counselor) who contacted students prior to their arrival, oversaw evening and weekend recreational activities, lived with the students, and assisted them with their classwork. The latter were selected from our undergraduate female engineering and math majors on the basis of applications, interviews, and letters of recommendation from college faculty. An EMT (mandated by state regulations for children's camps) also lived with the participants. We scheduled monthly meetings prior to the workshop, frequent informal meetings as needed during the workshop, and a debriefing session immediately following the conclusion of the workshop.

IV. Program Components

The unifying theme of EDGE, "Designing Tools and Toys for Disabled Children", was reflected in mini-courses, educational field trips, papers, oral presentations, and talks given by special guest speakers. The program achieved an appropriate balance of academics, educational field trips, and recreational activities. We have included the 12-day schedule from the workshop (Fig. 1).

A. *Educational Field Trips*: The three field trips not only allowed students to observe ways in which what they were learning in the classroom and laboratory applies in real work settings, but also exposed them to myriad career opportunities in engineering and the application of engineering to health care. On the first full day of the workshop, students toured the pediatric unit at Northwoods at Hilltop, a residential facility in Niskayuna NY that has been providing acute inpatient brain injury rehabilitation to children, adolescents, and adults since 1989. Here students had an opportunity to observe children for whom they would be designing toys and tools. The second trip was to the New York State Health Department Wadsworth Laboratories where students learned how transmission electron microscopes, DNA microarrays, and cytogenetics are being used in biological research. The third trip was to the State University of New York Center for Nanoelectronics to view their computer chip manufacturing facility. At all sites staff were encouraged to speak about their own career paths.

B. *Mini-Courses*: The academic portion of EDGE was divided into three mini-courses: (1) **Bioengineering Design Studio** in which students learned about the applications of technology for the design of devices for disabled children; (2) **Robotics Design Studio** in which students utilized robotic technology to design communications devices for disabled children; and (3) **Communications** which emphasized self awareness, interpersonal communications, and effective presentation techniques. An effort was made in all mini-courses to achieve a balance between depth and breadth, and between theory and hands on application.

1. Bioengineering Design Studio:

Objectives:

The objectives of this mini-course were to a) introduce the basic types engineering, b) focus on bioengineering as an exciting type of engineering, and c) introduce the elements of an organized design process.

Preparation:

To have the girls effectively carry out the design of useful toys, we borrowed the elementary design process steps used in our introductory freshman engineering course. The instructor (Prof. Balmer) introduced elements of the thermodynamics of biological systems (bioenergetics) that required only simple mathematics. These elements are easily applied to the human body for an understanding of dieting, exercise, and weight loss. Tables of food caloric values and exercise caloric requirements were prepared as handout materials. For the toy design process, the instructor visited several garage sales during the spring to gather a variety of used toys that could be modified in the design process. Funds were also set-aside for the girls to visit a local discount store and purchase specific items needed to complete their designs.

Implementation:

Six half-day sessions were scheduled over three consecutive days. The first day was spent in lecture and on the field trip to Northwoods. The remaining days were spent working in teams designing and modifying toys. The teams reported back to the entire class periodically. Staff and counselors functioned as support staff providing guidance when needed, acquiring materials, and teaching soldering skills. All construction was supervised.

Lecture/Lab schedule:

Session 1: The morning session of the first class began with a discussion of the student's vision of what an engineer does and what the word "engineer" means. The main branches of electrical, mechanical, chemical, civil, and computer engineering were then discussed, along with the main branches of biology (sub-cellular biochemistry, cell biology, organismal biology, and ecological biology). Bioengineering was introduced as the convergence of biology, engineering, and computer science. Finally the field of bioengineering was broken down into the main areas of biomedical, bioenergetics, biomechanics, and bioinstrumentation. Bioenergetics, the study of energy flows in a biological system, was then discussed in detail as a typical example of bioengineering. The concepts of heat and work were presented and related to metabolic rate. Examples were then presented to show the impact of dieting and exercising on weight loss. As a homework exercise the girls were asked to calculate how long they would have to exercise to work off the calories added by one candy bar. Session 1 ended with an infrared video camera and a baby. The camera highlighted the areas of heat loss from the baby, and then a facial infrared picture of each girl was taken and put on the workshop web site.

Session 2: The afternoon of the first day focused on the field trip to Northwoods. The hospital staff discussed the needs for specialized toys and introduced the girls to a number of children with specific handicaps.

Session 3: The second day included a discussion of the basic elements of engineering design. The following steps in the design process were discussed and illustrated:

- Step 1: Define the problem to be solved.
- Step 2: Determine the design requirements and constraints.
- Step 3: Brainstorm alternative design solutions.
- Step 4: Sketch the solutions.
- Step 5: Evaluate alternative designs.
- Step 6: Select a final design.

Step 7: Document the design (oral and written reports).

Session 4: During the afternoon of the second day the girls began designing toys for specific disabled children they had met at the hospital. The girls were divided into teams of three or four. Each team began the toy design process by defining the specific problem that interested them based on their observations during the hospital field trip. They then developed design requirements and constraints, and moved on to brainstorming and sketching possible solutions.

Sessions 5 & 6: On the third day the teams selected their best design and then constructed and tested it. Each team demonstrated their final toy design to the class and staff members from Northwoods. All toys were presented at the poster session. After the workshop was completed, the toys were donated to Northwoods.

2. Robotics Design Studio:

Objectives:

The seeds for this mini-course were planted during the fieldtrip visit to Northwoods at Hilltop. There, therapists introduced the girls to two adolescent patients who had lost their ability to speak. Each patient used a computerized “talk box” that enabled them to scan through a series of pictures and, when the correct picture was displayed, to press a button causing a word or phrase to be spoken. The therapists explained that insurance companies were reluctant to pay for these expensive devices until a patient’s capability to use one was proven. In this mini-course we designed and built a low cost prototype for a diagnostic “talk box” which could be used to assess this capability. Our objectives for the mini-course were to (1) show that engineers solve problems for people, (2) solve a realistic problem using electrical engineering and computer science, and (3) give the girls some “hands-on” experience leading to self-confidence.

Because of the complexity of the talk box, students were given significant direction in the design of the basic circuits and programming logic. However, there was sufficient flexibility in the design and construction of the circuit layout to allow for the inclusion of individual creativity. We also decided to use several experiments designed for high school students, which were provided by Parallax, to introduce our students to microprocessors and programming. The experiments melded nicely with our design and reduced some anxiety on the part of the students.

Preparation:

Profs. Hedrick (ECE) and Almstead (CS) began preparation for this mini-course in the fall of 2001. A basic design was produced using technologies that had proved successful in introductory engineering and computer science courses and in Union’s summer Robot Camp. Cost and time for construction were also considered. With this in mind we opted to: (1) use the Parallax Basic Stamp II microprocessor since it met the project requirements, was inexpensive, and used a simple programming language, (2) use breadboards for circuits to provide flexibility and ease of use, and (3) provide the speech capability through a software solution rather than purchasing expensive hardware. We chose Microsoft Agent technology since the use of the animated, speaking characters had sparked excitement in our introductory programming classes. A proof of concept design was built and tested early in spring 2002. Almost all of the materials were ordered ahead of time to ensure their availability.

Implementation:

We scheduled six half-day sessions spread over four days. Each session began with a lecture and discussion in a classroom setting. During this time an agenda and background material for understanding the laboratory work were presented. For the remainder of the session, the students worked in a laboratory in teams of two to construct a talk box. The teams were formed by the teachers and counselors who knew their capabilities and personalities well. Teachers and counselors also acted as lab assistants. Background reading assignments from handouts and paper design/planning assignments were given. All construction was done within the supervised laboratory sessions.

Lecture/Lab schedule:

Session 1: During the first lecture session we discussed the problem, presented a block diagram of the conceptual design, and formed the teams. In the laboratory, the teams set up their computers, installed and tested their microprocessors and began the experiments provided by Parallax.

Session 2: The lecture included an introduction to circuits, an interactive discussion during which the two basic circuits for the talk box were designed. The students continued with more experiments in the lab and built and tested samples of the circuits designed in the lecture.

Session 3: Basic programming was addressed in the lecture. During the lab, the teams built and tested all of the circuits for their talk box and programmed the microprocessors to drive the circuits.

Session 4: The lecture introduced Visual Basic and Microsoft Agents and presented a template program that the students would modify to provide the speech capabilities for their talk boxes. In the lab, the students designed, coded, and tested modifications to the template program to produce the desired behavior for their talk box designs.

Session 5: The lecture introduced the students to other methods of speech synthesis. The students then worked in the lab to finalize their talk boxes, prepare demonstrations, and experiment with other speech synthesizers.

Session 6: The students gave informal presentations and demonstrated their talk boxes. They were asked to address two questions: (1) what refinements they would make given more time, and (2) what issues they would have to address if it were to be manufactured commercially. Students voted for the top two solutions to represent them in the final poster session.

3. Communications

Objectives:

The communications mini-course, taught by Prof. Culbert, provided a forum for students to explore self-awareness, creativity, interpersonal skills, and presentation skills which are essential in engineering and in other careers. This mini-course consisted of three components: a Theater Workshop, an Introduction to Communications, and Troubleshooting Presentations. The Theater Workshop was included for the purpose of fostering creativity and teamwork among the participants. It was also felt that, given the nature of the program design project, which involved creating tools/toys for children in a hospital setting, a series of experiences which released emotions in a structured, creative and supportive environment would be a service to the participants. This workshop culminated in an exercise designed to bring dreams to life through group improvisation and dreamer-directed staging. The active, experiential approach to problem solving in theater games and activities complemented the research and problem solving aspects

of the design workshops and balanced the academic sessions. The objective of the exercise was to build trust and allow for the expression of personal issues in a non-threatening and creative process. The objectives of the Introduction to Communications and Troubleshooting Presentations components were to improve basic public speaking techniques and practices and provide specific feedback on the students' final oral presentations.

Implementation:

Theater Workshop:

This component, which was staged in Union's Yulman Theater, included four exercises.

1. The Communication Contract

This ice-breaker improvisation game was introduced to demonstrate the impact of attention, focus, commitment, teamwork, active participation and leadership in group productivity.

2. Character Traits and Essences, Shadow Walks

These are exercises in presenting the self truthfully and without fear of judgment. Character traits were "shared" in a game played in a circle. Shadow walks demonstrated character physicality in a fun game of self-discovery. "Essences" is a verbal and physical game of self-definition.

3. Parts of a Whole

This music-inspired movement exercise was designed to foster creativity and promote teamwork.

4. Dream Theater

This was the principal exercise/activity of the workshop. All the previous games and exercises served to open the participants to the trust, creativity and physical work of this activity. A follow-up discussion of the impact of the dream presentation and a critique of the creative process involved all students in releasing emotional reactions.

Introduction to Communications:

This was a mini-course in basic public speaking techniques and practices. The importance of the speaker-audience relationship was stressed through theory and practical demonstration. The lecture material and extensive handouts covered two principal concerns for the novice speaker: Managing Impressions and Delivery Tactics. Students were asked to prepare a self-introduction presentation and speech outline for feedback and review. Peer review forms were given and students were assigned to give feedback to each other before the faculty feedback session.

Troubleshooting Presentations:

This session included a review of each participant's outline for her speech and practical feedback on the presentations. Peer evaluations, along with discussion and critique, were used to maximize opportunities for delivery improvement and confidence.

C. Dinners with Women Engineers: On two occasions students had an opportunity to meet over dinner with local women representing several sub-disciplines of engineering. The dinners were arranged by an alumna who is an engineer at General Electric. One goal of this program component was to launch a mentoring program matching female engineers with girls interested in particular engineering fields.

D. On-Campus Presentations by Guest Speakers: Students had the opportunity to hear presentations by therapists who work with children at Northwoods, a philosophy professor whose specialty is biomedical ethics, a chemistry professor who had suffered a traumatic brain

injury, and a female engineer from Pratt & Whitney.

V. Assignments and Final presentations

A. *Oral Presentations*: Early in the workshop, students were divided into teams of two to research a specific topic related to engineering. Topics included: nanobiotechnology, toys for quadriplegics, medical prostheses, computer speech synthesis and recognition, famous female engineers, and the use of technology to help the disabled. On the morning of the last day of the program, each team gave a formal oral presentation.

B. *Poster Session*: On the afternoon of the last day of the program, students participated in a poster session in which their design projects were displayed and demonstrated. Invited guests included Union College faculty and administrators and parents. The session was covered by the media.

C. *Reflection Paper*: This consisted of a two page individually written paper which included a personal assessment of what the student had gained by participating in the workshop. Students were asked to summarize their experiences by describing what they learned, what was new to them, what they liked and disliked, and what they enjoyed most.

VI. Program Assessment

At the end of the workshop, students were asked to complete an evaluation form which asked them to rate each of the program components; to make comments about their college experiences, staff members, and the length of the workshop; and to make suggestions for improving the workshop for future students.

While the program was carefully planned before it began, some changes were made during the course of the workshop. For example, the idea for the poster session was not suggested until the end of the first week; it turned out to be one of the most successful aspects of the program.

VII. Use of Program as a Recruiting Tool for Union

Near the beginning of the 12-day workshop, representatives from our Admissions Office and Career Development Center spoke with the group about the admissions and interviewing process. Students were then offered group interviews with an admissions officer. Students were also encouraged to speak with faculty in fields of interest to them. In the fall, participants were invited to a reunion, which was held in conjunction with an Admissions open house. Included with the invitation was a Union College application with a fee waiver. Students attended a reunion dinner with EDGE faculty and counselors; spent the night with a student host; and then attended admissions programs and classes the following day. We maintained close personal contact with all of the students prior to and during the workshop, and some of the students following the workshop.

VIII. Program Funding

The total cost of the program was \$36,600. About half of the cost was covered by a \$1,500 fee, which included room and board. Half tuition scholarships were arranged for those who could demonstrate a need. The remaining was covered by donations from a number of sources including corporations, engineering societies, and individuals. A great deal of effort was expended to identify these funding sources. Our experience suggests that one of the greatest impediments to offering programs of this kind is finding a way to pay for them. However, one successful strategy was to ask donors to sponsor one or more students.

IX. Conclusion

It is clear from the students' evaluations that they found the workshop to be both stimulating and enjoyable. They were favorably impressed with all aspects of the workshop, including the staff, the field trips, the recreational activities, the interaction with other students, and the class and lab work. Several suggested, however, that the experience could be improved by spreading the workload more evenly over the two weeks of the program. Nearly all of the students said that the workshop was either the right length or not long enough and nearly all said that we had successfully met our goal of showing them what a small liberal arts college is like. On their applications to the program, students were asked about future career options. Most expressed interest in a variety of professions, including science, medicine, and psychology; 60% specifically mentioned engineering (especially biomedical). A similar question was asked on the final evaluation form. This revealed that 80% were interested in engineering and that their interest in the field had increased as a result of their participation in the workshop. Comments from some of workshop participants are included in the appendix.

While not explicitly stated among the goals of the workshop, our desire has always been to expose high school students to the best of what college - specifically Union College - has to offer. We are pleased to learn from our Admissions office that five of the 11 high school seniors who participated in EDGE last summer have applied to Union for the fall of 2003. We are hopeful that some of the younger students will apply in future years.

Union's intensive Educating Girls as Engineers workshop identified talented and motivated students, provided them with a college-level, academically rigorous experience, and contributed to their determination to attend college to begin preparation for careers in engineering. It was so successful that we would like to offer it to another group of young women this year. Women continue to be seriously underrepresented in these careers and EDGE is one important way Union is working to address this problem. The model which we have described could be easily adapted for other institutions, disciplines, and target populations

Acknowledgment: We would like to acknowledge the valuable help we received from our colleagues Robert Balmer, who developed the bioengineering mini-course, and Patricia Culbert, who developed the communications mini-course.

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JAMES N. HEDRICK

James Hedrick received a B.S. and M.S. in Electrical Engineering from Union College. He has taught both electrical engineering and computer science for the past seven years in the ECE and CS departments at Union. In addition to teaching, he is an Academic Specialist in the Union College Academic Opportunity Program. He developed and has taught the technology mini-course in the Summer Science Workshop for the past six years and was the Director of the EDGE program in the summer of 2002.

KAREN N. WILLIAMS

Karen Williams received a B.A. in Chemistry from Russell Sage College, an M.S. in Pharmacology from the University of Michigan, and a Ph.D. in Life Sciences and Systems from Union College. For nearly 30 years she has taught for the Biology Department at Union. Last summer she was the coordinator for EDGE and for seven years has coordinated the Summer Science Workshop for high school students from minority groups underrepresented in the science and health professions.

LINDA G. ALMSTEAD

Linda Almstead received a B.S. in Mathematics from Rensselaer Polytechnic Institute and an M.S. in Computer Science from Union College. She worked for a number of years in industry before joining Union's faculty where she has taught as a Lecturer in the Computer Science department for the past 11 years. She has led a number of outreach programs for local middle and high school students including Robot Camp and Web Camp. Last summer she was the primary lecturer for the Robotics mini-course.

Appendix

Comments from Students' Reflection Papers--July, 2002

“This program has provided me with a new look on engineering. This perspective showed me that even in the field such as engineering, it is possible to have a direct impact on people’s lives. I plan to share the techniques that I learned by my participation in this workshop with my community, so that its members will also be able to make a difference in the lives of the disabled. In addition, although I was previously considering engineering as a future career, this program has served to strengthen my faith that engineering is the correct career choice for me.”

“I had no prior experience in any field of engineering before I came to EDGE. I had hardly any experience designing things or making things. I also had very minimal computer skills . . . I still haven’t learned all there is to know but I feel that this program has awakened me to what it means to study engineering in college. I am almost positive now that I want to go to school for engineering.”

“Another thing that I learned was that college life is not as scary as it would seem. I love the independence . . . If I had to describe this program to my peers I would recommend it in a heartbeat. Overall, it was well put together; I learned a lot about engineering and myself. I met great people and really got to experience college. It was a hands on experience that I could never get in the classroom.”

“While experiencing what life might be like in college, we also got a chance to look ahead at life in an engineering career. This occurred by means of organized formal dinners with female engineers. These created an opportunity for me and for the other young women in the program to meet and converse with actual engineers from a variety of positions and backgrounds. By asking these women about their education and career paths, I learned about how I could maximize the effectiveness of my education as well as how to find a rewarding, interesting career.”

“The most memorable part of the workshop was the visit to the Hilltop Facilities. Just seeing the children in such disabled situations touched my heart and made me determined to help. After I met a few kids like Corey, Michael, and Tomid, I became motivated to help.”

“One of my absolute favorite activities was creating toys for disabled children. The design and creation of the toys was important, however visiting the Hilltop Hospital made the connection to real life. That is, what I learned in the classroom can then be applied in the real world. This is an important lesson because I feel that a person’s education and skill should be used to solve real problems and help the world be a better place.”

“When I came to this camp I was expecting to get a clear idea of what an engineer does. But as we spent more and more time in the classroom and with the engineers and professors it became clear to me, the real uniqueness of engineering. There are just so many options and so many different varieties to choose from that no one person can say “This is what an engineer does.” That is exactly what I wanted to hear. Knowing that now gives me the freedom to pick and

choose what I want to do when I go to school and when it comes time to choose a career. I now know what kinds of doors engineering can open up for me.”

“Engineering. Before this program, the word conjured up images of geeks with pocket protectors and calculators. However, I knew my strength in math and science and love for problem-solving would help me in such a career. I wanted to learn what kinds of engineering were available and whether any interested me. Through trips to laboratories and lectures on biomedical, electrical, and civil engineering, the career came to life. It reminded me of the gratification I felt when I finished an adapted remote control to give an adolescent more independence. It reminded me of the pride I felt when I actually created my own circuit program. Instead of a vague idea, engineering became an attainable career characterized by feeling and inspiration.”

“I found that college is for me and Union College is the place I want to be. I found that the work can be hard but rewarding and the professors make you feel like you achieved something. For example with the talk boxes, when we were finished I could look back on each step and feel proud that I made something so useful.”

“It changed my life in a way I never thought possible. Before I came to the program, I did not think that it was possible for a woman to be an engineer because it’s mostly a male dominated field. I was able to prove to myself that I was as good at engineering as any man out there and I’m proud of myself for having achieved such a great accomplishment in the program.”

“Over these two weeks I received an education, made some new friends, learned about myself as a person and had great times. . .I will always remember the summer I grew up at engineering camp.”

Fig. 1
 UNION EDGE: SUMMER ENGINEERING WORKSHOP HIGH SCHOOL GIRLS
 July 21-August 2, 2002

21 Sunday	22 Monday	23 Tuesday	24 Wednesday	25 Thursday	26 Friday	27 Saturday
2:00 to 4:00 PM Check-in	8:30 - 11:30 AM Introduction to Bioengineering 1:30 - 4:00 PM Visit to Hilltop 4:30 PM Admissions/ Inter- viewing Workshop	8:30 - 11:30 AM Bioengineering Design Studio 1:30 - 4:00 PM Bioengineering Design Studio 3:30 PM Bioethics lecture	8:30 - 11:30 AM Bioengineering Design Studio 1:30 - 4:00 PM Bioengineering Design Studio	9:00 - 11:00 AM Tour of local biomedical facility 1:00 - 3:00 PM Tour of local high- technology facility	8:30 - 11:30 AM Communications Workshop 1:30 - 4:00 PM Robotics Design Studio	12:30-9:00 PM Picnic and Recreational field trip to the ballet at Saratoga Performing Arts Center
6:00 PM Dinner	6:00 PM Dinner	5:00-7:00 PM Dinner at the Dean's house!	6:00 PM Dinner with practicing women engineers	6:00 PM Dinner	5:00-9:00 PM Dinner and recreational activity	
7:00 PM Reception for participants	7:00 PM Hilltop presentation					
9:00 PM Dorm meeting	9:30 PM safety presentation					
28 Sunday	29 Monday	30 Tuesday	31 Wednesday	1 Thursday	2 Friday	3 Saturday
10:30 AM-1:30 PM Brunch	8:30 - 11:30 AM Communications Workshop	8:30 - 11:30 AM Robotics Design Studio	8:30 - 11:30 AM Robotics Design Studio	8:30-11:30 AM Communications Workshop	9:00 - 11:00 AM Presentations	Home!
2:00 PM Union Scavenger Hunt	1:30 - 4:00 PM Robotics Design Studio	1:30 - 4:00 PM Robotics Design Studio	1:30 - 4:00 PM Robotics Design Studio	12:00 PM Lunchtime Discussion: "Seeding the Excitement about Engineering in your Community" Finish papers and prepare presentations	11:30 AM Lunch 1:00 - 4:00 PM Poster Session;	
6:00 PM Dinner.	6:00 PM Dinner with practicing women engineers	6:00 PM Dinner	5:00 PM Dinner at Jumping Jacks 7:00 PM Conversation with practicing woman engineer	6:00 PM Dinner	5:00 PM Farewell Dinner with speaker	

