

2006-1006: ENGINEERING EXPERIENCES - REPLACING FRESHMAN ENGINEERING SEMINAR WITH A FLEXIBLE, STUDENT-DRIVEN APPROACH

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Engineering Experiences – Replacing Freshman Engineering Seminar with a Flexible, Student-Driven Approach

Background

For a number of years all engineering freshmen at Stevens Institute of Technology participated in a first semester, one-credit Engineering Seminar. This course was based on the popular format championed by Raymond Landis [1] with some customization to the Stevens context. Similar courses are in effect at other schools with varied formats [e.g. 2]. The course was considered a part of the student advising system to complement the advising by individual faculty members who were assigned to the Freshmen. These advisors were randomly assigned and stayed with a student until the end of the third semester, at which point students elected an engineering major and were assigned an advisor in their chosen engineering discipline. The Engineering Seminar involved groups of 20-24 students meeting weekly with an individual engineering faculty member with all groups following the same syllabus. The faculty experience with this course was that initial student interest started to wane after a number of weeks. Feedback from students indicated that a quite a few resented having to spend the time meeting every week given the heavy credit load at Stevens. Students also indicated a desire to have more opportunity to focus on engineering careers, program-related topics and experiences outside the classroom.

In response to the above, and as part of a revision to the core curriculum to provide among other goals a more engaging and less onerous first year along with more choice, a new approach has been taken that attempts to preserve those elements of the Engineering Seminar that were valued by the students while offering a more flexible, engaging format. A two-semester sequence, E101-102 Engineering Experiences, has been introduced. The approach is to offer students a variety of experiences and events scheduled throughout the freshman year. Coupled with this new two-semester course has been a change to the advising system whereby an advisor is assigned to the incoming student based on his/her anticipated engineering discipline. The official election of a disciplinary program is still made at the end of the third semester, however it has been found that only approximately 15% of students are undecided on

entering and those students are assigned to a senior faculty member and then switched to a discipline advisor once they have a clearer idea of their commitment to a particular field.

Structure of the Course

E101-102 Engineering Experiences is comprised of a series of events offered each week that for the most part students elect to participate in. To do so they are required to register online through a dedicated website. This website provides some interesting functionality as described in more detail below.

A diverse selection of events is offered. Each engineering department is expected to provide orientations to their programs and organize a variety of events relevant to their field. These can include workshops, lectures; visits to research centers and laboratories; external trips; visiting speakers, including corporate events with a career focus. Where possible, departments are strongly encouraged to offer hands-on or active approaches. The events can range from lectures suitable for a large attendance to small group activities. Some interesting examples include: walking tours of new construction as well as a 150-year old ferry terminal by the Civil Engineering Department; a workshop on medical devices by the Biomedical engineering department; a 4-week project given by the Mechanical Engineering Department to step through the stages of designing a simple pump that included analysis and rapid prototyping.

In addition to the departmental offerings, a number of events are organized at the Engineering School level and also through other organizations within the Institute such as Career Services and the Academic Support Center. For example the latter is responsible for several workshops on such things as: practicing good study skills, effective time management and examination technique. These mirror the Success “101” type activities that had been found valuable in the previous Engineering Seminar syllabus. Career Services has offered popular workshops on resume preparation and interview technique. These are of particular significance to the approximately 40% of Freshman who will take part in the Cooperative Education program, with their first work period commencing in the summer after Freshman Year. Representatives of some of the companies that come on campus to recruit also provide seminars on careers in their fields.

A limited number of events are compulsory for all students, including a lecture at the start of the first semester that provides a background to Stevens and the curriculum. A lecture on applied ethics is also required in the second semester for all students. The ethics event also requires students to complete a short paper in which they apply the lecture content to an ethical issue of interest. This provides an important early message to the students on the significance of ethics in engineering and a broad-based and engaging foundation on which to build the topic of ethics within the disciplines later in the curriculum.

Logistics of the Course

The course is nominally assigned two 75-minute time slots each week with the total Freshman engineering class split approximately equally between the two slots to accommodate their schedules. Many of the events are scheduled to coincide with these time slots to ensure that students will be able to attend. This also means that many of the events are given twice to reach all who may potentially be interested and certainly this is so for the compulsory events. Other events, because of the need for additional time, such as for off-campus trips or due to the constraints of the providing individual(s) or organization, may be scheduled on days/times that are not available to all students. Where possible, the organizers are encouraged to offer repeats of these events to reach the broadest number of potential participants.

The multiple events most weeks, together with the online registration system, provide students with flexibility to choose in what and when they participate. In the first implementation the students were required to attend a minimum of five events each semester, ten in total for one credit.

Course Website and Registration System

A key enabler of the course function is a website and a registration system that is linked to the website. A view of the homepage is shown in Fig. 1. The website, in addition to linking to the registration tool, provides a Schedule of Events for the current semester to allow students to preview and plan which events they may wish to register for. An example is seen in Fig. 2. In addition there is a description of the course and its operation, links to the engineering departments and programs, to information on the engineering curriculum, and to a variety of

resources on careers, professional societies, licensure, etc. It also links to material on Technogenesis, a Stevens' initiative to inculcate an entrepreneurial orientation and provide associated knowledge to students. The website also links to the Advising website to reflect the linked role the course plays.

The linked Registration site is a custom developed web-based application driven by a SQL database and developed using PHP. It incorporates user authentication based on the Stevens enterprise CPIPE system that is used as a web portal and for email. Data is downloaded from the Institute's Student Information System at the start of the course to build a database of enrolled students and from this the associated records of events that they register for and actually attend. The database also has information on the individual faculty or staff who are responsible for the various events. This allows them to login to view information on their specific events. The course and database administrators can view all event details, enrollment and attendance records.

The student on login sees a listing of upcoming events. Past events do not appear but a link is provided to review events previously attended by the student for which that attendance is recorded in the database as described below. The event list includes a brief description for each event, date, time, duration, location and the responsible person. The student can choose to register for one or more events. Once registered, a student can later re-enter the site and un-register if they change their mind at least one day prior to the event (this policy is under review). If an event is already full due to an enrollment cap placed by the organizer, or in conflict with some other activity, students are able to register their interest in the registration system. Thus, the system provides event organizers with a listing of registered students as well as a list of interested students who could not attend. The latter allows for planning repeat offerings of popular events.

Event organizers log in under the Faculty category and see only the events for which they are responsible. This is illustrated by the sample screen shot of Fig. 3. The organizer can see a list of the names of all registered students, each linked to their email address in case the organizer needs to contact them. The organizer can also download a pdf file that automatically is

generated with the list of registered students and the event information to use as an attendance sign in sheet. This is important as credit is only given for events where students have signed in and that attendance recorded in the database. The organizer achieves the latter by re-entering the registration site after the event and checking off radio buttons next to each student to indicate who attended. The database can generate a report to the Course administrator to show all events attended by each student to assist with course management and grading.

Experience with the Course and Assessment

The course has received positive feedback from the faculty, particularly those involved with undergraduate advising and those who were involved in the original Engineering Seminar course.

In the first implementation it has proven a challenge to generate and schedule sufficient events early enough to provide the students with a full picture of what will be on offer for the full semester. This has caused some student frustration with not knowing what else might be offered and has contributed to the other issue, namely that of student procrastination, leading to a flurry of registrations for events in the latter part of the first semester just to complete the requirements. It is anticipated that in future years the events schedule will be much easier to establish at the start of the semester and this will allay many of these issues. We also anticipate one or two more compulsory events related to the original “Success 101” topics.

There has been an interesting but not surprising spread in engagement. There are many students who attended the minimum number of events required, yet a significant number attended many more than the minimum and took full advantage of what was offered. Not surprisingly, the latter group was enthusiastic about the course

Another challenge has been providing activity-oriented events; this requires extra effort on the part of organizers and for some disciplines is not easily achieved.

Formal assessment has been through the Stevens end-of-semester course and outcomes assessment system. For this course it took the form only of an online survey that addressed course delivery and several outcome-related questions that map to the overall ABET outcomes of the engineering programs. Students were also asked to rate each of the events that they participated in.

Results on the two primary course delivery questions reveal the following on a scale from 1 (poor) to 4 (excellent):

1. *Overall evaluation of format and operation of the course: Mean = 2.9; standard deviation 0.8*

2. *Overall evaluation of the appropriateness and value of the complete set of events offered:*

Mean = 3.0; standard deviation 0.8

These results show the students overall have given a “good” rating to the course. So a positive start but clearly room for improvement. The mean ratings of individual events was mostly close to 3 with very few below. The Comments section provided feedback on individual events and highlighted the common issues mentioned above of the need for provision of a complete program of events at the start of the semester and less lecture-type events.

Conclusions

This novel approach to replacing the Freshman Engineering Seminar with a student-driven, flexible course format that offers a variety of experiences over two semesters appears to have been well received by students and faculty. On the basis of the formal assessment, feedback to event organizers will allow for an improved set of offerings.

References

1. Raymond Landis, *Studying Engineering – A Road Map to a Rewarding Career*, Discovery Press, Burbank, California, 2nd Ed., 2000, ISBN 0-9646969-5-9
2. Budney, D.D., “*The Freshman Seminar Assisting the Freshman Engineering Student’s Transition from High School to College*”, American Society for Engineering Education, 2000 Annual Conference Proceedings, Albuquerque, MN, June 2001.

Fig. 1 Home page for the course

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SCHOOL OF ENGINEERING

About SoE Academics Research Admissions News Students Alumni

E 101 - 102 Home
General Course Info
List of Experiences
Engineering Programs
Engineering Curriculum
Advising
Resources
Useful Links
Technogenesis
Contact

E 101 - 102 Engineering Experiences

[Register For Experiences](#)

COURSE OBJECTIVES

This primary objective of the course is to provide incoming students with an opportunity to learn more about engineering as a profession and to explore the various engineering disciplines for which programs are available at Stevens. This is intended to assist students as they develop their interests and eventual commitment to a major field of engineering study. The course also includes other career, professional and personal development information and perspectives as well as orientation to Stevens' history, the curriculum, research and Technogenesis.

COURSE FORMAT

The course is split over the two semesters of the Freshman Year as E101 (Fall) and E102 (Spring) with a total of one credit awarded for completion of a minimum of **FIVE** experiences in each semester.

The course is offered in a flexible mode such that each student can register for those experiences that interest them by selecting from a list offered during the semester. *It should be noted however that a limited number of events are required of all students.*

Registration for experiences (apart from the compulsory events) is done online using a registration site that is linked from this webpage. Each experience is listed with a date, time, duration and location. Not all experiences are offered in the scheduled day/time slot for E101 – 102 as there may be logistical reasons to run them at other times, such as for an off-campus trip or because the experience requires more than the 65 minutes scheduled.

It is important to ensure that you sign the attendance list at each event in order to get credit. Credit cannot be given retroactively. Attendance will be taken at each event.

The registration process allows a student to express interest in an experience for which they are unable to register because it has reached the cap. In this way a repeat may be arranged if there is sufficient interest. The repeat may be offered either in the same semester for the Fall or in the second semester. Therefore students should check the offerings on a regular basis as they may be revised to reflect interest.

STUDENTS ARE STRONGLY URGED TO SPREAD THEIR EXPERIENCES AND NOT POSTPONE REGISTERING UNTIL LATER IN THE SEMESTER AS THEY MAY BE UNABLE TO COMPLETE THE REQUIREMENTS AT THAT TIME





Fig. 2 Sample listing of events on webpage

List of Events


http://www.stevens.edu/engineering/E101-102/event_list.htm

Week 6	10/4 & 10/7	
Real Time Observations and Computer Forecast Models of New York Harbor	Prof. Blumberg	(Dates changed to 10/06 & 10/07) *Registration required
Biomedical engineering orientation	Prof. Ritter	McLean basement room 001 (10/07 only) *Registration required
Chemical: Tour of Microchemical Research Center	Prof Lee	*Registration required
Week 7	Mon (no classes) & 10/14	
Accenture - Consulting Seminar		(Wednesday 10/12 Bissinger Room)*Registration required
Academic Success Workshop		(10/12 Room K228)*Registration required
Week 8	10/18 & 10/21	
Biomedical: Healing Bones	Prof. Hazelwood	*Registration required
Chemical: Tour of Microchemical Research Center	Prof Besser	(Repeat on student request)*Registration required
Environmental: Tour of the Nichol Lab for environmental research at Stevens	Prof Christodoulatas	*Registration required
Week 9	10/25 & 10/28	
Mechanical: Design experience - Design a Pump (requires 4 meetings)	Prof. Hadim	*Registration required
Chemical: Tour of Highly Filled Materials Center	Prof Halil Gevgilili	*Registration required
Mechanical: Design experience - Design an Autonomous Vehicle	Prof. Hadim	*Registration required

Fig. 3 Registration site as viewed by faculty member showing event and registered students (single placeholder name shown as illustration of format)

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SCHOOL OF ENGINEERING

SoE Home Search People Finder Feedback



- [E 101 - 102 Home](#)
- [My Events List](#)
- [Student's Interested in My Events](#)
- [List of All Events](#)
- [Logout](#)

E 101 - 102 Engineering Experiences Registration

Hello **Keith Sheppard**,

Here is the list of Events and student registered

No.	Event	Students Attending
1	<p>Accenture - Consulting Seminar A Human Resources representative during the first half hour will present defining the field of consulting, i.e. what does consulting entail, what types of educational backgrounds are relevant, what do consulting companies look for when hiring, etc. During the second half hour, a Stevens grad with a Master's in Environmental Engineering who works for Accenture, will talk about his experiences in consulting. The seminar is designed to offer information on the field of consulting. This Seminar is open to everyone. Place: Bissinger Room Date & Time: Wednesday, 12th October 2005 at 01:00 PM Duration: 1 Hr Capacity: 100 Instructor: Keith Sheppard Download Registration PDF</p>	<div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-bottom: 5px;">Check All</div> <p>Michael Carpenter (Attended) Michael Carpenter (Attended) Michael Carpenter (Attended) <input type="checkbox"/> Michael Carpenter Michael Carpenter (Attended) <input type="checkbox"/> Michael Carpenter Michael Carpenter (Attended) Michael Carpenter (Attended) Michael Carpenter (Attended) Michael Carpenter (Attended) Michael Carpenter (Attended) Michael Carpenter (Attended) Michael Carpenter (Attended) Michael Carpenter (Attended) Michael Carpenter (Attended)</p> <div style="border: 1px solid #ccc; padding: 2px; display: inline-block; margin-top: 5px;">Submit Attendance to Database</div>



