University of California, Merced
Engineering Service Learning Program

Service Learning Program Notebook

1. School of Engineering Presentation: Overview of Program

2. Course Description and Syllabus: ENGR 097 Engineering Projects in Community Service

3. Service Learning Proposal Instructions

4. Skills Session Schedule Fall 2005

UC Merced

Foster Family Center for Engineering Service Learning – A National EPICS Site

Valerie J. Leppert
Associate Professor
and Director

Rosalina Aranda
Progam Coordinator

School of
Engineering

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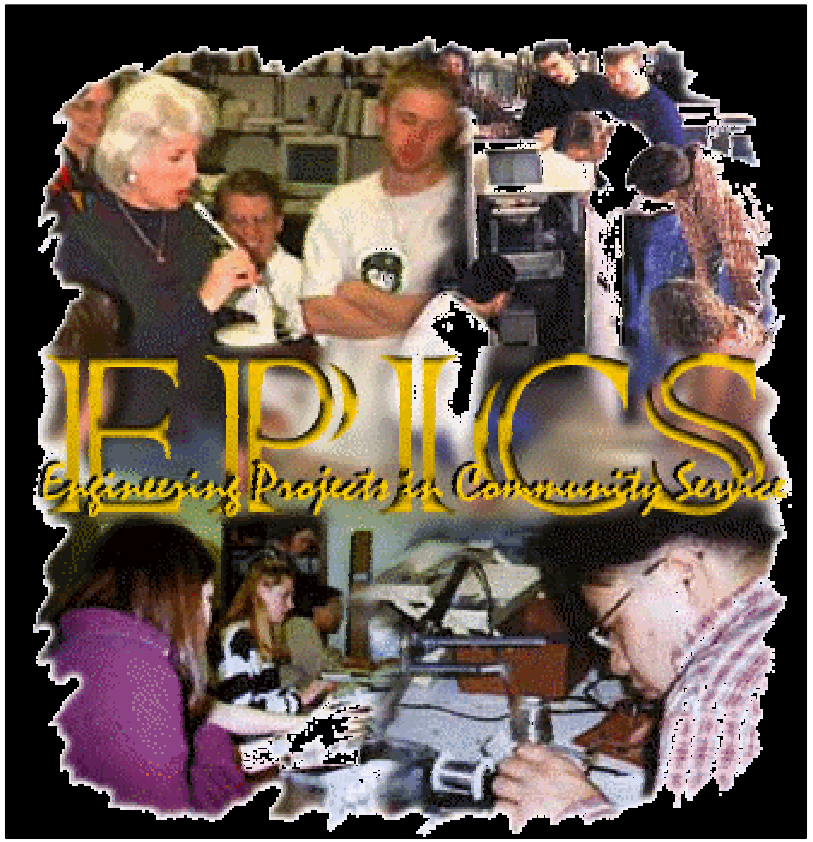
Engineering Service Learning

What is Engineering Service Learning?

Engineering Service Learning is an academic program in which multidisciplinary student teams of Freshman through Seniors work with a faculty mentor to solve an engineering-related problem for a non-profit organization.

Students get academic credit and real-world engineering experience and the community benefits.



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Engineering Service Learning

What are the guiding principles of Engineering Service Learning at UC Merced?

- **There must be a significant design challenge for lower and upper division students**
- **Multi-year partnership with community partner**
- **Students learn about the social context of their of their project and their future roles as citizens and professionals in the community**
- **Students earn academic credit**
- **Multidisciplinary teams of 8-16 students**

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Engineering Service Learning

What are the benefits to students?

- **Learn technical skills**
- **Learn project skills in leadership, teamwork, communication, and project management**
- **Gain edge in job market**
- **Develop professional network through interaction with mentors and community partners**
- **Students learn the value of their profession to the community**

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Engineering Service Learning

What are the benefits to the community?

- **Increase the effectiveness of non-profit organizations that serve the community by solving their engineering-related problems**
- **Promotes life-long engagement of students in community service**
- **Opportunity to interact with students**

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Engineering Service Learning

What is the academic role of Engineering Service Learning at UC Merced?

- **Deliver training in technical design and project management skills that are required by accrediting organizations**
- **Give students an edge in the job market**
- **Increase retention**
- **Engage students in their education**
- **Recruitment – increase the visibility of engineering careers in the community**

Background

Based on Engineering Projects in Community Service (EPICS) Program Started at Purdue University in 1995

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Background

Based on Engineering Projects in Community Service (EPICS) Program Started at Purdue University in 1995

1	NSF Awards $2.5M to Take EPICS Program Nationwide
2003	State of Indiana Governor's Award for Outstanding Volunteerism
7	Excellence in Education Award for Co-Director Oakes
9	NAE's Gordon Prize

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National Sponsors

Engineering Service Learning at UC Merced

November 2003 – Faculty Participate in NSF Grant Proposal to Start an EPICS Site
March 2004 – NSF Grant Awarded

Engineering Service Learning Summer 2004

Castle Science and Technology Center

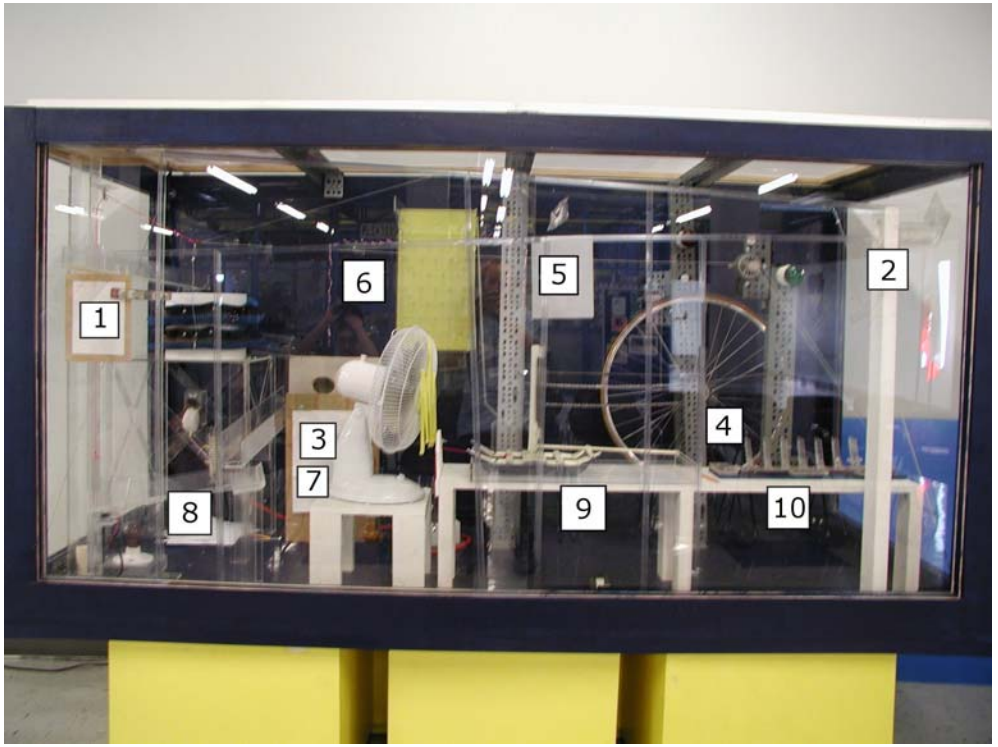
Service LearningTeam Summer 2004

Engineering Service Learning Summer 2004

Rube Goldberg Device

Castle Science and Technology Center Service Learning Team

Summer 2004



The Foster Family Center for Engineering Service Learning

In November of 2004, the Foster Family Pledged an Endowment of $1M + $200K Operating Expenses, getting UC Merced's Engineering Service Learning Program off to a Great Start.

Engineering Service Learning
Summer 2005

Castle Science and Technology Center Service Learning Team

Summer 2005

Matthew Nelson
Nathan Graves
Cameron Hoyle

Engineering Service Learning Summer 2005

Castle Science and Technology Center Service Learning Team

Summer 2005

Supported by NSF NSEC Center Of Integrated Nanomechanical Systems

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Present Status

50% of Engineering Students are Registering for Engineering Service Learning for the Fall of 2005

Established Teams:

Yosemite National Park, Resources Management and Science Division

Create digital library of park data

Mariposa Gem and Mineral Musuem

Design natural lighting system for displays

Castle Science and Technology Center

Design new exhibits

Example Projects

Established Teams (cont'd):

National EPICS Program
Develop on-line assessment system

Prospective Clients:

Merced County Office of Education
Develop materials engineering curricular material

The Women's Place
Design and implement information management system

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Engineering Expertise

Bioengineering

Computer Science and Engineering

Environmental Engineering

Materials Engineering

Mechanical Engineering

Solar Technology

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In Future

Expand the number of teams

Expand the program into community colleges

Expand the program into high schools

Begin national collaborations:
- **Engineers Without Borders**
- **Habitat for Humanity**

Getting There ...

We are looking for community partners now and will be looking for team mentors in the future:

School of Engineering
UC Merced
209-724-4411
engineering@ucmerced.edu

ENGR - 097 Engineering Projects in Community Service

Course Description:
Engineering Service Learning is an academic program in which multidisciplinary teams of Freshman through Senior students work with a faculty mentor to solve an engineering-related problem for a non-profit organization.

Students get academic credit and real-world engineering experience, and the community benefits. This program is based on the Engineering Projects in Community Service (EPICS) program at Purdue University. Visit **epics**.ecn.**purdue**.edu/ for more information.

Course Principles:
- Multidisciplinary teams of 8-16 students
- There must be a significant design challenge for lower and upper division students
- Students learn design process, project management, client communication, teamwork
- Multi-year partnership with community partner
- Students learn about the impact and social context of their project, and their future roles as citizens and professionals in the community
- No obligation for remuneration by client (proto-type or software project). Larger projects may require funding commitment by client or joint proposal efforts.

Benefits to Students:
- Early opportunity to practice engineering
- Learn technical skills
- Learn teamwork, project management, client communication, and engineering design skills
- Gain edge in job market
- Contribute to the community

Student Leadership:
Note that engineering service learning projects are *student-led* and *team-based*. Advisors monitor the team's progress on the project, direct students to sources of technical information, provide advice on project management, monitor each student's progress, verify that the needs of the project partner are being met, and assign grades. Advisors guide students, but do not direct them, in the design process and project management.

Supplies purchased by students
Design notebook

Resources
The service learning program has a number of resources for teams. These include Tablet PCs, an LCD projector, and digital camera. We can also help you with scheduling meetings with clients, scheduling rooms, purchasing supplies, etc. Please contact the program coordinator for help with these matters.

Ms. Rosalina Aranda
Engineering Service Learning Coordinator

Course Requirements:
Attend 1 hr. weekly meeting with advisor
Attend a minimum of 3 skill sessions (times to be announced)
Meet outside of class with teammates, as necessary
Submit weekly team and individual progress reports (a few sentences describing last week's progress and plans for coming week)
Team submission of written project proposal
Team presentation of project proposal to client
Team submission of written final project report
Team presentation of final project report
Assess contribution of self and peers to project

Grading (percent contribution to grade):
60% team effort
- 5% weekly team reports
- 20% team presentations (2)
- 20% team reports (2)
- 15% client and faculty evaluation

40% personal effort
- 5% weekly personal reports
- 15% design notebook (2)
- 15% peer and faculty evaluation
- 5% class participation

Milestones

Week 1	-	Initial Team Meeting
Week 2	-	First Working Meeting
Week 4	-	First Meeting with Client
Week 5	-	Dry-run of evaluation exercise
Week 7/8	-	Written and Oral Project Proposal
Week 14	-	Evaluation Exercise
Week 14/15	-	Written and Oral Final Project Reports

Project Descriptions

CRN	Sec.	Day	Time	Place	Instructor
1125	1	T	11-12	KOLL 470	Roland Winston/Gerardo Diaz
1126	2	T	2-3	KOLL 470	Valerie Leppert
1128	4	T	4-5	KOLL 470	Roger Bales/Shawn Newsam
1129	5	Th	11-12	KOLL 470	Christopher Viney
1130	6	Th	2-3	KOLL 470	Jeff Wright/Staff
1131	7	Th	3-4	KOLL 470	Jeff Wright/Staff
1132	8	Th	4-5	KOLL 470	Jeff Wright/Staff

Section 1 - *California State Mining and Mineral Museum, Mariposa*
Design natural lighting system for gem and mineral display in new building. Assess other energy needs. Emphasis on solar optics, energy science and engineering, and mechanical engineering.

Section 2 - *Castle Science and Technology Center, Atwater*
Design and build exhibits aimed at middle-school children for CSTC museum. This year's focus is on an interactive nanotechnology exhibit. We will be building a model of the space elevator and designing interactive learning software. Emphasis on bioengineering, materials engineering, computer science and engineering, and mechanical engineering.

Section 4 - *Resources Management and Science Division, Yosemite National Park*
Design a digital library for the client. The initial focus is on water quality data. Emphasis on environmental engineering, and computer science and engineering.

Section 5 - *Merced County Office of Education, Merced*
Design curricular materials for K-12 students to teach physics, chemistry, and biology principles in a materials engineering context. The initial focus is on bioengineering examples.

Section 6 - *A Woman's Place, Merced*
Design and implement solutions to information technology needs for shelter for battered women and their children, and victims of sexual violence. Emphasis on computer science and engineering.

Section 7 - *Engineering Projects in Community Service, UC Merced*
Implement an on-line program and student assessment system for adoption at UC Merced and the National EPICS program. Emphasis on computer science and engineering.

Section 8 – *Family Resource Council*
Design and implement solutions to information technology needs of client. Client is a consortium of local non-profits.

Course Schedule

9/5 Labor Day

Week 1 - 9/6-9/9 — Initial Meeting with Students

Faculty Member
- Introduce self/project
- Contact info/office hours

SL Admin
- Introduction to SL
- Requirements
- Review course packet
- Paperwork
  - Hold harmless waiver
  - SL assessment consent form
  - Pre-SL assessment
  - Change section form

Assignment:	*Due*:
Hold harmless waiver	In class
SL assessment consent form	In class
Pre-SL assessment	In class
Change section form	Midnight, Thur., 9/8

Week 2 - 9/12-9/16 — First Working Meeting with Students
- Team discusses roles and assigns a communications officer and a recorder who will be issued the team's Tablet PC
- Identify possible client meeting times for team/faculty advisor in Week 4
- Communications officer contacts SL administration immediately with client meeting times
- Students exchange contact information
- Prepare for client meeting

Assignment:	*Due*:
Team member responsibility form	Begin in class
Email SL admin with client meeting times (comm. officer)	By midnight day of class
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 3 - (9/19-9/23) — Prepare for client meeting

Assignment:	*Due*:
Must have design notebook	In class
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 4 - (9/26-9/30) — Meet with client

Assignment:	*Due*:
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 5 - (10/3-10/7) Develop written project proposal/budget
Dry run evaluation exercise

Assignment:	*Due*:
Spot-check of design notebook	In class
Dry run grading exercise	In class
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 6 - (10/10-10/14) Work on written project proposal/budget
Practice project proposal presentation

Assignment:	*Due*:
Submit written project proposal draft	In class
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 7 - (10/17-10/21) Practice project proposal presentation to client

Assignment:	*Due*:
Submit written project proposal/budget	In class
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 8 (10/24-10/28) Project proposal presentation to client

Assignment:	*Due*:
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 9 (10/31-11/4) Work on project

Assignment:	*Due*:
Turn in design notebook	In class
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 10 (11/7-11/10) Work on project

Assignment:	*Due*:
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.

Team report to be filed by communications officer	Thur. sections - midnight, Tues.

11/10 - Veteran's Day

Week 11 (11/14-11/18) Work on project

Assignment:	*Due*:
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 12 (11/21-11/23) Work on project

Assignment:	*Due*:
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

11/24-11/25 Thanksgiving Holiday

Week 13 (11/28-12/2) Practice Final Presentation

Assignment:	*Due*:
Final project report draft	In class
Electronic submission team/individual weekly report	Tues. sections – midnight, Sun.
Team report to be filed by communications officer	Thur. sections - midnight, Tues.

Week 14 (12/5-12/9) Final Project Report Presentations
Evaluation Exercise

Assignment:	*Due*:
Final project report presentation	By Ths.,12/15
Final design notebook submission	In class
Written final project report due	In class
Complete Post-SL survey	In class
Peer and faculty evaluations	In class

Week 15 (12/12-12/15) Final Project Report Presentations

Assignment:	*Due*:
Final Project Report Presentation	By Ths.,12/15

12/15 - Last Day of Classes

Service Learning Section Change Requests
Must be submitted by Midnight, Thursday, September 8, 2005

If you would like to change service learning sections, we will do our best to accommodate you. Submit your request by email or phone to Ms. Rosalina Aranda, raranda@ucmerced.edu, 209-205-0973.

Include your 1) **name**, 2) **email address** and **telephone number**, 3) **section number you are dropping**, and 4) **your top four choices** for a new section. Be sure to check for scheduling conflicts.

Check your on-line schedule of classes to confirm your new section on Monday, September 12, 2005. If you need to confirm which section you are enrolled in, please contact Ms. Aranda.

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1125	1	T	11-12	KOLL 470	Roland Winston/Gerardo Diaz
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Service Learning Proposal Instructions

Due Date and Submission Procedure

The first draft of the written proposal is due by October 14th. The final draft is due by October 21st. The procedure to submit your draft and final proposals consists of three steps:
1. upload the proposal to your team's homepage
2. send email to all of your team's advisors letting them know that the proposal has been linked
3. receive confirmation from at least one advisor that the proposal has been successfully accessed.

All material should be part of the web document.

Why Write and Present a Proposal?

- To demonstrate your understanding of your community client's needs.
- To help you formulate your goals.
- To discover your team's strengths and weaknesses.
- To determine the resources available and your project's needs.
- To create a formal record of your plans.
- To pull your team together.
- Proposal writing is a valuable skill in almost all engineering jobs.

An Overview of the Required Proposal Format

- Cover Page - 1 page
- Executive Summary / Abstract - 1 page
- Table of Contents
- Body - 8 pages max
  - Introduction, including Motivation, Problem Identification, and preview of the remainder of the proposal
  - Project Description
  - Team Organization
  - Project Planning Schedule
- Resources and Needs - 1 page max
- Team Background
- Appendices

Cover Page

On the Title/Cover Page, you should give
- your project title
- client organization(s)
- the names of the team members and contact information (e.g., email addresses) -- Listing your name means you've read the proposal!
- the date the proposal is due

Executive Summary (1 page max)

The Executive Summary should include the following:
- a summary of the objective(s) of your project, including a brief description of your client community service agency;

□a summary of the major components of your approach to the project;
□a concise statement of the expected outcomes.

Table of Contents

Body (8 pages max)

□Introduction (1 page max)

The introduction should provide three types of information:

- o Motivation for what you are doing: concise statement of your client's needs, constraints, and resources
- o Problem Identification: concise statement of the specific problem(s) you will be addressing
- o A preview of the rest of the proposal

□Project Description (7 pages max)

- o How do you propose to solve the problems? The Project Description should describe the approaches you will consider in attacking the problem, identify the relevant issues you will need to consider, and summarize the expected outcomes.
- o If your project consists of several tasks, the Project Description should start with a single paragraph that introduces all of your team's tasks (or workunits). The remainder of this section should then consist of one subsection for each task.

□Team Organization (1/2 page)

Show your Team Organization Chart (i.e., who is doing what) with respect to both the overall team and the major tasks of your project.

□Project Planning

Give a projected schedule for your project. Use a timeline (Gantt chart) that includes milestones. The timeline should go from the beginning of the project to the expected completion, fielding, and evaluation of the project.
An example of a Gantt chart may be found at
http://shay.ecn.purdue.edu/~epics/docs/docs/project_plan_example/timeline1.gif

□Resources and Needs (1 page max)

□Equipment/software needed to get started.
□List of relevant equipment already available.
□Equipment/software you expect to need later.
□Outside resources you may draw on.
□Lab space required.

References

Examples of how to write citations for a wide variety of publication sources are at
http://www.lib.memphis.edu/gpo/citeweb.htm
For guidelines and examples of how to cite web pages and other information obtained from electronic sources, see
http://www.uvm.edu/~xli/reference/apa.html

http://www.beadsland.com/weapas
http://www.nrlssc.navy.mil/meta/bibliography.html

Team Background

- List of team members.
- Relevant expertise and experience of each member.
- Limit to 1/4 page for each person.

Appendices

Appendices are optional. They can be used to include:

- relevant information from community client;
- anything else you think is appropriate.

Be reasonable about the length of appendices.

How Proposals are Evaluated

Both the content and presentation of your proposal are important. Attributes of a good proposal include:

- well-formulated, clearly stated goals and plans
- sufficient, but not excessive, detail
- Good writing:
  - correctness: Spelling, grammar, choice of words should be correct.
  - clarity: Each sentence, paragraph, and section should make a clear statement.
  - flow: The sentences, paragraphs, and sections should follow a logical progression.
- Adherence to required format

What Will be Done with the Proposals?

The proposal

- serves as a working document to guide your project planning;
- will be used in the future to introduce new team members to your project;
- will ultimately be given to your community client.

Your advisors will give you feedback on the proposal. You will be expected to revise the proposal so that it is suitable for distribution -- e.g., to your project client and on your web page.

Hints

- Pick your word processing environment before you start writing; remember that the proposal will be posted to the web.
- One person should serve as document master.
- Everyone works on the last few drafts.
- Everyone reads the final version.
- Look at previous proposals (e.g., on EPICS web pages) -- e.g., LCC (AAC) F95 proposal, VNHHS (HHS) F95 proposal.
- Good writing takes practice.
- Since you will be expected to revise the proposal as needed to make it suitable for public distribution, there is value in getting it right the first time.

Service Learning Proposal Presentations

Schedule

Proposal presentations to clients will be made during the week of 10/24-10/28. Presentations are to be at most 15 minutes long, plus 5 minutes for questions and discussion. Post your presentation on the team web page during the week of 10/17-10/21.

Organization

The presentation should follow the same basic outline as the written proposal:

- Cover Page: Project title, community client, team members, date
- Outline/overview of the presentation
- Body
  - Motivation and Problem Identification
  - Project Description: How do you propose to solve the problem(s)?
  - Team Organization
  - Project Planning Schedule: milestones, GANTT charts
- Resources and Needs: brief summary
- Team Background: brief summary of team members and their relevant strengths and areas of interest and expertise
- Summary/Conclusion

Presentation Mechanics

- Choose a software platform for preparing your talk material -- e.g., Microsoft PowerPoint or open source presentation format.
- Consult SL admin about what computers and projection capabilities are available.
- You may use a computer projector for your presentation or overhead transparencies.
- A standard rule of thumb is to assume 2 minutes per overhead. This translates to a total of 7 or 8 overheads for a 15-minute presentation.
- In general, landscape format (wide pages) works better than portrait format (tall pages) for presentations.
- The presentation may be made by any number of the team members, from one spokesperson to group leaders to the whole team. Choose whatever you think will be effective.
- **Practice the presentation several times!**

Skills Session #1: Family Resource Council
Dennis Haines
Operations Supervisor
Lecture on operating in the non-profit environment
Thursday, September 15, 2005
5-6
Kolligian Room 209 (GW)

Skills Session #2: Team Building-Working Together as a Team
Valerie Leppert
Thursday, September 29, 2005
12-1
Kolligian Room 209 (GW)

Skills Session #3: Engineering Design Examples From Industry
Gerardo Diaz
Lecture on how engineering is used in the real world.
Thursday, October 3
12-1
Kolligian 280

Skills Session #4: Goal Setting, Problem Identification , and Solution Strategies
Astronaut Steve Robinson
Lecture on his life and how engineering issues should be identified.
Friday, October 14, 2005
2-3
Kolligian 209 (GW)

Skills Session #5: Resume Writing
Mary Willis and Kelly Patterson/Career Center
Lecture on incorporating SL into your professional resume

1. Thursday, November 3 from 12-1
2. Friday, November 4 from 2-3

Kolligian 209 (GW)