

INTRODUCTION

"I gained the idea that engineering was like dancing; you don't learn it in a darkened lecture hall watching slides: you learn it by getting out on the dance floor and having your toes stepped on."

– Jack Alford, Professor of Engineering Emeritus,
Cofounder of the Engineering Clinic,
Harvey Mudd College 1963

In 1963, Professors Jack Alford and Mack Gilkeson invented the Engineering Clinic, a series of required courses in which junior students form interdisciplinary teams to tackle company-sponsored design and research projects.

Like the "clinical" experience at medical school where students learn the practice of their profession by working with real patients and real problems, in the Engineering Clinic you will be exposed to the art and practice of your profession by working on real problems for real clients.

This Clinic handbook is intended to assist you effectively in the Engineering Clinic program and to understand what is expected of you during the academic year. The handbook is divided into the following sections:

Inside Front Cover - Clinic Calendar with Important Dates

Section 1 - Course Information

Section 2 - Clinic Operation

Section 3 - Project Planning and Communication

Section 4 - Clinic Business Policies

Appendix A - Clinic Forms

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1 COURSE INFORMATION

1.1 WHAT IS CLINIC?

The Engineering Clinic is a set of three-unit required courses for junior and senior engineering majors (E-111, E-112, E-113; nine hours work per week). The Engineering Clinic is the centerpiece of the design and professional practice component of the engineering curriculum.

Students work in project teams of four or five juniors and seniors. The teams work on professional design and development projects for clients from industry, government, and the community.

The clients pay a fixed fee (\$41,000 for 2006/2007) for student teams to work on current problems which the company or agency needs solved. The client/sponsor appoints a liaison that will have contact with team members at least once a week to offer clarification and direction. The client/sponsor expects a level of effort of greater than 1200 hours per year, per project team. To meet this goal each student should plan to work an average of 10 hours per week on their project. The objective is to produce useful results on an open-ended authentic project to the client's satisfaction within the constraints of time and budget. The students do the work; the faculty advises, coaches, and evaluates; the client informs, guides, and accepts or rejects the results.

1.2 EDUCATIONAL GOALS

Gain experience with the nature, demands and ramifications of real-world problems:

- *Decisions and tradeoffs*
- *Adequate reporting*
- *Project control via schedule and budget*
- *Vendor relations*
- *Client's changes*
- *Resource limitations*
- *Confidentiality*

Develop leadership/membership in team efforts:

- Division of work
- Delegation
- Authority/responsibility/accountability
- Resolution of personal conflict
- Utilization of a variety of talents and skills
- Personnel evaluation and criticism
- Error correction

To increase student understanding of the engineering design processes:

- Work plan, negotiation, contract, execution, evaluation
- Feasibility study
- Preliminary design
- Detail design
- Revision
- Release
- Field test
- Production
- Service
- Salvage

To increase students' ability to apply course material:

- Recognize applications and limitations
- Reality vs. model
- Prediction and variety of checks
- Balance of analysis, experimentation, computation, simulation, optimization

To gain real world insights:

- Develop career goals and plan
- Learn about patents and notebook recording
- Get acquainted with engineers and companies
- Sense the complexity, difficulty and time span involved in solving real problems

To assist HMC toward its goals:

- Lead toward new private/public financial support
- Encourage interdisciplinary exchange and cooperation
- Keep faculty abreast of new technology

1.3 COURSE REQUIREMENTS

The main requirement of the Clinic program is to execute the project successfully. The students in a team are jointly responsible to the faculty, the client liaison, the Engineering Office, and to each other for organizing, scheduling, budgeting, implementing, time-managing, and reporting. It is particularly important to be able to report progress (including both successes and failures) in a time-effective manner.

In addition to executing the project and reporting progress, the course also requires:

- Weekly meetings with the faculty advisor
- Weekly meetings of the team
- Weekly contact with the company liaison
- Maintenance of a team headquarters, message center, and lab area
- **Attendance and participation in the weekly Tuesday 11 a.m. oral presentations (Includes evaluating presentations of other teams.)**
- Presentations to the client, including Projects Day (Liaisons and company representatives should be encouraged to attend your Tuesday presentations)

- Planning at least one plant tour each year and giving at least one on-site presentation to the sponsor
- Coordination with the Engineering Office on travel, purchases, and all other expenses
- Signing confidentiality and patent agreements
- Completing the end of project wrap-up. (Returning notebooks, room keys, dismantling and storing all materials used during the project, and signoff of Clinic Completion Form.)
- Arranging delivery to client of hardware/software as promised

1.4 GRADING

The faculty advisor assigns the semester and year-end grades. Students are graded each semester. Under unusual circumstances students working both semesters may request a grade of N or U (Normal Progress or Unsatisfactory). Students who request the N or U grade should do so before December 1, and should not assume that approval will be automatically granted. Juniors in the first semester are assigned a letter grade.

At year-end all students receive letter grades on their Clinic work. The faculty advisor may choose to write and file a letter of special commendation for a student doing an outstanding job.

1.4.1 Grading Criteria for Clinic Project Grades

Technical Contribution:

- Adequacy and appropriateness of analyses, syntheses, tests, conclusions, covering library, field, laboratory, computer, or shop work

Project Management and Control:

- Initiative and imagination in taking responsibility either as a leader, or in volunteering as a team member
- Giving and taking criticism is a part of the job
- Keeping team, client and advisor informed
- Quality of written, graphic, and oral work
- Taking obligations seriously in meeting deadlines
- Active participation in team meetings
- Attendance at the 11 a.m. Tuesday presentations

Overall Effect:

- Useful results from the individual's efforts

Note: Each faculty advisor ranks the relative importance of the above *according to his/her own values*. Normally, at the semester's end, each team member is asked to rank him/herself and the others on the above or similar criteria by completing a **Clinic Project Grading Form** (available online, or Form A in *Appendix A*). Students should discuss these rankings and grading with their advisor early in the project.

1.4.2 Graduation Requirements

The award of the Bachelors Degree for an engineering major at the college requires the completion of the program of course work stated in the HMC Catalog, 2003-2005, along with a finished **Clinic Completion Form** (available online, or Form H in *Appendix A*). Specifically in relation to the Clinic courses, the Catalog states as a graduation requirement:

"Seniors must submit a final Clinic report that is acceptable to the project's faculty advisor."

In addition to assigning a letter grade to a student for the Clinic course, the faculty advisor must also inform the Technical Support Manager (Daniel Pereira) that the final Clinic report was acceptable by signing the Clinic Completion Form. The Technical Support Manager (Daniel Pereira) will then inform the Registrar that the student has fulfilled the Clinic requirements to graduate.

Whether you are a third or fourth year student, an acceptable final project report is of paramount importance both to you and to the faculty advisor. By accepting your final report, the faculty advisor assumes responsibility for delivering a final report of appropriate standard to the client without further contributions from the student team. The faculty advisor will not accept a report that is incomplete. **Make sure to follow the format of the Clinic_Reports_Template located online and in your \\charlie.ac.hmc.edu directory.**

1.5 TEAM ASSIGNMENTS

In the spring semester preceding the current academic year, a **Project Interest Form** is filled out by every student who will be taking Clinic in the fall (available online, or Form B in *Appendix A*). The form assists the staff in pinpointing the students' areas of interest so that they can, when possible, acquire projects that reflect those interests. The Engineering Clinic then acquires the sponsors for the upcoming academic year; agreements are signed, and project specifications are outlined.

In late August, Project Descriptions will be available for online Internet viewing. Students review these descriptions and fill out a **Project Choice Form** (available online, or Form C in *Appendix A*) based on their selections, and submit the form online. The form also indicates whether or not the student would like to be a team leader. Students are assigned to a Clinic project based on their choices and availability. Every effort is made to place a student in his/her area of interest.

Soon after the start of classes in the fall, the Clinic Team Roster is posted in the Engineering office, Breakroom/Lounge and online, showing the Clinic team room, project sponsor, student team, liaison, and faculty advisor.

Juniors are expected to take only one semester (half the juniors in the fall; the other half in the spring). Exceptions must be approved by the Clinic Director. This division is necessary to balance the team members on the projects.

2 CLINIC OPERATION

2.1 MILESTONES

There are three major milestones during the academic year for your project, each marked by delivery of a written report.

MILESTONE 1: WORK PLAN

Within First Six Weeks of the Start of the Semester

To begin a Clinic project, each team orients itself with the client and the advisor by preparing, submitting, and coming to an agreement on a Work Plan, which covers the team's activities and expectations for the whole year. Writing and negotiating this document takes two to four weeks of consultation, background study, and revision at the beginning of the semester (**begin using the Clinic Reports Template here**). The following are among the considerations:

- What do you understand the problem to be?
- Is it the same as the client views it?
- What are the various approaches to a solution?
- What do you expect to deliver at the end?
- Can you do it?
- How are you going to schedule your work?
- Where applicable, work plans shall include a:
 - Work breakdown structure
 - Linear responsibility chart
 - Gantt chart
 - Description of progress monitoring

Although the Work Plan (or Proposal, as some clients or faculty may refer to it) will vary according to the project and client, there are certain elements it must include. These are

- 1 Literature review (or Background), which demonstrates that the team has understood the technical nature of the problem and prior work and solutions.
- 2 Technical approach, which explains the design or solution space which the team has available and either the basis for selecting solutions or, in some cases, the specific solution to be developed.
- 3 Management Plans, including the Work Breakdown Structure, a detailed organized task list for the project; a Gantt Chart, a timeline for completing key phases or groups of tasks; a Linear Responsibility Chart, a matrix relating key tasks to particular team members; and a List of Deliverables, indicating what work product will be delivered to the client, along with a due date for each item. See Section 3.2 for more information.

MILESTONE 2: MID-YEAR REPORT

Last Day of First Semester Classes

The Mid-Year report is the halfway point for the Clinic team's project and should state the team's progress to date, including any changes in the work scope, decisions, etc. It is especially important to report all progress (including both successes and failures). If any changes in the project's direction need to be made, the sponsor and liaison should be informed through this report. When done carefully, appropriate parts of the material may be used in the final report as well (add new info to a copy of your Work Plan). See samples of some mid-year reports that are available from the Technical Support Manager (Daniel Pereira).

In many cases the client and team will agree to using a *Technical Memorandum* as the mid-year report. A tech memo allows the client to review the technical understanding and progress of the team. Guidance on when a tech memo is appropriate, along with guidelines, is available on the Charlie:Clinic volume, Templates folder.

Regardless of whether a mid-year report or a tech memo is used to report technical progress, teams must specifically address the level of progress made in accomplishing the goals and deadlines given in the Work Plan. In particular, if tasks were scheduled for completion during the first semester, the team should report on whether or not these goals were met.

MILESTONE 3: FINAL REPORT

Friday after Projects Day

The Final Report is one of the most important aspects of the Clinic Program. Through this report your project is communicated to others. Documentation can represent the success or failure of your project and should be considered a **top priority**.

The following is a suggested sequence of steps and due dates for a well-planned Final Report: (NOTE: Any schedule a faculty advisor requires supersedes this sequence)

- **5 weeks before Projects Day:** Draft outline, then final outline
- **4 weeks before Projects Day:** Separate sections drafted by team individually
- **3 weeks before Projects Day:** Draft total text with "art work" sketches
- **2 weeks before Projects Day:** Draft read and returned with comments
- **1 week before Projects Day:** Revisions, added work, re-write
- **1 week before Projects Day:** Final Draft of text
- **Friday after Projects Day:** Approved final draft (everything to be self-contained in one document) turned in to the Technical Support Manager (Daniel Pereira) ready for editing. For more detailed information on the final report, please see the Clinic Reports Template (available in the Charlie:Clinic volume and online).

Planning your schedule around these three milestones is an important part of the Clinic experience. To assist you in writing your reports, you are encouraged to stop by and see the Technical Support Manager to see some samples of work plans/reports.

2.2 REPORTS

Note: To make the Clinic reports more uniform, all reports are to be written in Microsoft Word 2000 for PC or Microsoft Word 2001 for MAC. The actual type styles, formatting styles, and layout of the report are all fully explained and contained within the Clinic Reports Template (available in the \\charlie.ac.hmc.edu directory and online), so be sure to read it. **If the Final Report is not formatted according to this template, the report shall not be accepted by the Technical Support Manager (Daniel Pereira).**

2.2.1 Submission of Reports

All work plans, mid-year reports, and final reports should be stored in the team's \\charlie.ac.hmc.edu directory throughout the year while working on reports. Your faculty advisor must approve the report/drafts before they are turned in for corrections. See 2.2.2 Example of Charlie Clinic Folder Structure below.

At the end of the year, your final report, Projects Day presentation and Poster will need to be copied into another location on Charlie (to be determined) for archiving purposes. Check with the System Administrator (Fady Bishara) later in the year for this information. Your Clinic Completion Form will not be signed off until this is accomplished.

Work Plan

Draft Deadline: Friday, October 6th
Submission Deadline: Friday, October 13th
Instructions: Submit (1) copy to Technical Support Manager

Mid-Year Report

Draft Deadline: Friday, November 17th
Submission Deadline: Friday, December 1st
Instructions: Drop File into Charlie directory (see 2.2.2 below). Email Clinic Administrative Aide to advise her that the report is in the appropriate directory. She will then forward the document electronically to the Liaison.

Final Report

Draft Deadline: Friday, April 20th
Submission Deadline: Friday, May 4th
Instructions: Submit (2) hard color copies (no staples) of final report along with a CD to Technical Support Manager.
* Make sure all required information is included within the report (do not have 2 separate files to make up the final report) including drawings, photos, etc.
* Do not leave for an end-of-term vacation without making sure that all necessary work has been reviewed by your faculty advisor and delivered to the Technical Support Manager.

2.2.2 Example of Charlie Clinic Folder Structure

This is an example of how your Charlie Clinic folder should be structured. You may not need some of the folders listed, but your folder should be neat, and items should be easy to locate at the end of the year.

Charlie:Clinic

- ☐ Engineering
 - ☐ IRWD (main Clinic team folder)
 - ↳ ☐ Work plan
 - ↳ ☐ Mid-Year/Tech Memo
 - ↳ ☐ Final Report (only the final version should be here. **Do not store drafts of the final in this folder.**
 - ↳ 📄 IRWD_Final_Report.doc (all required info within ONE document, clearly marked; NO linking within document)
 - ↳ ☐ Report Drafts (optional)
 - ↳ ☐ Graphics
 - ↳ 📄 Pump.bmp, etc.
 - ↳ 📄 Logo.jpg, etc.

2.3 CONFERENCES WITH ADVISOR, CLIENT, TEAM

Teams should meet with their advisor and communicate with their client on a regularly scheduled basis. As a course, Clinic has set times during which students and faculty should be free of other course conflicts. Team meetings with the faculty advisor should be scheduled weekly, at regular times. In addition teams may wish to schedule weekly work sessions at which all team members participate and work together. Client liaison meetings or telephone calls should also be scheduled weekly, unless the liaison seeks a different schedule.

All regularly scheduled meetings should be conducted using an *agenda*. The agenda helps participants understand the nature and purpose of each topic under discussion. The agenda should be distributed to all participants at least one day prior to a meeting. Topics on the agenda will vary with the nature of the meeting. Client meeting agenda items may include:

- Progress on meeting this week's work goals (with individual updates)
- Work assignments for the coming week
- Requests for additional technical support in particular areas
- Scheduling concerns (such as visits to the client's site)
- Feedback from the client on previous work products

A record of meetings should be kept and made available to participants as needed. Most teams will want to produce formal minutes of meetings with liaisons. A well structured agenda will greatly facilitate this. Taking minutes at meetings should rotate among the members of the team, and the final minutes should be reviewed by the team leader before distribution.

2.4 PRESENTATIONS

The hour between 11:00 a.m. and 12:00 noon on Tuesdays has been set aside for Clinic presentations by Clinic teams. Attendance by Faculty and Students is **mandatory**.

2.4.1 Fall Oral Presentations

During the fall semester, each team will present three times. These presentations will be made in small groups of 3-4 teams with faculty advisors present. The fall presentations are informal. Use of PowerPoint is not encouraged. Overheads of simple diagrams are useful but their use should be limited. The purpose of these discussions is to get to the technical meat of the project. The following guideline is useful for the fall presentation:

First Presentation: Specification requirements

Second Presentation: Overall system design and, where appropriate, potential impact on society

Third Presentation: Complete analysis of one subsystem

Teams will typically have a full hour to present the following material in the order shown:

2-5 Minutes: Describe company/project.

5-10 Minutes: Project outline/schedule including hours spent on tasks and hours remaining.

Remainder: Technical content.

Questions should be taken as they arise.

2.4.2 Spring Oral Presentations

These are 20 minute professional-level presentations, appropriate to the audience and guests, and should include a balance of spoken words, slides, power point transparencies, charts, operating demonstrations, and the like. At least the following four slides are required for all formal presentations:

- Project statement
- Project deliverables
- Tasks remaining and amount of time required to finish each task
- Budget status expressed in terms of percentage of total allocated funds for each line item

One or more team members participate, noting that this is an opportunity for all students to gain confidence and ease in what later, for most of you, will be a frequent demand in your profession. Here are some guidelines:

- Prepare notes, but DO NOT read them verbatim
- Prepare your presentation so that those at the back of the room can understand
- Be aware of the lighting
- Don't speak in the dark
- Don't over-light your slides
- Take into account the audience

- Rehearse (with a friendly critic)
- If you make a mistake while talking, correct yourself and keep going
- Don't worry if you can't answer all the questions from the audience
- Make a mental or written note, however, to follow up
- Rehearse the "question and answer" part of your presentation
- You will receive **evaluations** of your talk (see online, or Form G in *Appendix A*)

The week prior to your scheduled presentation date, you will be notified by Letty Molina via e-mail to schedule the Tuesday presentation time with a Monday-night practice during the same time slot.

Audio-visual equipment for Monday practice and Tuesday presentations will be handled through Clinic. Microphones and PCs will be available for all Clinic teams. An overhead projector will always be available in McAlister. If there are any other special audio-visual requests needed by a team, please contact Michael Meyka, AV Manager.

After the presentation in the Spring, the teams, their faculty advisor, and the liaison are invited to lunch, along with some invited guests. This affords a friendly time for the team to discuss the presentation, explore questions or issues raised, and generally celebrate the experience in a comfortable setting. All team members are strongly encouraged to attend the luncheons. Luncheons are organized by the Development Office.

2.5 CLINIC EVENTS

2.5.1 Orientation Day (Tuesday, September 12, 2006)

This is the first formal meeting with the client liaison of the academic year. Clinic Orientation Day began in 1978 and has proved to be a very successful method of getting the projects off to a good start. Company liaisons are invited for a 10:00 a.m. briefing by the Clinic Director. At 11:00 a.m. the company liaisons meet with the team in assigned meeting rooms to explain the details of the project to the team. This is followed by lunch at 12:00 p.m. for the student teams, liaisons, and the faculty advisors. After lunch, meetings with the liaisons can continue throughout the afternoon if needed.

2.5.2 Clinic Presentations (11 a.m., Tuesdays)

Please refer to the previous section (2.4) for detailed information regarding Clinic Presentations.

2.5.3 Projects Day (Tuesday, May 1, 2007)

The last formally scheduled presentation of the academic year is Projects Day. On this day each team formally presents the results of its work to clients, invited industrial guests, faculty, staff, and students. These are carefully prepared presentations, lasting about twenty minutes each, and are repeated a total of three times during the afternoon. They correspond to engineering reviews for the "board of directors," with both the oral and visual elements and a "question and answer" period at the end. The audience includes client representatives, as well as engineering and management personnel from present sponsors and potential sponsors. The audience at each presentation time ranges from 10 to 40.

Students should refer to the Projects Day Program for detailed information on schedules of times and locations.

2.5.4 Poster Presentation

Poster sessions are very common at scientific and professional meetings, and provide an alternative way to communicate your results to a large number of people. Visitors to Projects Day can see at most six presentations; the poster session allow our guests to learn much more detail about projects that they did not see presented, and will help them better decide which presentations they want to actually see. We expect that most of our visitors will tour the poster session. An example of a poster will be shown at a team leader meeting held prior to Projects Day, and the template to be used is in the Charlie:Clinic volume, in the Templates folder.

2.5.5 Team Leader Meetings

The team leader meeting is a forum where the leaders can get together and discuss mutual pertinent problems. We attempt to have monthly meetings each semester. Team leaders, Clinic Director, and Clinic staff go over agenda items pertinent to each semester (i.e., purchasing, budgets, travel, reports, assessment and Projects Day).

2.5.6 Clinic Advisory Committee Meetings

The Clinic Advisory Committee is a special purpose committee of the Harvey Mudd College Board of Trustees. The committee is comprised of Trustees, industry leaders, and Clinic directors. The committee's mission is to offer advice to the college's students, faculty, and staff for the purpose of sustaining and improving the Clinic Program. The committee meets four times per year. The meetings during the year are held on Tuesdays, and the committee is invited to attend the Clinic presentations. The teams giving the presentations that day, their faculty advisors and liaisons are invited to a luncheon held after the presentations for further assessment-oriented discussions.

2.5.7 Oral Presentations to Clients

At least one oral presentation should be given each year at the company site. The best time for the first presentation is at the end of the first semester, coinciding with the mid-year report. This should be scheduled as a design review in which other engineers and scientists at the company are invited to attend. You should ask your liaison to arrange this meeting. A formal design review can often be one of the most valuable forms of feedback from the client about your project. A second oral presentation might be arranged at the end of the second semester to report on the final results and deliverables.

2.5.8 Computer Accounts and Email Lists

The Clinic students will have a Charlie account assigned by Academic Computing, and a Charlie Clinic team folder. However, it is each team's responsibility to set up the type of security they want their Clinic folders to have. If students have any problems setting up their files, changing their team's membership, and/or setting access privileges, they need to contact the System Administrator (Fady Bishara, P-B178).

The System Administrator adds the students' names to the Clinic team email lists and team leader email list as soon as they are decided for fall, and updates the list again when the spring juniors are added. If any additions or subtractions need to be made, follow the steps in guidelines provided to you by Academic Computing on contacting the listkeeper via email.

3 PROJECT PLANNING AND COMMUNICATION

3.1 SAFETY

At the first team leader's meeting of the year, we will be discussing safety rules and guidelines. The information we will discuss was taken from a survey of professors, staff, and students. An HMC Injury, Illness & Prevention Plan booklet will be provided to each team in their Clinic room.

3.1.1 Regulations for Engineering Laboratory Areas

- It is the responsibility of the Clinic team's team leader and faculty advisor to ensure that the testing and experiments performed under their direction meet the appropriate safety standards.
- At least two people must be in the work area at all times. Any exceptions must be approved by the Faculty Advisor and the Campus Safety Chair, Melonee Cruse.
- Performance of unauthorized experiments and unauthorized removal of equipment or chemicals from a laboratory are cause for dismissal from the course and possibly from the college.
- When using rotating machinery, do not wear loose clothing. Long hair must be tied back. Minimum wearing apparel includes a shirt, pants, and covered shoes. Safety or personal prescription glasses must be worn at all times. All rotating elements must be surrounded by a protective shield to prevent accidental contact by the user, or to contain parts should the rotating element fail.
- When using compressed gases, or hose air above 20 psig., all hoses and connectors must meet the standards set out by the vendor and/or the appropriate codes. Testing of pressure vessels should **never** be done with compressible gas.
- When using 110 V. or 220 V. power, all connectors must be properly grounded. Further, all instruments must be properly fused. Any connection to higher voltage power sources must be supervised by the Faculty Supervisor or the Campus Safety Chair.
- Before using hazardous materials or gases, refer to the Material Safety Data (MSD) Sheets - available from the Stockroom Curator (Sam Abdelmuati) - for information regarding special handling, storage and disposal methods. The area containing the hazardous materials must be clearly marked and must have a copy of the Material Safety Data Sheet within the area. Appropriate eye protection and clothing must be worn at all times.
- Please do not dispose of any chemical or hazardous material in sink or drain.

3.1.2 Hazardous Materials Usage

Engineering Clinic teams that require the use of chemicals must inform the Stockroom Curator so that proper steps can be taken to ensure all safety measures are met.

- All containers, including waste containers, must be labeled correctly. The appropriate labels can be obtained from the Engineering Stockroom, P-B174.
- Obtain all required MSD Sheets.
- The use of chemicals for a given Clinic team must be in a room that has a hood. No chemicals can be used in a room without a hood.
- Labels must clearly state the amount of volume of the chemical(s), type, hazard categories, physical state, date and purpose.
- If container houses mixed chemicals, they must all be listed on the label. Do not use the word "mixed chemicals" alone.
- A hazardous material sign must be placed on the Clinic room door facing the hallway. You can obtain a sign from the stockroom.

3.2 *PROJECT SCHEDULE*

Various software programs are available to assist in allotting your time, setting schedules, and assigning resources, and are on the ECF (Engineering Computational Facility) computers.

3.2.1 Work Breakdown Structure

Teams must prepare and review a Work Breakdown Structure (WBS) with their faculty advisor. The WBS should have sufficient detail to allow the faculty advisor and liaison to determine whether the scope and approach to the project are appropriate for a Clinic-length project. A sample WBS is shown on page 15.

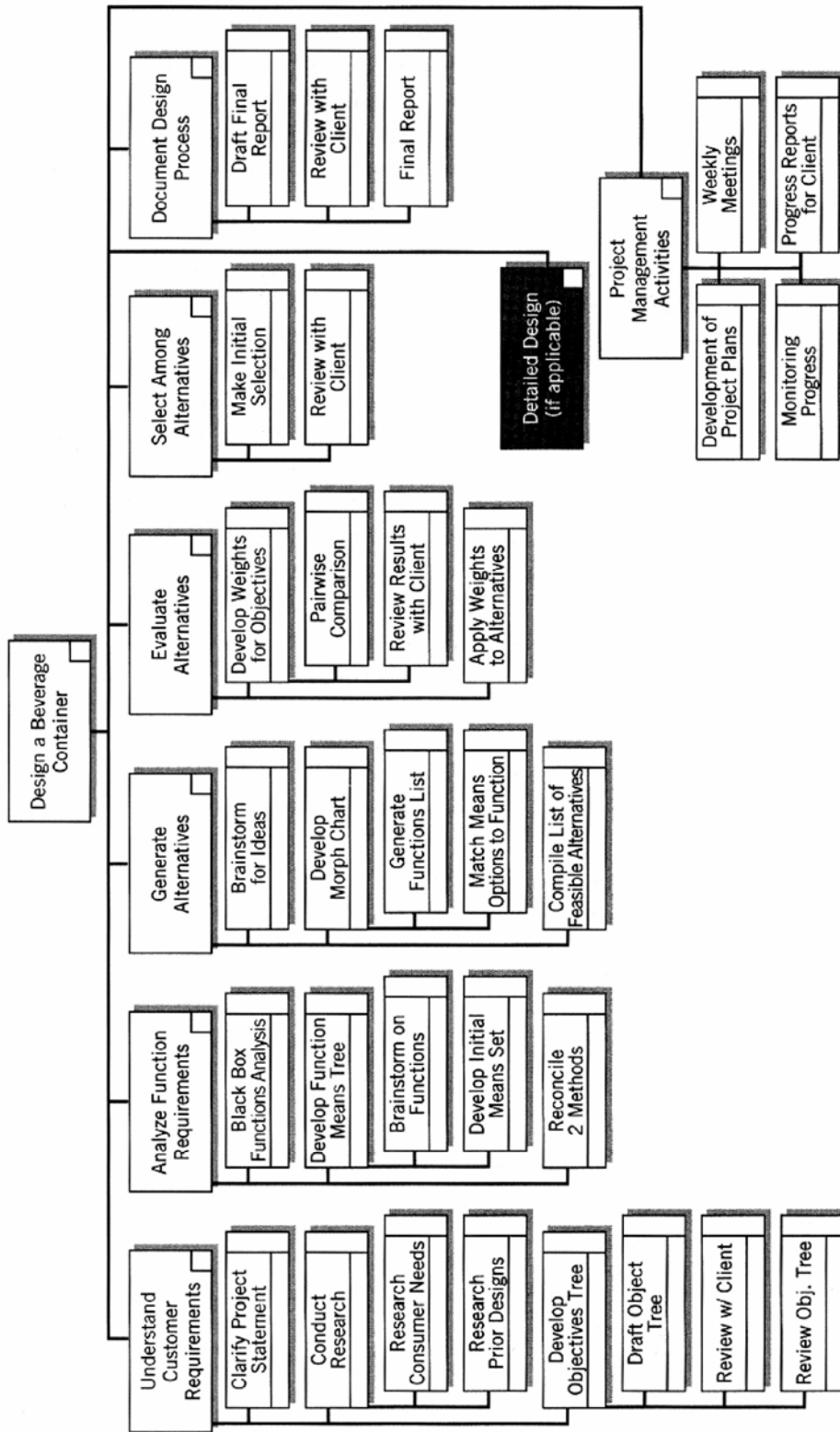
3.2.2 Gantt Chart

Teams must prepare a team schedule which relates tasks and time. The usual format for this is the Gantt chart. Gantt charts are easily prepared using Microsoft Project, which is available to all teams. A sample Gantt chart is shown on page 16.

3.2.3 Linear Responsibility Chart

Teams must prepare a linear responsibility chart (LRC) showing the responsibilities and roles of team members and others in completing project tasks. The LRC should include responsibilities such as reviewing or approvals by the liaisons or faculty advisor. A sample linear responsibility chart is shown on page 17.

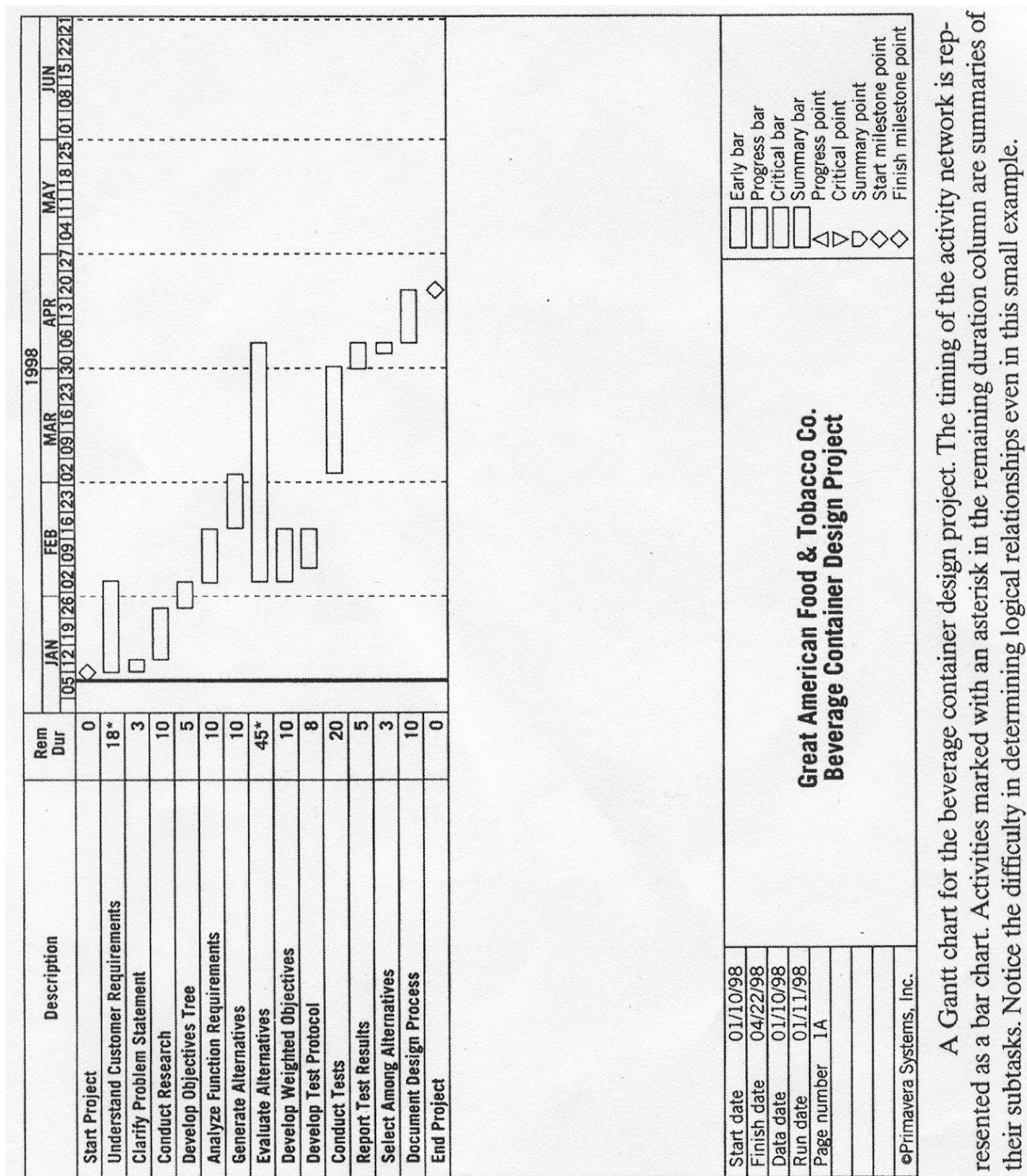
Sample WBS



A work breakdown structure (WBS) for the beverage container design project. Because the design project is just beginning, the structure necessarily takes on a formal and somewhat generic framework. Note, however, that the designers are already aware of some details, such as the distinction between identifying consumer needs and prior designs.

Gantt Chart

An example of a typical Gantt Chart, useful in establishing timelines for project completion, is shown here.



A Gantt chart for the beverage container design project. The timing of the activity network is represented as a bar chart. Activities marked with an asterisk in the remaining duration column are summaries of their subtasks. Notice the difficulty in determining logical relationships even in this small example.

Linear Responsibility Chart

Each participant in the project can read down his column and determine his responsibilities over the entire project. Alternatively, the Project Manager can read across a row and determine who is involved with each task.

	Team Member #1	Team Member #2	Team Member #3	Team Member #4	Team Member #5	Director of Design	Client Liaison	Client Research Director	Outside Consultant
1.0 Understand Customer Requirements	1								
1.1 Clarify Problem Statement	1	2	2	2	2		3	4	
1.2 Conduct Research	1	2		2	2		4	4	4
1.3 Develop Objectives Tree	1								4
1.3.1 Draft Objectives Tree			2	2		5	5	3	4
1.3.2 Review w/ Client	1		2			5	5	3	4
1.3.3 Revise Objectives Tree	1		2	2		6		4	
2.0 Analyze Function Requirements	2	2	1	2	2	5	4	3	3
3.0 Generate Alternatives				1					
4.0 Evaluate Alternatives	5	1	2	2	2				
4.1 Weigh Objectives	1	2				5	6		
4.2 Develop Test Protocol	5	1			2	5	4	3	3
4.3 Conduct Tests		1	2		2			5	3
4.4 Report Test Results	5	2	2		1	5	5	5	5
5.0 Select Preferred Design	1	2			2	5	6	4	4
6.0 Document Design Results		1							
6.1 Design Specifications	1			2		6			
6.2 Draft Final Report	5	1		2		5	5		4
6.3 Design Review w/ Client	1	2		2		5	3	4	3
6.4 Final Report	5	1		2	2	5	6	4	4
7.0 Project Management	1								
7.1 Weekly Meetings	1	2	2	2	2				
7.2 Develop Project Plan	1	2	2	2					
7.3 Track Progress	1					5			
7.4 Progress Reports	1						5		
Key:									
1 = Primary responsibility									
2 = Support/work									
3 = Must be consulted									
4 = May be consulted									
5 = Review									
6 = Final Approval									

3.3 KEEPING RECORDS

3.3.1 Minutes of Meetings

Some record should be retained of all transactions (i.e. major decisions and basic assumptions) of team meetings or trips throughout the year. This is not merely to justify later decisions. Such a record keeps clear the various and frequently changing agreements among the client, advisor, leader, and team members.

- Minutes should include:
 - Date, location, time, and persons present
 - Items accomplished since the last meeting
 - Individual responsibilities for next week's work
 - New facts and data; changed work plan; special problems, etc.

- Remember to:
 - Write legibly as the meeting progresses
 - Use enough detail and clarity to be understandable
 - Don't rewrite or copy them: edit and then photocopy the original (see for E in *Appendix A*)

3.3.2 Trip Reports

Teams should prepare trip reports whenever the team travels to an off-campus location, such as the client's facilities. The trip report should include the purpose and agenda of meetings, new information uncovered as part of the trip, and any follow-up responsibilities that result from the trip. Designate a team member (or members) in advance to take notes. A copy of the trip report should be provided to the liaison.

3.3.3 Project Records

The team is expected to maintain a file for correspondence, vendors' catalogs, reports, work plans, etc., that comprise the project's written component. (This is in addition to the assigned file space on the Charlie:Clinic account.)

3.3.4 Project Notebook

The Clinic supplies one page-numbered notebook per student at the beginning of the term, in order to retain a permanent file of important project developments. This book carries the developing thoughts, suggestions, sources, data, circuits, sketches, test results, and conclusions as the project proceeds. It will form the basis for any possible patent application. (Note: several patents have already resulted from such work.)

Write or label in ink. Use all the odd-numbered pages in sequence (start with pg. 3 leaving pg. 1 for Table of Contents). Leave no blanks for later fill-in. Cross out work later found erroneous. Date and initial every entry. Get a witness' signature for important ideas...paste or staple in extra needed sheets of information, curves, or computer printouts. Use the book for vendors' names, telephone numbers, etc. Make the sketches complete, so they can be copied. Label curves, oscillograms, etc.

On test runs, list equipment and circuit diagrams used so the experiment can be duplicated. Write so that someone else on the team can understand your notes.

When you do library searches, bring your notebook along. Also, highlight important pages, data, or conclusions to make it easier to find material when writing your progress or final reports later.

At the end of the term, or the closing of your assignment to the project, turn in your notebook to the faculty advisor for inspection and then deliver to the Stockroom Curator along with your Clinic storage box.

3.3.5 Correspondence, Original Reports, and Project Records

- The Engineering Office has originals of:
 - Project Description
 - Client contract or research agreement/letter
 - Student/faculty non-disclosure agreements
 - Team's formal work plan
 - Mid-Year progress report
 - Final report (original) with CD
 - Project notebooks after project closure
 - Budget files

- The team is responsible for archiving and storing:
 - Back-up disk of work plan, mid-year report and final report
 - Originals of vendors' inquiries and answers
 - Originals of audio-visual slides, charts, overheads, PowerPoint presentations
 - Originals of oral evaluation sheets after delivery to Engineering Office for review
 - Minutes of meetings
 - Technical notes/manuals
 - All of these materials must be delivered to the Engineering Office at the end of the project

3.3.6 Inventory Control

An Inventory Control form will be available for your use and may be picked up from the Stockroom (P-B174). This form will be used when new equipment is bought or when equipment is disposed of. It will also be the responsibility of each team to check items in or out using the Inventory Control Program on the PC in the Stockroom Curator's Office (P-B174). Each team will also be responsible for filling out a **Clinic Completion Form** (available online, or see Form H in *Appendix A*) at the end of the year indicating everything that is in their box for storage purposes. This form will be passed out to team leaders. Additionally, the Stockroom Curator will issue each team an equipment tracking form, which needs to be completed and turned in to the Technical Support Manager at the end of the project.

3.4 COMMUNICATION

3.4.1 Client Contact

The company liaison represents the customer's needs and usually is the technical authority and information resource. The liaison may not know the solution, but is probably aware of some alternatives that haven't worked in his/her experience, and he/she may also know of experts in the field that may help. More importantly, the liaison's decisions should guide the team in its work.

When the project is first negotiated, the Engineering Office will have requested (and secured) agreement on weekly contact. It is of great importance to keep up this contact in order to avoid dead-ends and wasted efforts. If weekly contact in some form is not pursued, there should be good reason, and both the faculty advisor and the company liaison should be informed of the reason.

3.4.2 Team Responsibility

1. Keep the client informed about progress
2. Get necessary information from the client
3. Put important information/decisions in writing, distributing copies to all concerned
4. Keep the Engineering Office informed, especially about any problems that may occur

3.5 TEAM LEADER RESPONSIBILITIES

Although it is possible that the team leader could function within the group as an Administrative Aide or by carrying out the group consensus, it will usually be to your advantage if the leader functions as a supervisor. Such a structure has the merits of fixing the responsibility for making decisions. The team leader is also responsible for compiling all the reports.

3.5.1 Management

It is the team leader who will bear most of the management responsibilities, and all team members should recognize that a significant amount of his/her time and energy would need to be devoted to such managerial tasks. The following nine-point plan has been suggested for successful engineering supervision:

- Clarify roles and responsibilities
- Define objectives
- Provide information
- Provide education
- Monitor progress
- Solve the unsolvable problems
- Praise and blame
- Evaluate results
- Sell the results

3.5.2 Put it in Writing

So that essential understandings are preserved, the team leader must make sure that important objectives, schedules, decisions, and changes are in writing and circulated to all who need to know.

3.5.3 Running a Meeting

- Have a mental plan for the goals of a meeting
- Have an agenda and deal with:
 - What has been done since the last meeting
 - New data, new problems, new sources
 - New conclusions, hence new decisions
 - What each member's responsibilities are for the next week
- Suggest, monitor, avoid unproductive tangents
- Other subjects needing attention are:
 - Preparation for next client meeting or Clinic oral presentation
 - Position as to schedule (ahead, on, or behind)
 - Extra help needed (shop, drafting, computer, expert consultant)

As with any group activity, everyone's time is wasted if a participant doesn't come prepared. If last week's work is not done, one should present a plan for catching up next week. Delays due to illness or other emergencies must be resolved quickly.

3.5.4 Personnel Problems

Conflicts, disagreements, and hurt feelings often arise during the close, highly dependent team relations in a project. Conflicts must be faced and resolved, whether by compromise, discussion or through external arbitrator. Even more serious is the problem of a teammate who does not do his/her share of the work. All of these situations are real and present, and beg for tactful and positive handling.

3.5.5 Clinic Team Budget

Funds are assigned to each Clinic team based on their **Budget Estimate Form** (available online, or see Form I in *Appendix A*. **NOTE: Use only this form. Any other version shall not be accepted**). Budget expense reports are distributed at the end of each month to the team leader and faculty advisor. Beginning in March and until the end of the school year, budgets will be distributed weekly. The team leaders are encouraged to report any discrepancies to the Staff Accountant (Cynthia Wheeler, P2373). If the initial allocation is not sufficient for successful completion of the project, additional funds may be assigned, subject to availability of funds, faculty advisor's approval, and upon submission of a revised Budget Estimate Form to the Staff Accountant.

4 CLINIC BUSINESS POLICIES

4.1 PURCHASING

As a member of a Clinic team, you may find it necessary to purchase equipment, software, parts, etc. for your Clinic project. Before deciding on any of the purchasing procedures below, check first with the Stockroom to be certain the item you require is not already available. Check with the machine shop manager, Mike Wheeler, before making any purchases of metal or wood components.

If it is determined that the item must be purchased or leased, there are a number of vendor references at your disposal. The Stockroom has a small reference library. In addition many vendors and products can be located by using the search engines on the World Wide Web. Consult with the Stockroom or Technical Support Manager (Daniel Pereira in Parsons 2370) for help in locating suppliers.

Procedures for making purchases are outlined below:

- Purchases with petty cash
- Purchases made with HMC debit card
- Purchases with a Purchase Order (PO)

4.1.1 Shipping and Billing Information

For your information, our shipping and billing information is provided below. **Be sure to instruct the vendor with the following shipping and billing information:**

Ship to:

Harvey Mudd College
Attn: (Name and Clinic)
Parsons B174
260 East Foothill Blvd.
Claremont, CA 91711

Bill to:

Harvey Mudd College
Engineering Clinic
Attn: (Staff Member ordering)
260 East Foothill Blvd.
Claremont, CA 91711

***Note:** If you need to make any delivery arrangements other than to the stockroom, i.e., pick it up yourself, you must notify the stockroom and/or person who purchased your items on receipt of the merchandise, so you can provide the related paperwork for payment to be verified.*

- If you order any heavy items that require special handling (i.e. fork lift), please notify the Stockroom Curator or the Technical Support Manager ahead of time so that they can make the necessary arrangements

4.1.2 Purchases with Petty Cash

Note: This procedure is limited to a maximum of \$25 if the Engineering Clinic funds are to be utilized.

- Determine your cash needs and check with the Staff Accountant (Cynthia Wheeler) to determine if petty cash is available. If there is insufficient cash, you may use personal funds.
- In order to request a cash advance, you will be asked to fill out a Petty Cash Receipt by the Staff Accountant. Once this form is filled out, she will then advance you the funds.
- Make the purchase. You may use the Engineering Clinic van if it is available. If you use a personal vehicle, keep track of mileage and include the information when requesting the reimbursement.
- Obtain a **Reimbursement Form** from the Engineering Office. After the purchase has been made, fill out the form and attach the original receipt(s), have your faculty advisor sign it, then turn in the form and unused cash to the Staff Accountant.

4.1.3 Purchases with HMC Debit Card (\$3,000 limit)

Note: This procedure is basically the same as purchases with P.O. but will expedite your order. Obtain a **P.O. Request Form** (see sample Form J in *Appendix A*) from the Engineering Office or the Stockroom.

- Contact the vendor to get the correct part number, the price and availability of the items needed. **Never place any orders yourself.**
- Obtain the required signatures on your purchase request form.
- Take completed request form to the (1) Stockroom Curator (Sam Abdelmuati) if order is over \$3,000; (2) the Technical Support Manager (Dan Pereira P-2370) if order is between \$1,000 and \$3, 000; and (3) the Administrative Aide (Sue Lindley) if order is less than \$1,000. **All orders shall be placed by above-mentioned staff ONLY, once an approved/signed purchase requisition is submitted.**
- Once a vendor is designated and that vendor confirms that the materials are available, and meets the specification and delivery requirements, etc., the staff cardholder(s) will confirm that the vendor agrees to accept VISA and issues to the vendor all required information to purchase the item. Staff then directs the vendor to include the following information on the shipping label and packing list: Cardholders name and telephone number; complete delivery address; the words "Purchasing Card Purchase"; the vendor's order number.
- The cardholder will then write on the P.O. Request "Purchasing Card Purchase." The yellow copy of the P.O. Request Form will then forwarded to the Stockroom Curator to hold until order is received, and the pink copy will go to student (mailbox) who placed the order.
- **If the order is not received by the date expected, the student who requested the order be placed must see the Staff member who ordered the item for him/her (i.e., Sam, Dan, or Sue) to check on the order status.**
- Please do not contact the vendor after your order has been placed.

4.1.4 Purchases with a Purchase Order

Obtain a **Purchase Order Request Form** (available online, or see example Form J in *Appendix A*) from the Engineering Office or the Stockroom.

- Contact the vendor (there is a telephone in each Clinic room as well as the Engineering Department Lounge for this purpose) and inquire if the company will accept an HMC Purchase Order. Also determine if the PO# will be accepted verbally or if it will have to be faxed. Please obtain a written quote from the vendor via fax or email, including all contact information.
- Determine if the item(s) is in stock, and if not, when shipment can be expected. If the item(s) is in stock, or can be obtained within project schedule constraints, obtain all costs including taxes, shipping, and handling. In some cases you may wish to pay a premium for expedited shipping and handling. If you do, obtain these costs as well. Be sure to note the name of the person who provides the quotes along with all other information required on the PO request form.
- Completely and legibly fill out the PO Request Form. Pay particular attention to the description and applicable part numbers. If the PO must be faxed, clearly indicate that fact following the item(s) description. You must be sure to indicate to whom the purchased item(s) will go to after the Clinic project is completed. In some cases, the sponsor will wish to obtain possession at the conclusion of the project. In most cases when the purchase is made with sponsoring funds, the item(s) becomes school property. Merchandise in this category may be placed in the Stockroom inventory at the time of receipt, in which case it will be "checked-out" to the ordering party. Completely fill out the bottom portion of the form, including "Requested by," "Clinic Sponsor," and "Account Name."
- Obtain the necessary approvals. Normally you should obtain your advisor's signature, but if that should impose a hardship on your project, you may request either the Clinic Director or Engineering Technical Support Manager for approval for the Stockroom.
- **Take the completed PO Request Form to the Stockroom Curator (Sam Abdelmuati) for order completion.** Once the request is turned in to the Stockroom Curator, do not contact the vendor. Should you need to contact the vendor, please contact the Stockroom Curator. It normally requires two working days or more to obtain a PO number, as it must be processed through the University Center Purchasing Department. High priority requests may be expedited, and a PO number obtained in one-half day, but this procedure places a burden on our staff and should be avoided whenever possible. The Stockroom Curator will annotate the PO request Form with the issued PO number when it is received from the Purchasing Department. The pink copy of the PO Request Form will then be placed in the requester's Clinic Mailbox.

Note: The Stockroom Curator will place the verbal Purchase Order. Conversely, the Stockroom Curator will FAX those orders that have been annotated as required. The status of faxed POs can be determined by calling x73530. In the case of expedited and Faxed POs, the requester should make sure that the Stockroom Curator is aware of the status of the request and that the Purchasing Department has been properly notified.

All Merchandise purchased either by P.O. or Debit Card is brought to the stockroom if it is delivered elsewhere. The Stockroom Curator will send an email notification to the recipient about pickup of merchandise. When purchasing most items, UPS 2nd day shipping will be used whenever possible.

4.1.5 Returning Items

The Engineering Stockroom Curator handles all returns and shipping/receiving. Please contact him for return instructions (Parsons B174, x73530).

Note: Failure to correctly follow these steps will delay payment to the vendor and will jeopardize our open account standing.

4.2 TRAVEL

During the academic year your team may have the opportunity to go on sponsor site visits which may involve same day or overnight travel.

4.2.1 Air Travel

For this type of travel, please fill out a Travel Request Form and return to Clinic Administrative Aide (Letty Molina) as soon as possible or within 3 weeks of travel. She will make all the travel arrangements based on your request on the form. The form is available in the engineering office and on the engineering website (see example Form K in *Appendix A*).

4.2.2 Travel Reimbursement

Any receipts incurred during overnight business travel should be turned in to the Staff Accountant (Cynthia Wheeler). A travel report will need to be processed for your reimbursement. The form is available in the engineering office and on the engineering website.

4.2.3 Clinic Van

The Clinic van may be checked out for Clinic business on a "first come, first served" basis from Cynthia Wheeler in the Engineering Department Office. However, you must be on the HMC authorized drivers list. Driver authorization forms can be picked up from and submitted to Cynthia Wheeler. Processing time is 4-6 weeks for CA residents (6-8 weeks for out of state). If any problems occur with the van, please notify Cynthia or someone in the Engineering office. The van should always be returned with at least a 1/2 tank of gasoline. If the Clinic van is not available, Cynthia can help you make reservations to use the Facilities and Maintenance van. The Clinic van is not available for personal use.

4.2.4 College Insurance

If you use your own car, you are paid 44.5 cents per mile to cover expenses. If you have an accident, the only coverage is your own insurance. If you do not carry insurance, you may not use your own car at any time for college business.

4.2.5 Rental Car Insurance

Insurance coverage varies from company to company and from state to state. When renting an automobile on college business, the extra collision and liability insurance should ALWAYS be elected and the medical insurance ALWAYS declined. With collision insurance, the small additional cost is more than offset by the increased protection. Medical benefits are provided by the College's Travel Accident policy.

Exception: If a college issued purchase card is used to rent a vehicle (Faculty member), you do not have to purchase the collision coverage offered by the rental company. The credit card company provides primary auto insurance for vehicles rented with the purchase card when used for HMC business purposes.

4.2.6 Private Plane

Whenever possible, commercial air travel should be used. On certain, rare occasions, a private plane may be used for Clinic business. The following stipulations apply:

- Contact CUC Risk Management Director to determine current insurance requirements. All team members may be required to sign a liability release form
- Do not leave if 'bad weather' is forecast
- Even if no 'bad weather' is forecast, pilot must have IFR and night flight ratings
- Make alternate travel plans for emergency use
- Obtain written permission of Clinic Director

4.3 REIMBURSEMENTS

Reimbursements are processed by the Staff Accountant (Cynthia Wheeler).

Harvey Mudd College has a policy for reimbursement of expenses for travel, entertainment and other business expenses. Not all items are authorized for reimbursement (such as hotel movies, rental car upgrades, traffic, parking violations, and alcohol). To view the policy and to obtain reimbursement forms, please see the Staff Accountant.

4.3.1 Meals and Entertainment

Throughout the Clinic year various teams will need to meet with sponsor companies either at HMC or take a trip to meet with the liaison at their place of employment. On these occasions it may be necessary to have a business meal (breakfast, lunch, or dinner). Business meals are generally considered to be business-related only when the project is discussed as the primary topic of conversation. Meals while traveling should be included in the travel budget. Business meals must include the faculty advisor and the liaison unless the meal occurs on an approved business trip. Exceptions will be approved only when the team has received **prior written approval** of the faculty advisor.

Documentation must show that a business discussion was held during a business meal. The department entertainment reimbursement request must include appropriate receipts (detailed food receipts, listing beverages, food items, and tip information), a complete listing of attendees, and a brief description of the meeting.

In order to make a uniform policy the following limits will apply to Clinic business meals: for breakfast it is \$10.00 per person attending, lunch is \$15.00 per person; for dinner it is \$25.00 per person. An acceptable gratuity is between 15% and 20%. If one goes beyond 20% it may not be reimbursed. The total allowance for food per team is \$200.00 per school year.

Late night "snacks" are not approved business meals under the Clinic policy, even if the team discussed the project while the snacks are consumed.

NOTE: Alcoholic beverages shall not be reimbursed.

APPENDIX A: CLINIC FORMS

Form A:

Form B: Project Interest Form

Prospective Clinic students fill out this form at the end of every year in order to help the Engineering Office identify areas of interest for the following year's projects.

Form C: Project Choice Form

This Project Choice Form is used for students to select the Clinic team they wish to join for that term. There is no guarantee that you will get your first choice.

Form D: Progress Report

This is a sample progress report, which can be used to record weekly progress during team meetings.

Form E: Sample Team Meeting Minutes

These sample team meeting minutes may help give you an idea of what sort of information is important to keep records of during team meetings.

Form F: Prepared Questions for Meeting with Client

These are some sample questions that were prepared for a meeting with a client to give you an idea of what your Clinic team should prepare.

Form G: Fall and Spring Presentation Evaluation Form

This is the Clinic Presentation Evaluation Form, which you will use to provide feedback to those who presented regarding style, organization, etc. This form is very useful for presentation improvement, so please evaluate other Clinic teams in a way that will be helpful to them.

Form H: Clinic Completion Form

This form is a **graduation requirement**. It will have an area for your team to check off everything that is in your Clinic team's box, and needs to be signed off by three different officers.

Form I: Budget Estimate Form

This form is used to help the Engineering department keep track of how your team utilizes funds for the Clinic project.

Form J: Sample Purchase Order Request Form

This sample PO Request Form must always be used.

Form K: Travel Request Form

This form is used when Clinic travel requires air transportation. Turn in requests to the Clinic Administrative Aide, Letty Molina.

Form A:

Form B: Project Interest Form

**ENGINEERING CLINIC PROJECT INTEREST FORM
2005/2006**

During the summer months the Clinic office will be acquiring projects for the next school year. In order for us to seek projects that would be of your interest, we ask that you complete this form and return it to us before Friday, May 5th, 2006.

NAME: _____ Junior _____ Senior _____

Campus ext: _____ College _____ Major _____

Engineering field of interest:

Biomedical ____

Chemical ____

Civil ____

Communications ____

Computer ____

Electrical ____

Environmental ____

Materials ____

Mechanical ____

Reason(s) this area is of interest to you: _____

Due in the Engineering Department, Parsons 2373 by Friday, May 5th, 2006.

Form C: Project Choice Form

ENGINEERING CLINIC PROJECT CHOICE SHEET

NAME: _____ Jr. ___ Sr. ___

Campus ext. _____ College: _____ Major: _____

Interest in being Team Leader: Yes ___ No ___

Are you a U.S. Citizen? Yes ___ No ___

Engineering field of interest:

Biomedical ___

Chemical ___

Civil ___

Communications ___

Computer ___

Electrical ___

Environmental ___

Materials ___

Mechanical ___

1st choice: _____

2nd choice: _____

3rd choice: _____

4th choice: _____

5th choice: _____

Reasons for Selection: _____

***NOTE:** If you are not an HMC Engineering student, you must get Clinic Director's approval **BEFORE** signing up for Clinic.

Director, Engineering Clinic

PROJECT CHOICE SHEETS ARE DUE IN THE ENGINEERING OFFICE, PARSONS 2373, BY 5:00 P.M. TUESDAY, SEPTEMBER 5TH, 2006 FOR FALL SEMESTER, AND MONDAY, DECEMBER 4TH, 2006 FOR SPRING SEMESTER.

ENGINEERING CLINIC PROGRESS REPORT Weekly Meeting

Clinic Name:

For Week Ending:

Names:		
Agenda Topics		Action Item
1. Planned Activities for the Week		
2. Actual Progress Completed		
3. What Attack Seems Most Promising		
4. Progress Planned for Next Week		
Other Information:		

Form E: Sample Team Meeting Minutes

Team Meeting February 14, 1994

Present: Joanna, Imber, Erika, Professor Cha

Agenda:

1. Report of week's activities (include the photometer purchase)
2. Work Assignments
3. Clinic Presentation, March 2
4. Effect of Utility Rate Structure on Estimated Energy Savings
5. Brief Biographies for the new work plan

Minutes:

	DONE:		TO DO:
Jo:	Received info from Mainstem Co. on vehicle system for Palo Alto. Found book on IES light standards at Sprague.	Jo:	To contact mfrs. Re: filters for YAC. To recommend light meter to buy.
Team	Measured light levels at YAC building. Problems in transmissivity ratios.	Erika:	To meet Brotzman re: streetlights.
Jo:	Found light meters to range from GE \$50 ($\pm 15\%$) to Weston \$170 ($\pm 7\%$).	Jo:	To get vehicle data from J. Kennedy
Imber:	HAVE YAC floor plans.	Team:	To get light measurements at Baseline today, noon.
Erika:	Has info on lamp fmrs.	Imber:	To get ANSI standards and market data on lights.
Imber:	Tried to get info on projections of energy prices from D.O.E.	Erika:	To talk to factory re: theory of heat-flux meter.
		Imber:	To get more info by tomorrow on actual use time of city bldgs.
		P. Cha:	To check LWV on their use of new Home Energy Audit forms.
		Team:	Meeting Thurs. 4pm on oral presentation.

Form F: Prepared Questions for Meeting with Client

Automatic Sun/Wind Data Recorder

1. Does the client expect the same instrument to be used from the tropics to the arctic? What changes are permissible?
2. What are the expected production quantities of the recorder, and how is this related to their costs?
3. What computer type (manufacturer) and data format is the information to be controlled for?
4. Does the client have any present test data on competitive components or vendors? (E.g. anemometer towers?)
5. How many persons and what technical level will visit the recorder location for the periodic “memory dumps?”
6. What proportion of test sites will have AC power available? Etc.

Form G: Fall & Spring Presentation Evaluation Form

**HARVEY MUDD COLLEGE ENGINEERING CLINIC
FALL and SPRING Presentation Evaluation Form**

Team Name: _____

I am a: Faculty Member Student
 Clinic Liaison Other Industry Representative
 Other _____

Note to Evaluators: This is a program evaluation form. Our program goals for presentations precede evaluation questions. Teams should be evaluated as if they were industry professionals. Fall and Spring presentations differ as follows:

Goal: Students practice and improve presentation skills

- _____ 1. Overall, this presentation was prepared well and professionally presented.
- _____ 2. The project, from problem statement to solution options, was clear to the audience.

Goal: Students are able to use technologies currently used in industry research

- _____ 3. Students use appropriate techniques, skills, and modern engineering tools.

Goal: Students develop positive attitudes toward classroom discussions

- _____ 4. The presentation stimulated a number of questions by student observers.

Goal: Students develop critical thinking skills in the presentation environment

- _____ 5. The questions from student observers were analytical and reflected critical thinking.

Goal: Students demonstrate progress on projects

- _____ 6. Based on observation, the team appears to be on schedule.
- _____ 7. Based on observation, the project appears to be within budget.

Goal: Students are able to function on multidisciplinary teams

- _____ 8. The project required a multidisciplinary approach by team members.
- _____ 9. Each member of the team seemed to make a contribution to the team's work.

Comments: Please write your recommendations to the team on how they might (a) improve their methods or understanding of this project; (b) discuss your overall impressions of the presentation; and/or (c) improve the presentation.

Form H: Clinic Completion Form

Clinic Completion Form

It is the Team Leader's responsibility to have this form completed, signed off and turned in to Daniel Pereira in Parsons 2370 no later than Friday, May 4, 2007. All four (4) signatures are required for graduation.

CLINIC TEAM NAME: _____

BOX ITEM:



LAB BOOKS:	<input type="checkbox"/>	How Many? _____
PHOTOS:	<input type="checkbox"/>	
BLUEPRINTS:	<input type="checkbox"/>	
NOTES:	<input type="checkbox"/>	
PAPERS:	<input type="checkbox"/>	
AGENDAS:	<input type="checkbox"/>	
REPORTS:		
FOLDERS:	<input type="checkbox"/>	
BINDERS:	<input type="checkbox"/>	
REF. MATERIALS:	<input type="checkbox"/>	
POSTER SESSION ITEMS:	<input type="checkbox"/>	
PARTS:	<input type="checkbox"/>	Brief Description _____
HARDWARE:	<input type="checkbox"/>	Brief Description _____
SOFTWARE:	<input type="checkbox"/>	Brief Description _____
CD-ROMS:	<input type="checkbox"/>	How Many? _____
DISKS:	<input type="checkbox"/>	How Many? _____
TAPES:	<input type="checkbox"/>	How Many? _____
SLIDES:	<input type="checkbox"/>	How Many? _____
VIDEOS:	<input type="checkbox"/>	How Many? _____
CIRCUITRY:	<input type="checkbox"/>	Brief Description _____
OTHER:	<input type="checkbox"/>	

1. I, _____ (Sam Abdelmuati), have possession of the Clinic team storage box and the contents are as listed above, and can also state that the team's work area has been cleaned, and all equipment checked out of stockroom has been returned. The equipment tracking sheet has also been completed and returned.

2. I, _____ (Faculty Advisor), can certify that my Clinic team has submitted a completed final report in acceptable form.

3. I, _____ (Daniel Pereira), have possession of two copies of the Clinic team final report **in paper form as well as a CD**, and it is ready for final corrections. The team has assured that the final report, Projects Day presentation and poster are housed in their Charlie Clinic folder and are easy to locate.

Form I: Budget Estimate Form

BUDGET ESTIMATE FORM

Please fill out the following estimated budget for your Clinic project and turn it in to Cynthia Wheeler by Friday, October 13, 2006. Be sure to go over this list with your faculty advisor and have it signed before turning it in.

Clinic Sponsor _____ Team leader _____

Clinic Advisor's Approval _____ Team leader's Telephone _____

Estimated Costs:

Travel and Transportation _____

Equipment Rental/Lease _____

Computer Supplies _____

Laboratory Supplies _____

Equipment Purchases _____

Meals (fixed) \$200.00

Office & Other Expenses _____

Total Estimated Cost _____

Please note: Teams will be reimbursed for meals **only** when both, faculty advisor and company liaison are present.

Any other anticipated expenses should be listed on the other side of this form. **ONLY** this form shall be accepted.

Form K: Travel Request Form

**HARVEY MUDD COLLEGE – ENGINEERING CLINIC
TRAVEL REQUEST FORM**

* **DEADLINE:** As soon as possible or within 3 weeks of travel.

Name: _____ Date: _____

Clinic Team: _____

Faculty Advisor: _____

Purpose of Travel: _____

Name(s) of those traveling (correct spelling):

AIR TRAVEL:

Date of OUTBOUND Travel: _____ Time-frame for outbound travel: _____

Date of RETURN Travel: _____ Time-frame for return travel: _____

OR

(Optional) Preferred travel itinerary:

Outbound: Airline _____ FLT# _____ DEP _____ ARV _____

Return: Airline _____ FLT# _____ DEP _____ ARV _____

* **NOTE:** Preferred travel itinerary is not guaranteed.

LODGING: _____ Rate Code: _____

CAR RENTAL: _____ (for discount rates)

SHUTTLE: _____

Attach additional info. if needed.

Turn in to Clinic Administrative Aide, Letty Molina in the Engineering Office

6/8/2006

APPENDIX B: ENGINEERING CLINIC FACILITIES AND SERVICES

B.1. SPRAGUE LIBRARY

Resources can be found at <http://voxlbris.claremont.edu/default2.html>

B.2. CLINIC TEAM ROOMS

At the beginning of the school year when you are assigned to your team, you are also assigned a Clinic team room. A work area within the room will be assigned to your team. Each team will also have a Clinic computer with which to do Clinic assignments, research and reports, and are loaded with software specific to the basic needs of Clinic. The rooms also have a phone to be used for Clinic business only.

Should any problems arise in the Clinic team rooms, notify the Technical Support Manager (Daniel Pereira, x18792). Any additional software that your team might need should be purchased through your team's budget.

B.3. OTHER FACILITIES AND SERVICES

The Engineering Clinic Program makes use of a number of general-purpose facilities available within the Engineering Department to enhance the effectiveness of Clinic teams carrying out their projects.

The Engineering Computational Facility cluster, including the Center for Design Education, provides data acquisition, measurement analysis and software. For other available software, please contact the System Administrator (Fady Bishara, P-B178). The laboratories cover the spectrum of engineering disciplines; biomedical, chemical, civil, computer, electrical, materials, and mechanical engineering.

To use any of these lab areas, contact the Professor in charge of the lab or the Stockroom Curator (Sam Abdelmuati, P-B174). **Do not remove any equipment from these labs without the express consent of the Stockroom Curator.**

Dynamic Testing Lab (P-B179; x74114):

Equipped with HP 3852A data acquisition system, workstation running Labview, and signal-processing instrumentation for recording ambient and forced-vibration response measurements. Contact Prof. Duron for permission to use this lab.

Electronics Lab (P-B172):

This laboratory has 14 individual stations equipped with multimeters, oscilloscopes, function generators, signal generators, a spectrum analyzer, power supplies, an LCR meter, and standard electronics components. Please contact the Stockroom Curator (Sam Abdelmuati) or Prof. Baumgaertner for permission to use this lab.

Bioengineering Lab (P-2391; x71677):

Equipped with inverted microscopes, laminar flow hood, incubator, histology facilities and centrifuge for tissue engineering applications. See Prof. Orwin for permission to use this lab.

Systems Communication Lab (P-2381; x73527):

Equipped with synthesized signal generator, wave form synthesizer, spectrum analyzers, frequency and time interval analyzer, workstations running HP VEE for signal processing applications. See Prof. Molinder for permission to use this lab.

VSLI Lab (P-2387; x71675):

Equipped with workstations used for the development of microprocessor chips. See Prof. Harris for permission to use this lab.

Materials Lab (P-B185; x71672):

Equipped with electron/optical microscopes, metallographic preparation, and sample preparation facility for measurement of material properties and examination of microstructure. See Prof. King for permission to use this lab.

MTS Testing Lab (P-B173):

Equipped with three MTS universal dynamic testing machines and one protoboard-designing machine. See Prof. King for permission to use this lab.

Microprocessor Lab (P-2383; x71709):

Equipped with microprocessor development workstations running DESIGLAS (formerly Microsim) and Xilinx (from ECF), signal and logic analyzers, digital circuit testing equipment. See Sam Abdelmuati or Prof. Harris for permission to use this lab.

The Engineering Clinic Lounge (P-2377)

This room has been designed for your convenience and is equipped with the following:

Computer:

PC: Pentium Processor

Scanner:

HP ScanJet 4300C

The Design Center (P-B178)

This room is just as the name implies, and is equipped with the following:

Computers:

PC: 20 computers

Intel Pentium 4, 2.8 GHz

Windows XP

Printers:

Tektronix Phaser 860 Color Laser

HP LaserJet 4300DP

HP DesignJet 5000PS

The Engineering Lounge (P2377) contains a work table and student mailboxes that should be checked on a daily basis. The computer and scanner are to be used for Engineering Clinic and related work. If you need to print out personal documents (printers available in the Design Center, B-178), there is a charge of 5 cents per page. To print a color document you must first get approval from the System Administrator (Fady Bishara). Personal color documents may be printed at a charge of \$2.00 per page if pre-approved. The System Administrator is available to assist you with any problems arising in the Lounge or Design Center. Under no circumstances are you to add or delete from the hard drives of the computers. If any additions are made they will be deleted without notice.

Telephones:

Each Clinic team room has a shared phone to be used for Clinic related business. Clinic students may also use the phone that is located in the Lounge. **These phones are for Clinic purposes only.**

Software:

Programs commonly used in engineering are already installed on your team's computer. If it is determined that other specialized software programs are needed, you will have to utilize your budgeted Clinic funds. Any problems or software issues that arise should be directed to the System Administrator (Fady Bishara, P-B178). Do not install any software on any computer even if related to your Clinic project without the System Administrator's approval.

Engineering Stockroom (P-B174):

The Stockroom is open the following hours: Monday through Friday from 8:00 a.m. to 12:00 p.m. and 1:00 p.m. to 5:00 p.m.

The Stockroom Curator (Sam Abdelmuati) will assist you with many of your technical problems. He will see that many small items such as electronic components, wire wraps, small tools, etc., are kept in supply. Contact him when you are considering space requirements, local suppliers, equipment needs, and special experimental requirements. You should discuss safety procedures with the Technical Support Manager (Daniel Pereira) before starting any hazardous experiments.

Photocopy Machine:

The copy room is located in Parsons 2366, and houses a Canon ImageRunner 7200 copy machine. Each Clinic team will receive a seven-digit code, which will be used to access the new copier. The Clinic team faculty advisor will also use the same code when copies are required by him/her for Clinic purposes. This code will be assigned to you by the Staff Accountant (Cynthia Wheeler).

Conference Room:

The Conference Rooms located in P-1288A, P-1290B, and P-1292C are available for Clinic meetings. They must be reserved on the engineering web site. A confirmation email will be sent with the reservation information.

Internet:

The Internet is available through any MAC or PC computer on campus. It enables you to send messages, read newsletters, etc. The services available include: Telnet, FTP, E-mail, Gopher, WWW, and UseNet News Groups. See Academic Computing (P-B148) for more information. The web site for the Engineering Department is located at "<http://www.eng.hmc.edu>".

Fax:

A Fax machine is available in the Engineering Department office, and should only be used for Clinic-related business. Please ask any of the office staff for details. The primary FAX number is (909) 621-8967. The secondary FAX number is (909) 607-4619.

Tele & Video Conferencing:

Conference calls can be made with preinstalled Polycom speaker phones available in Conference Rooms P-1288A, P-1290B, P-1292C, and one NEC speaker phone is also available for checkout from the Clinic Administrative Aide (Letty Molina). Video communication is also available through a Sony PCS-1/IP system in the big Engineering Conference Room, P-2375. To use the video conferencing room, reserve it through the website. For use of special equipment, please contact the Administrative Aide (Sue Lindley) 24 hours in advance of the required meeting time.

APPENDIX C: CODES OF ETHICS

IEEE CODE OF ETHICS

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. to accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology, its appropriate application, and potential consequences;
6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Approved by the IEEE Board of Directors
February 2006

AICHE CODE OF ETHICS

The Board of Directors of the American Institute of Chemical Engineers adopted this Code of Ethics to which it expects that the professional conduct of its members shall conform, and to which every applicant attests by signing his or her membership application.

Members of the American Institute of Chemical Engineers shall uphold and advance the integrity, honor, and dignity of the engineering profession by: being honest and impartial and serving with fidelity their employers, their clients, and the public; striving to increase the competence and prestige of the engineering profession; and using their knowledge and skill for the enhancement of human welfare. To achieve these goals, members shall:

- Hold paramount the safety, health, and welfare of the public and protect the environment in performance of their professional duties.
- Formally advise their employers or clients (and consider further disclosure, if warranted) if they perceive that a consequence of their duties will adversely affect the present or future health or safety of their colleagues or the public.
- Accept responsibility for their actions, seek and heed critical review of their work and offer objective criticism of the work of others.
- Issue statements or present information only in an objective and truthful manner.
- Act in professional matters for each employer or client as faithful agents or trustees, avoiding conflicts of interest, and never breaching confidentiality.
- Treat fairly and respectfully all colleagues and co-workers, recognizing their unique contributions and capabilities.
- Perform professional services only in areas of their competence.
- Build their professional reputations on the merits of their services.
- Continue their professional development throughout their careers, and provide opportunities for the professional development of those under their supervision.
- Never tolerate harassment.
- Conduct themselves in a fair, honorable and respectful manner.

Revised January 17, 2003

Contact Information: AIChE Customer Service
American Institute of Chemical Engineers
3 Park Ave, New York, N.Y., 10016-5991, U.S.A.
Tel: 800-242-4363; International Tel: (212) 591-8100;
Fax: (212) 591-8888
E-mail: xpress@aiiche.org

These are more Internet addresses to the Engineering Codes of Ethics pages.

AIChE – <<http://www.aiiche.org/about/code.aspx>>

ASCE – <<http://www.asce.org/inside/ethics.cfm>>

ASEE – <http://www.asee.org/about/Engineering_Ethics.cfm>

ASME – <<http://files.asme.org/asmeorg/governance/3675.pdf>>