AME Senior Design

Student Handbook
2017
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GENERAL COURSE INFORMATION

Our goal in AME4553 Design Practicum is to provide an opportunity for Junior Engineers to gain experience in applying the Principles of Engineering Design that were internalized in AME4163 – Principles of Engineering Design. This is your opportunity to work in teams and apply what you know in solving a complex problem that necessitates the design of realistic systems, components, and processes.

The project sponsor sets forth the goals for the project and reviews the team’s work. The faculty advisor coordinates and advises the efforts of the students. Finally, the team of students learns and performs the tasks necessary to achieve the desired goals, culminating in delivery of a valuable product to the sponsor.

Succeeding in the senior design practicum program will require application of the lessons you’ve learned throughout your time at OU, organization techniques in order to meet deadlines while creating deliverables that fulfill your project’s requirements, and use of teamwork skills in order to efficiently accomplish your work as a group.
STEPS IN THE DESIGN PROCESS

While working on your capstone project, your group must follow the steps of the design process.

- **Define the Problem:** Be sure that you completely understand the needs and wants of the sponsor in regards to your solution to the project.
- **Do Background Research:** Understand the topic you are working on, how your hardware will interact with other hardware, what it will be used for,
- **Understand and Specify Requirements:** Using what you know about the sponsor’s desires and the background research, determine specific goals to achieve in solving the problem.
- **Generate Concepts:** Consider a variety of options that might solve the problem.
- **Choose Most Likely to Succeed Concept:** Compare the possible solutions, selecting the one that best balances the needs and budget of the sponsor with the project requirements.
- **Develop Selected Concept:** Determine what is necessary to put the chosen solution into action, including deciding what must be purchased or built, what software will be necessary to design or operate the solution, and any other concerns that must be addressed before the solution may be made a reality.
- **Build a Prototype:** Using what is known, produce a prototype of the hardware for your solution that may be used to determine how viable the solution is.
- **Test and Redesign:** Determine what problems, if any, exist with your prototype, along with what aspects of it could be improved. Work to fix these issues in the next version.
GRADING CRITERIA

The first deliverable of the program: **Plan of Action** is part of AME4163: Principles of Design. Check the course syllabus of AME4163 for grade information.

The grade in AME4553: Senior Design Practicum consists of two components: group grade and individual grade. The OU mentor/s will circulate details.

**Group Grade**
- Mid-Term Report and Presentation: 20%
- Final Presentation/Poster Fair: 25%
- Final Report: 25%

**Individual Grade**
- Weekly Progress Report: 10%
- Participation/Class Assignments: 10%
- Subjective Evaluation: 10%

A = 90-100%  B = 80-89.99%  C = 70-79.99%  D = 60-69.99%  F = Below 60%

Minor variations in grade composition may occur among instructors. A group grade is assigned to everyone in the team. The individual grade would however differ and thus determines your final grade in the course. Each team member must prepare and submit a weekly report. Attendance is mandatory at group meetings, class meetings, and presentations (mid-term, final, and guest lectures). Subjective Team Evaluation is based on input from team members. Subjective Advisor Evaluation is based on faculty advisor impression, and may include input from sponsors, colleagues, team members, technical staff, and external judges. 25% (of the total grade) for project completion by due date is all or none.
# MILESTONES ME CAPSTONE 2016-2017¹

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Solicitation</td>
<td>August – Mid-October 2016</td>
</tr>
<tr>
<td>Team/Project Assignments, AME 4163</td>
<td>Thursday, November 10, 2016</td>
</tr>
<tr>
<td>Team Organization, AME 4163</td>
<td>Mid-November 2016</td>
</tr>
<tr>
<td>Plan of Action, AME 4163</td>
<td>Tuesday, December 6, 2016</td>
</tr>
<tr>
<td>Mid-Term Design Review (Mid-Term Report and Oral Presentation)</td>
<td>Tuesday, March 7 and Thursday, March 9, 2017</td>
</tr>
<tr>
<td>Final Design Review (Draft Final Report and Oral Presentation)</td>
<td>Tuesday, April 25 and Thursday, April 27, 2017</td>
</tr>
<tr>
<td>Final Report</td>
<td>Tuesday, May 2, 2017</td>
</tr>
<tr>
<td>Poster Fair/Final Prototype</td>
<td>Thursday, May 4, 2017</td>
</tr>
<tr>
<td>Completion of Project and Deliverables Due Date</td>
<td>Friday, May 5, 2017</td>
</tr>
</tbody>
</table>

¹ Check class announcements for any last minute changes. Guidelines, format requirements, and evaluation forms for reports and presentations are provided in this document.
### Milestones AME/ISE Interdisciplinary Capstone

#### Spring 2017

<table>
<thead>
<tr>
<th>Activity</th>
<th>Approximate Date</th>
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</thead>
<tbody>
<tr>
<td>Team Orientation</td>
<td>Early December</td>
</tr>
<tr>
<td>Company Orientation</td>
<td>Early December</td>
</tr>
<tr>
<td>ISE Orientation</td>
<td>January 18, 8:30 am</td>
</tr>
<tr>
<td>Seminar: Project Management</td>
<td>January 27, 3:00 pm (tentative)</td>
</tr>
<tr>
<td>Presentation 1 @ ISE</td>
<td>February 3, 2:00 pm</td>
</tr>
<tr>
<td>Seminar: Presentation Skills</td>
<td>February 12, 3:00 pm (tentative)</td>
</tr>
<tr>
<td>Workshop: Presentation Evaluation</td>
<td>February 19, 3:00 pm (tentative)</td>
</tr>
<tr>
<td>Seminar: Systems Evaluation</td>
<td>March 10, 3:00 pm (tentative)</td>
</tr>
<tr>
<td>Mid-Term Design Review @ AME</td>
<td>March 7 and 9, 1:30-4:15 pm</td>
</tr>
<tr>
<td>Seminar: Financial Analysis</td>
<td>March 31, 3:00 pm (tentative)</td>
</tr>
<tr>
<td>ISE Poster Session</td>
<td>April 07</td>
</tr>
<tr>
<td>Final Presentation @ ISE</td>
<td>April 28</td>
</tr>
<tr>
<td>AME Poster Session</td>
<td>May 4</td>
</tr>
<tr>
<td>Company Presentation</td>
<td>May 1 – May 5</td>
</tr>
<tr>
<td>Final Report &amp; Deliverables Due</td>
<td>May 4, 3:00 pm</td>
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### WEEKLY MILESTONES: SPRING 2017

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
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<tbody>
<tr>
<td>1. Jan 17-21</td>
<td>Review Project Objectives and Goals</td>
</tr>
<tr>
<td>2. Jan 22-28</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td>3. Jan 29-Feb 4</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td>4. Feb 5-11</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td>5. Feb 12-18</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td>7. Feb 26-March 4</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td></td>
<td><strong>Draft of Mid-Term Report Due</strong></td>
</tr>
<tr>
<td>8. March 5-11</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td></td>
<td><strong>Mid-Term Report and Oral Presentation (March 7 or 9)</strong></td>
</tr>
<tr>
<td>March 12-18</td>
<td><strong>Spring Break</strong></td>
</tr>
<tr>
<td>10. Mar 26-April 1</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td>11. April 2-8</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td>13. April 16-22</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td></td>
<td><strong>Draft of Final Report Due</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Final Presentation (April 25 or 27)</strong></td>
</tr>
<tr>
<td>15. April 30-May 6</td>
<td>Weekly Progress Report</td>
</tr>
<tr>
<td></td>
<td><strong>Final Report Due (May 2)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Poster Fair Design Competition / Final Prototype Designs (May 4)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Team Evaluation Due</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Final Deliverables Due and Completion of Project Due (May 5)</strong></td>
</tr>
<tr>
<td>16. May 7-13</td>
<td><strong>Final Exam Week</strong></td>
</tr>
</tbody>
</table>
RECORD KEEPING

Proper records are important to track the progress of the project, to clarify agreements reached, to retain information and knowledge gained, to transfer results to the sponsor, and to disseminate results to your colleagues or public at large.

**Project Notebook:** Each team member must acquire a page-numbered notebook (as specified by your instructor) to record important project developments. You should keep this notebook in your possession during all project related activities. This book carries the meeting minutes, thoughts, ideas, suggestions, comments, sources, sketches, data, test results, conclusions, etc. The project notebook would form the basis for any possible patent application.

Write in ink. Write legibly with enough details and clarity to be understandable. Use pages in sequence. Leave no blank pages to fill later. Paste or staple sheets of information, computer printouts, e-mails etc. List important phone numbers, addresses, etc. Record meeting minutes including date, location, time, persons present, targets accomplished and planned, new facts and data, etc. During the testing phase, record test conditions, procedure, and results obtained. The faculty advisor shall occasionally ask you to turn in your notebook for inspection.

**Project Folder:** Each team shall maintain a dropbox folder (www.dropbox.com/) with electronic files of the following items as they become available. This folder should be shared with the faculty advisor.

- Strategic Plan/Team Organization
- Plan of Action
- Weekly Progress Reports (Group)
- Mid-Term Presentation
- Mid-Term Report
- Final Presentation
- Poster Display
- Final Report

**Project Records:** Each team shall maintain the following records.

- Files of correspondence with vendors, liaison, etc.
- A file of financial records including copies of purchase receipts
- Users’ or Instruction manual of equipment purchased
- Technical Specifications of purchased items
- Any other related information

**Vendor Catalogs:** Catalogs acquired during the project should be kept in the Capstone Cafe (FH143) for general use.

**Storage Space:** Lockers may be acquired for storage of project related supplies, equipment, or materials. Contact Billy Mays in the machine shop for locker assignments.
MEETINGS AND CONFERENCES

During the execution phase of the Plan of Action, i.e., in Spring Semester, team meetings and conferences with faculty advisor and liaison are required.

- All members of each team must meet once a week to review progress during the past week and to make plans for the next week. During the meeting, specific targets must be assigned to or undertaken by each team member. The target must be finite and not a generality. It should consider “What exact actions do I have to do to carry out the strategic plan to achieve the exact results necessary for this stage of the strategic plan, within the limits of available resources?”

- The meeting discussion must be recorded, and a group progress report must be submitted to the faculty advisor by 11am on Thursday (or as instructed by your advisor) using the attached format (Progress Report – Group). Each team member must record his/her targets and submit his/her weekly progress report to the instructor by 11am on Thursdays (or as instructed by your advisor) using the attached format (Progress Report – Individual).

- Each team will meet weekly at a regularly scheduled time with the faculty advisor to review progress, plans, and to seek advice. Additional meetings with the advisor may be arranged as necessary.

- The team must meet with the Project Liaison as necessary. At the minimum, a copy of the weekly Progress Report - Group should be submitted to the Project Liaison to maintain effective communication.

- The team members must meet regularly as needed to perform the project task.

- The mid-term and final presentations are combined for all sections. You are expected to attend a minimum of seven presentations to provide review and feedback.

- We invite guest lecturers to speak on various topics of professional interest such as business planning, entrepreneurship, intellectual property, patent laws, ethics, and engineering codes and standards. Attendance is mandatory at these meetings announced in advance.

- A poster fair is scheduled in the last week of classes.

- There are no regular lectures in this class, except as announced by the faculty advisor.
PROFESSIONAL CONDUCT

The Senior Aerospace and Mechanical Engineering Practicum represents the culmination of instruction obtained throughout your academic career. As a result, it should be treated as one of the most important undertakings of your senior year as it provides a framework for your future employment. It is also critical to note that you represent the University of Oklahoma in every aspect of this practicum and you should conduct yourself as such. Since all practicum teams are unique, this outline is only to be used as a generalized guide. Consult a teaching assistant or faculty member on a per-needs basis.

COMMUNICATION

- No offensive language when any official practicum work is being conducted on or off campus
- Copy each team member on official practicum communication, addressing members appropriately
- Unless otherwise agreed to, advisors, sponsors and other business partners are to be addressed formally (Mr, Mrs, Professor, etc…)
- Keep records or logs of every form of communication
- Agree upon a reasonable file naming convention for all files and file types

DRESS/ATTIRE

**Group Work – Comfortable & Casual**
Comfortable or otherwise casual clothing is to be worn when working privately on/off campus with team members. **Avoid** clothing can be described as revealing or offensive (slogans, graphics, etc…) to any party involved in the meeting. If meetings are conducted within machining/fabrication shops, the typical guidelines of these areas are to be followed (closed toed shoes, long pants, etc…).

**Field Visits & Business Transactions – Business Casual**
A field visit to a sponsoring or partnering company for your project entails meeting with employers and employees of companies who are paying keen attention to your work and presentation. **Unless** field visits require physical, dirty work or interaction with machinery (machine shops, etc…), attempt a business casual form of dress.

**Midterm & Final Presentations – Business Formal**
Presentations usually involve faculty & staff, sponsors, visitors and classmates and are to be treated as a major milestone of the practicum schedule (see schedule presented in this handbook). **Unless** your team has obtained a particular uniform for presentations (polo shirts, etc…), you are expected to adopt a business formal style of dress.
Comfortable & Casual
- Sundress
- Long or short skirt
- Khakis or Jeans
- Shorts
- Plain T-shirt (no slogans), polo shirt, turtleneck
- Casual button-down blouse
- Casual button-down shirt
- Loafers, sneakers (with or without socks), sandals...

Business Casual
- **Women**
  - Skirt, khakis, or pants
  - Open-collar shirt, knit shirt or sweater (no spaghetti straps or décolleté)
  - Dress
- **Men**
  - Seasonal sport coat or blazer with slacks or khakis
  - Dress shirt, casual button-down shirt, open-collar or polo shirt
  - Optional tie
  - Loafers or loafer-style shoes, and socks

Business Formal
- **Women**
  - Suit
  - Business-style dress
  - Dress with a jacket
  - Stockings (optional in summer)
  - Heels, low or high
- **Men**
  - Dark business suit
  - Matching vest (optional)
  - Dress shirt
  - Conservative tie
  - Leather dress shoes and dark dress socks

CONFLICT RESOLUTION
Conflicts should be resolved as per the manner embodied in the Team Contract. As with every other aspect of life, people differ in opinions or encounter other conflicts. Use this only as a guideline to attempt conflict resolution. Do not attempt to conclude a milestone while a conflict is unresolved.

*Disagree with another member’s proposition? Were you offended by a member’s suggestion or statement? Meeting times not mutually agreeable? Is a teammate making unethical decisions in the conduct of research, etc...?*

**Communicate with the Individual**
Within the course of a day or two, attempt to communicate your position with the offending member first. This may come in the form of an email, text message or face-to-face. Attempt to record the full extent of the conversation in the event further action becomes necessary.

**Communicate with the Team**
If a one-on-one approach does not help to resolve the issue, within the course of day two or three, raise the discussion with the entire team at a group meeting or through email. Each team member is to objectively consider both sides of an argument and collectively reach a compromise that seeks to end conflict without compromising quality of work or participation. An independent, unbiased contribution by a teaching assistant can aid in the resolution of the situation.

**Communicate with Instructor**
This is regarded as the final step in the conflict resolution process for the practicum. Approach your instructor (advisor) with all facts collected about the conflict (including prior attempts to resolve the issue) and suggestions or judgement will be made. Note that this decision is to be applied immediately and proof of implementation may be required by the advisor. This step should be completed **no more than four days** after an initial conflict arises.
ORGANIZATIONAL CHART

There are several ways in which to organize your team. A suggestion follows. You may use the structure shown below to organize the team. Figure 1 gives a detailed structure of how the positions fit together and figure 2 shows an example of how team roles may be distributed.

TEAM LEADER (Manager of Project) forms the EXECUTIVE DIVISION - This division supervises the activities so that the organization runs smoothly to produce and deliver a high quality product to the sponsor. The Team Leader is responsible for providing leadership to the project team, directing the project's resources, developing the project plan, applying lessons learned on the project, ensuring that the project is completed on time, within budget, and with acceptable quality, and plays a primary role interfacing and coordinating with sponsor and Capstone advisor.

TEAM INTEGRATOR forms the COORDINATION DIVISION - This division establishes a coordinated and functioning organization. The Team Integrator is responsible for integrating all written inputs from team members (plan of action, weekly reports, mid-term and final reports, mid-term and final presentation, and poster Fair display) into a well-written document and adding an executive summary.

TEAM ACCOUNTANT forms the FINANCE DIVISION - This division handles the finances and cares for assets so that the product is delivered within budget constraints. The Team Accountant prepares and provides budget and invoice statements for all reports; makes purchase orders and maintains an electronic record of all purchases and expenditures using table format in a Word document providing the following information for all items purchased: company from which purchased, manufacturer of product, product number, product description, quantity, and cost.

TEAM PUBLIC RELATIONS LIAISON forms the PUBLIC DIVISION - This division delivers the product to the sponsor, and generates public (e.g., students, community, and industry) interest in the capstone design program. The Team Public Relations Liaison performs all public relations duties on the project and serves as the team’s liaison on the Capstone Poster Fair Design Competition Committee.

TECHNICAL GROUP #1 forms the TECHNICAL DIVISION - This division provides a high quality product within the time constraints. The Technical Group #1 is composed of all team members and is responsible for performing all engineering work on the project such as analysis, design, procurement, preparation, production, and construction.

TECHNICAL GROUP #2 forms the QUALIFICATION DIVISION - This division ensures that the product meets or exceeds the expected level of quality. The Technical Group #2 is composed of all team members and is responsible for performing all qualifying engineering work on the project such as testing, validation, review, and feedback.
* Light shaded boxes are departments of the OU mentor. Dark shaded box “Review and Feedback” is sponsors’ department. All other boxes represent posts taken up by student team members.

**Figure 1. Detailed Organizational Structure of a Capstone Design Course**
<table>
<thead>
<tr>
<th>Team Member</th>
<th>Assigned Posts</th>
</tr>
</thead>
</table>
| OU Mentor                 | • Capstone Program Officer  
                            • Sponsor Affairs Officer  
                            • Personnel Officer  
                            • Ethics and Inspection Officer  
                            • Income Officer  
                            • Recognition and Awards Officer |
| Sponsor                   | • Review and Feedback Officer                                                  |
| Junior Engineer 1         | • Executive Officer/Director  
                            • Procurement/Preparation Officer  
                            • Analysis and Design-Section 1 In-Charge |
| Junior Engineer 2         | • Communications Officer/Coordination Director  
                            • Records/Reports Officer  
                            • Analysis and Design-Sections 2 In-Charge |
| Junior Engineer 3         | • Disbursement Officer/Finance Director  
                            • Inventory Officer  
                            • Production/Construction Officer |
| Junior Engineer 4         | • Testing and Validation Officer  
                            • Analysis and Design Officer |
| Junior Engineer 5         | • Public Relations Officer/Public Director  
                            • Distribution/Promotion Officer  
                            • Procurement/Preparation-Section 1 In-Charge  
                            • Production/Construction-Section 1 In-Charge |

Figure 2. Example of Post Assignments
CAPSTONE CAFÉ POLICIES AND PROCEDURES

Each person is responsible for ensuring that all policies are carried out to ensure consistent and coordinated efforts to support the program goals.

Capstone Café

Located in FH 143, the Capstone Café has computer work stations for project research, design simulation and analysis. Access to the room is controlled by a security system that is integrated with the OU OneCard Office. The card swipe security system records the date, time and identity of each OU ID card used to enter the room.

Each capstone instructor should request access for their student teams by providing a list of student names and ID numbers to the Assistant to the Director, with a copy to the Capstone Coordinator. Arrangements will be made with the OneCard Office for the students to be added to the Capstone Café card swipe system. Only students enrolled in a section of AME 4553, Design Practicum, will be allowed access.

Each person receiving entry privileges to the Capstone Café is responsible for being sure that all policies are carried out and that consistent and coordinated efforts are made to support the program goals.

- Absolutely no food or drink items are allowed in the Capstone Café.
- Project sponsors or other external visitors may visit this area from time to time. Keep the desks, shelves, work area, etc., neat, orderly, and operational. See that papers are not scattered around.
- Limit your computer usage to capstone projects only (example: no checking e-mail or working on homework for other courses). A computer may be used long-term for running simulation projects that require extended computational time. The team working on that project is responsible for appropriately labeling it as reserved with a piece of paper over the monitor or keyboard.
- All users of the Capstone Café should keep watch over the equipment, upkeep and security features of the facility (example: no propping the door open or opening for others). Any out-of-the-ordinary conditions should be reported immediately to the AME Office and the Capstone Coordinator.
- Abuse or violation of these policies may result in revoked entry privileges

Lockers

The Capstone Café will no longer serve as a storage facility for a team’s supplies, equipment, project prototype, etc. Lockers are available by making arrangements with Billy Mays in the machine shop. A key to the team’s locker can be checked out through the AME Office (Melissa Foster) after Melissa has received approval from Billy.
MACHINE SHOP AND LABORATORY SAFETY

Safety is everyone's business. Prudent safety practices require that the involved individual recognize that (i) known hazards need to be eliminated, (ii) potential hazards should be thoroughly investigated, and (iii) protection against known and potential hazards should be a way of life.

Although the university strives to provide safe equipment and a safe environment, safety ultimately falls upon the person who works in the lab. That person must be constantly aware of his/her responsibility to himself/herself as well as to the university in order that the chance of serious injury, loss of life, or damage to equipment is minimized. The individual should constantly watch out for potential hazards, know the recommended operational procedures, and if in doubt consult the responsible person such as the technician or a faculty member before operating the equipment. Report the potential for known hazards to the proper authorities and take all necessary precautions.

The following is a list of guidelines that should be followed by the persons working in the AME laboratories. However, the individual should not construe that his/her responsibilities are limited to this list. Proper behavior is a must in the AME machine shop, Capstone Student Support Laboratory and other Laboratories.

**General Guidelines**

1. Persons in charge of labs/shops should make available a copy of these guidelines to individuals working in their labs. Individuals who fail to follow these guidelines may be removed from the lab and/or may lose their privileges to use AME laboratories.

2. Individuals should familiarize themselves with fire exits in the lab and the locations and use of fire extinguishers and first aid equipment.

3. Individuals should use protective equipment (e.g., gloves, masks, eye protection wear, and ear protection) wherever recommended. Open top shoes (e.g., sandals, thongs, etc.) will not be permitted in the shop to prevent foot injury.

4. When working on experiments in a lab/shop, there must be at least two people within reachable or communicable distance from each other. Exemptions may be granted by the person-in-charge of the lab for certain types of work which are commonly recognized as safe.

5. Equipment should not be disconnected from existing installations without the approval of the individual concerned.

6. Equipment should only be borrowed from any lab/shop if properly following the procedures for such removal of equipment set by the person-in-charge of that lab.

7. Smoking is not allowed in any area of the Machine Shop or Felgar Hall.

8. Eye protection to be worn in the AME shop at all times

9. No gloves are to be worn while using rotating equipment

10. Safety and operation of equipment training will be done by the shop personnel at different times through the semester/year. Shop personnel will set and announce the training times.
Safety rules have been developed for specific items in the machine shop/lab including

- Grinders
- Respirators
- Lathes, Drill Presses
- Electrical Systems
- Heating Protection
- Chemical and Flammable Liquid Storage
- Housekeeping
- Welding Equipment/Cutting Torches
- Drill Presses
- Saws

Please contact Billy Mays in the AME Machine Shop for additional safety guidelines if your project involves any of these items.
SAFETY TRAINING

A. GENERAL
Individual training in job responsibilities and job operations, proper methods and techniques to be used, and the hazard associated with the function or systems involved are the most important elements in achieving safe operations. Technicians will be responsible for assuring all newly assigned individuals receive adequate training before beginning to work.

Formal training is required for all individuals engaged in hazardous operations such as high voltage work and operating machinery.

B. ON-THE-JOB TRAINING
On-the-job training will be accomplished by supervisors and foremen responsible for the individual. This training will include:

- University safety program.
- Prescribed safe clothing and equipment for the job.
- Emergency treatment of injuries.
- How to report a fire or serious injury and accident
- Specific hazards associated with the job.
- General hazards encountered in the work area and how to avoid them.

If an employee demonstrates through accidents or continued unsafe acts that he/she does not understand the safety requirements of his/her job, the individual will be re-trained through formal training programs, repeat on-the-job instructions, or be personally counseled by a supervisor.

C. ENVIRONMENTAL HEALTH
The safety officer or safety coordinator will maintain close attention with environmental health activities to coordinate company requirements for those functions falling within their control. There is a relationship between accident prevention and occupational health. For example, some industrial chemicals present a variety of serious hazards to health and property when improperly handled. That is, depending on conditions, the vapor from a chemical can ignite or explode; it can cause dizziness or death when inhaled or dermatitis when touched. The Safety coordinator and the local health department will cooperate in their efforts to ensure the success of the safety Program and to minimize occupational health and safety hazards.

D. FIRE SAFETY
There are four classifications of fire:

CLASS A: Natural Materials - Ordinary fires of paper stock, wooden skids, or textiles. These fires require cooling, quenching, or smothering and can be put out by water.

CLASS B: Flammable or Combustible Liquids – Liquids such as alcohol, printing ink, or solvents may catch fire. These fires must be smothered or blanketed. Water can make them worse. These fires are very dangerous. Soiled oil rags can burst into flames from spontaneous combustion. They should be kept in metal containers with spring lids.
CLASS C: Electrical - The substance burning is electrically energized. These fires may be dealt with as if they were CLASS A fires except that using water can cause electrocution if the current is on as water conducts electricity. These fires require a non-conducting extinguishing agent unless you are absolutely sure the current is off.

CLASS D: Metals - Combustible metals, such as magnesium, titanium, etc., are used in the printing industry. Class D fire extinguishers are available, but these fires and Class C fires probably need the attention of the fire department.

**Portable Fire Extinguishers**

Fire extinguishers are only effective for small fires in the early stages. Only properly trained employees should use fire extinguishers:

- Just as there are different kinds of fire, there are different kinds of fire extinguishers. Using the wrong kind may cause more damage than good, and may even cause the fire to spread.

- All fire extinguishers at AME are B or C.
FIRE EMERGENCY PROCEDURES

UPON OBSERVING A FIRE
1. Call 911.
2. Call a supervisor.
3. Station a person on the street adjacent to the facility to direct Fire Department personnel to the area.
4. Assess seriousness of fire.

IN CASE OF MINOR FIRE:
5. Fight fire IF IT CAN BE DONE SAFELY. (In the meantime, Supervisor calls the Fire Department)
6. Cooperate with the Fire Department.

IN CASE OF MAJOR FIRE
7. Leave fire area. CLOSE DOOR BEHIND YOU. (Set off fire alarm)
9. Cooperate with the Fire Department.
10. Individuals should meet in parking lot.
11. Supervisor is responsible for the head count.

EMERGENCY PROCEDURES CHECKLIST

CALL 911. GIVE CLEAR, ACCURATE DIRECTIONS.

ASSIGN A COMPETENT PERSON TO MEET AMBULANCE AT ENTRANCE.

RESTRICT THE IMMEDIATE AREA OF THE ACCIDENT SCENE TO AUTHORIZED PERSONNEL ONLY.

IF FURTHER DANGER EXISTS, CLEAR AREA.

Other Emergency and Important Phone Numbers
- GODDARD HEALTH CENTER PHONE 325-4611
- OU POUCE DEPARTMENT PHONE 325-2864
- OU PHYSICAL PLANT PHONE 325-3060
- OKLAHOMA POISON CONTROL PHONE 271-5454
- AME CONTACT: DR. MISTREE CELL PHONE 306-7309
   BILLY MAYS HOME PHONE 364-2096
PATENT AND LITERATURE SEARCH

In the course of your design project, doing research to understand both the nature of the problem and the elements of your solution will be a necessity. This information will come from two major sources: patents and peer reviewed journal papers. Properly citing such sources can lend credence to the solution designed in your capstone project.

**Patents**
When someone invents a novel technique or device, they often file for a patent to protect their intellectual rights to that invention. Because patents include detailed descriptions of the relevant inventions, a patent search can yield valuable information about how some process may be performed, or how a similar device has been designed. The United States Patent and Trademark Office maintains a website (http://patft.uspto.gov/) that features a search engine for patents published since 1976. Google also has an option to search only for patents (www.google.com/patents) which may be used to find relevant information.

**Journal Articles**
Publication in a peer reviewed journal is a major goal of any scientific research. A wide variety of journals exist, covering nearly any topic of study Publication of results allows for other researchers within a particular scientific discipline to build off of each other’s results, furthering knowledge within that discipline. Using this research in your project can greatly assist your understanding of the subject. The University of Oklahoma library (http://libraries.ou.edu/) may be searched to obtain full text journal articles, and many articles that are not owned by OU may be obtained through interlibrary loan through the same web site. Other search engines like Web of Science (http://apps.webofknowledge.com/), Google Scholar (www.google.com/scholar), or JSTOR (http://www.jstor.org/) may also be used, although OU-provided article access through those sources will only work if searching from a computer on an OU network.

STANDARDS

Depending on the topic of your design project, an understanding of the relevant standards may be vital to producing a valid solution. Many different engineering, industry, and environmental standards exist for different subjects. The National Resource for Global Standards (www.nssn.org/) may be searched to find relevant standards for the subject you are working on. Understanding what restrictions and guidelines are placed on your work from different standards is vital for any design project.
SUGGESTED FORMAT FOR WEEKLY PROGRESS REPORT (GROUP)

Weekly progress report from the group is a requirement for capstone. The format of the progress report will depend on the faculty advisor for your project.

- Memo format
- Presentation format

The Weekly progress report must include the following information:

A. Targets Planned Last Week
   List targets planned last week (copy the list from the previous week)

B. Targets\(^2\) Completed
   List targets completed by the team during the week. Provide specific details supporting completion, e.g., part drawings, material list, test results, report prepared, discoveries made, etc. Provide attachments as necessary.

C. Targets Not Completed/Actions Needed to Ensure Future Success
   List targets planned but not completed during the week. Identify sources or causes of obstruction, and explain how the team planning will be improved to avoid incomplete targets in the future.

D. Plan of Action for the Next Week
   List targets planned for the coming week. Identify resources (time, money, people, facilities, software, hardware, etc.) and coordination (within and outside the group) required. List the sequence of actions needed to accomplish the targets. Identify what will be produced at the end this effort. The weekly plan must align with the strategic plan and the overall plan of action. In developing this plan consider “what exact action do I have to do to carry out the strategic plan to achieve the exact results necessary for this stage of the strategic plan within limitations of available resources?"

E. Time Invested by Individuals in Team and Associated Activity
   We expect each person to invest a minimum of 10 hours per week in this course. This time includes meeting with faculty mentors, sponsors,

F. Approvals/Problems/Concerns/Achievements or Success
   Submit requests for approval by the advisor or liaison. Explain any problems or concerns of any division (executive, coordination, financial, technical, etc) or department of the team. List important achievements or successes made.

\(^2\) A target must be specific and not a generality. It must be terminable, i.e. it can be done, finished, or completed. For example, “start calling suppliers” is not specific enough. However, “call so-and-so and request product catalog for so-and-so to design so-and-so” can be completed. The target must accomplish a desirable part of the overall strategic plan to reach the project goal.
SUGGESTED FORMAT FOR WEEKLY PROGRESS REPORT (INDIVIDUAL)

Individual weekly progress reports from each team member is a requirement for capstone. The format of the progress report will depend on the faculty advisor for your project.

- Memo format
- Presentation format

The Weekly progress report must include the following information:

**Targets Planned Last Week**
List targets planned last week (copy the list from the previous week)

**Targets**³ Completed
List targets completed by you during the past week. Provide specific details supporting completion, e.g., part drawings, material list, test results, report prepared, discoveries made, etc. Include attachments as necessary.

**Targets Not Completed/Actions Needed to Impede Incomplete Targets in the Future**
List major targets planned but not completed during the week. Identify sources or causes of obstruction, and explain how you would improve your future planning to overcome them.

**Plan of Action for the Next Week**
List targets planned for the coming week. Identify the time and resources required by you, and how you will coordinate with other members of your team. List the sequence of actions needed to accomplish the major targets. Identify the end product(s) of your efforts. The weekly individual plan must align with the weekly group plan. The group plan should support the strategic plan and the overall plan of action.

**Problems or Concerns/Achievements or Success**
Explain problems or concerns of your own division or department. List your achievements and successes.

**Estimate of Productive Hours Spent in Tasks**

³ A target must be specific and not a generality. It must be terminable, i.e, it can be done, finished, or completed. For example, “start calling suppliers” is not specific. However, “call so-and-so and request product catalog for so-and-so to design so-and-so” can be completed. The target must accomplish a desirable part of the overall strategic plan to reach the project goal.
INSTRUCTIONS FOR ORAL PRESENTATIONS

A mid-term and a final oral presentation are required. These are professional-level presentations, appropriate to the audience comprising of your colleagues, faculty, sponsors, technical liaison, and guests. The presentation should include power point slides and, if possible, operating demonstrations. You should allow time for a question-and-answer session at the end of your presentation. A total of approximately 30-minutes are allocated for each team. The presentation schedule will be announced in advance. Two concurrent sessions will be held. You may switch between sessions only during the designated times.

A laptop and a computer projector will be available in the presentation room. To avoid technique interruptions and delays, you MUST submit and test your presentation in advance (typically the hour before presentations begin) in the presentation room.

Faculty mentor(s) designated for each team will conduct a thorough evaluation of the team. In addition, each member of the audience including faculty, fellow students, and sponsors shall evaluate each presentation. Thus, you will evaluate each team in the sessions you will attend. Copies of the Design Evaluation Form will be provided at the presentation sessions and should be turned in to the TA present after each presentation.

Suggested Guidelines

1) All team members should participate in the presentation.
2) Dress nicely. No shorts, jeans, or hats.
3) The quality of slides counts. Use large font for text, clear graphics, and smart color combinations for superior visual impact.
4) Divide topics among team members, and avoid repetition.
5) Do not assume that the audience knows about your project.
6) Prepare notes, but do not read them verbatim.
7) Be aware of the lighting. Avoid speaking in the dark.
8) Face the audience while speaking.
9) Speak so that audience at the back of the room can understand.
10) If you goof while talking, correct yourself and continue.
11) Rehearse your presentation (with a friendly critic), and ensure that it is within the time limit.
12) Allow time for question and answer as part of your presentation.
SUGGESTED FORMAT FOR PROJECT PRESENTATION

- Project Title, team name, sponsor, liaison, faculty advisor
- Project Goal/Purposes
- End Products/Deliverables Required
- Strategic Plan
- Organizational Structure
- Project Status
  - Major Tasks (Completed)
  - Schedule (and Remaining Tasks)
- Financial Statement
  - Expense Report
  - Acquisitions and Assets
- Technical Approach (Largest section of the presentation)*
  - Functional Requirements
  - Concept Generation and Selection
  - Analysis and Design of Subsystems
  - Proof-of-Concept Hardware
  - Testing, Correction, and Qualifications Procedures/Results
  - Final Prototype and Documentation
- Potential Impact of the Project (as applicable)
  - Engineering Community
  - Business Enterprise
  - Society at large
- Acknowledgements (as applicable)
- Questions/Answers Session

* Mid-Term Presentations must devote a greater amount of time on Technical Approach.
SUGGESTED FORMAT FOR END OF SEMESTER REPORT

Cover Letter: Addressed to sponsor and introducing the plan of action, original signature of the team communicator

Cover Page: project title, submitted to, submitted by XYZ Corporation, and date.

Signature page: typewritten names and original signature of each team member.

Executive Summary: Summarize the project emphasizing important accomplishments.

Table of Contents

Goals: Provide the statement of goal or purposes achieved.

Introduction/Background: Introduce the problem, provide background information, and explain the need to solve it.

Desired End Product: Identify the nature and function of the end product desired.

Design Requirements: List detailed design and function requirements and specifications.

Technical Approach: Describe overall approach for the problem. Describe steps used and the outcome. Provide recommendations for future work.

Schedule: Identify duration of each major task using the Gantt chart.

Budget Statement: List items purchased and cost.

Facilities and Resources: Identify/list facilities and resources used.

Team Organization: List team structure and posts taken by each team member. Describe duties of each post taken by a team member (List what changes/additions you would make on the experience gained during this project).

References (Users’ Manuals, detailed specifications, calculations, suppliers etc)

Appendices (as needed)
GRADING RUBRIC FOR FINAL REPORT

The report will be evaluated by the OU mentors. The following are the main elements that will be considered by the evaluator of your final report as they determine your grade.

- **Application of the Principles of Engineering Design** in determining the solution to the problem.
- **Knowledge demonstrated**: Are all elements of the report correct? Does it support the feasibility of the project? Was all necessary information clearly conveyed? Did all members of the group demonstrate a full understanding of the topic? Were proper sources cited to back up what was done?
- **Critical thinking**: Were all elements of the project considered? Were proper tools and methods of analysis used to address the problem? Was the solution arrived at only after careful consideration of alternatives?
- **Sponsor satisfaction**: Was the project completed within the budget given by the sponsor? Were all of their desires and needs addressed? Were all deliverables properly completed and given to the sponsor?
- **Writing**: Did the document follow all stylistic guidelines? Was it thoroughly proofread to avoid typos? Was the grammar consistently correct? Was the tone and style appropriately professional? Was it appropriately succinct when possible, without leaving out important details?
DISPLAY/POSTER FAIR

Poster sessions are commonly used at professional and scientific meetings. They provide an effective way to communicate your results to a large number of people. In contrast, visitors to the Final Design Presentations would normally attend a limited number of presentations. Poster sessions allow greater interaction between teams and visitors, and allow an opportunity to display the prototype designed and/or built. A visitor may spend more time with a particular team, depending upon his/her interest.

The display/poster fair shall be held in the bottom floor of Devon Energy Hall in the last week of classes. Two aspects are involved: a poster to show your work by text/photographs and a physical display of the product (if applicable). Each team shall be provided with one table and two chairs to setup their display/poster. Consider how you will secure the poster to ensure it stays stable throughout the day. Consider the set up time in your planning so that your display/poster is ready for viewing by public at/before specified time. Although we plan to advertise the event, please feel free to invite your family, friends and colleagues to showcase your work.

A panel of judges from outside the University of Oklahoma shall evaluate your display/poster. Our judges are senior engineering personnel from various companies and organizations. We plan to recognize excellence in Design Practicum Projects through awards as explained separately.

Dress business casual. Team members to answer questions from judges or audience must be present at the poster/display booth, but not all team members are required to be present at the booth at any given time. Thus, you should rotate responsibilities to ensure that at least one team member is present at the booth at all times during the poster fair. Good oral communication in explaining your project to judges is extremely important. You are responsible for removing all items from the booth at the end of the fair, and for ensuring that the grounds are left in good condition.

Suggested Guidelines:

- Show the actual product or component that you designed/built. Use video display or computer demonstrations if you are unable to transport your product to the display booth. You must arrange for your own display equipment.
- You will be emailed a Power Point template (with appropriate size) to prepare the poster. Use a large font so the reader can view your poster from some distance.
- Keep the text to the minimum and emphasize the main ideas that you want to convey. The reader can ask you questions if more details are needed.
- Use photographs, figures, and graphs to make your poster visually pleasing. Make effective use of color and contrast.
- You will be provided with additional instructions on deadlines for submitting the poster for printing.
SPECIAL RECOGNITION

We believe that excellence in teamwork is important and must be recognized. Thus, the following awards are presented to the Best Teams after final design presentations:

**Best Presentation Award**: This award recognizes the team with the best Final Presentation. The selection is based on the numerical score from audience using the Presentation Evaluation Form.

**Project Awards**: These awards recognize teams with the best overall effort in different project categories. Awards are determined by panel of industrial judges. Best overall projects for the year are also recognized.
2-PAGE POWERPOINT SUMMARY FORMAT

Prior to the Poster Fair, each team will prepare a 2-page PowerPoint summary of their project. After the team's faculty advisor has reviewed and approved the file, send it by e-mail to Dr. Siddique (zsiddique@ou.edu). Additional instructions will be provided later. Your 2-Page descriptions will be used to produce a summary display for the Poster Fair.

Overall background and style is determined by the team. However, the use of color and pictures is encouraged.

The first page or slide should include at least:
1. The name of the project
2. The objective of the project
3. The names of the team members
4. A team photo
5. The name of the sponsoring agency
6. The name of the sponsor’s liaison
7. The name of the faculty advisor

The second page or slide should include at least:
1. Summary statement(s) addressing how the problem was resolved.
2. More pictures!
PURCHASING PROCEDURE FOR STUDENTS MEMO FROM MELISSA FOSTER

Memo

To: AME Teams
From: Melissa Foster
Financial Associate I
Date: 1/30/2017

AME Team Sponsors,

With the beginning of the school year and the changes in membership and leadership of student organizations at AME, below is a list of helpful purchasing procedures and tips learned from past experience. It will help to make things run smoothly if you can have your teams follow these steps.

AME Purchasing Procedures for Capstone Students

Our preferred method of purchasing is with the AME P-Card. The department has many online accounts set up for material purchases. We also have an Amazon Prime membership. Prior to making any purchases, the AME P-Card form must be completed and approved(signed) by the capstone instructor. This form must include your team number as well as the appropriate account number.
When ready to make your purchase, bring your completed form to the AME office. We would like each team to have a representative who will carry out the purchasing, budgeting, and coordination of this process. Orders need to be entered in the AME office on the computer in office 211. A member of the AME staff (Melissa Foster or Charie Johnson) will then process the order with a University Purchasing Card.

If materials need to be picked up locally, such as from Lowe’s or Home Depot, see Billy or Greg in the AME Machine Shop to see if this is possible. Billy or Greg can also place online orders.

If necessary, you may need to obtain a purchase order (PO). Students will need their capstone instructor's approval, name of their capstone project and the approximate cost of the materials. See Melissa Foster in the AME office (FH 211) for the proper form.

**Purchases using Personal Funds**

On occasion, you may need to make an emergency purchase using personal funds and request reimbursement. Melissa Foster or Charie Johnson in the AME office will process such requests. These requests must be signed/approved by your Capstone instructor prior to submission.

Because of the paper work involved, please minimize reimbursement requests by having one team member purchase items and combine several purchase receipts on a reimbursement request. Please keep in mind it may take a few weeks for the reimbursement to be processed. It is not advisable to turn in all receipts at the end of the semester.

Some stores do not provide itemized receipts (ex.Hobby Lobby). In this case, a handwritten description of the materials purchased will need to be included with the request in order to obtain a reimbursement. Please plan material lists early to reduce the number of emergency trips for materials.

Thank you,

*Melissa Foster*
AME Office
Felgar Hall RM 212
mfoster@ou.edu
325-5012
**Request for Purchase on AME PCard***

*All standard small dollar restrictions apply. American Express is the card*

Date Requested:_____________  Acct.#: _______________
Detail: _______________

Student Name: _______________________________________________________

Email Address:_________________________ Phone:_____________________

Faculty/Staff Request & Approval:_____________________________________

Ordered by:__________________________ Date:_____________________

Vendor: ______________________________________________________________

Phone: ________________________________ (for phone orders)

Web site: _______________________________ (for internet orders)

Shipping details: __Overnight  __Standard Ground  
__Other____________________

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<th>#</th>
<th>How Many</th>
<th>Part/Catalog #</th>
<th>Description</th>
<th>Total Cost</th>
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Total Purchase

Attach list if more items are needed.
Submit to Melissa Foster when completed. 325-5012 or mfoster@ou.edu

**COMPUTERS CANNOT BE ORDERED USING THE P-CARD.**

PO#_______________________________ Paid by PCARD_____________________

PURCHASE CANNOT EXCEED $5,000.00
PEER EVALUATION FORM

Name of the Team Being Evaluated: ____________________________  Date: ________

**Purpose:** OU mentors may solicit peer evaluation. Evaluate each team member including yourself using this form. Submit this form electronically to the mentor after each major step (plan of action/mid-term/final presentations). The mentor will share this input with your team to provide constructive feedback. It is to your advantage to assist your teammates since the team cannot perform unless each member makes it do so. Thus, help your teammates to the best of your ability. If you see a person not doing his/her job or doing it poorly, give him/her some suggestions to look over.

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<tr>
<th>Last Name (in alphabetical order)</th>
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<td>Contribution towards team planning</td>
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<td>Execution of tasks undertaken/assigned</td>
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<td>Understanding of team organization/personal duties</td>
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<td>Communication and timeliness</td>
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<td>Professional and ethical responsibility</td>
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<td>Report writing and record keeping</td>
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<td>Application of knowledge to achieve the design goals</td>
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<td>Initiative and innovation</td>
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<td>Quality of work performed</td>
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<td>Orderliness of work area and/or tasks performed</td>
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<td>What changes are necessary to improve the performance? (use additional space as necessary)</td>
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<td>What changes are desirable to improve the performance? (use additional space as necessary)</td>
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Please write your name on the back of this form if submitting a paper copy.
# FINAL/MID-TERM DESIGN PRESENTATIONS EVALUATION FORM
(SAMPLE)

**Your Name** (required): 
(Circle one) Sponsor/Liaison, AME 4553 Student, Faculty Member, TA, Guest, Other

**Name of Project Evaluated:**

**Advisor of Project** (Circle one): Altan, Siddique, Song, Stalford

**Day Project Presented** (Circle one): April 26, 2011; April 28, 2011

**Time Project Presented** (Circle one): 1:30–2:00; 2:00–2:30, 2:30 – 3:00; 3:00 – 3:30; 3:30-4:00, 4:00-5:00

**Final Design Presentations Evaluation Form**

Note: Please evaluate teams as if they were industry professionals. Provide your written comments to help the team achieve their goal of developing a superior end-product.

<table>
<thead>
<tr>
<th>Rating Scale:</th>
<th>1</th>
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<th>3</th>
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<td><strong>Unacceptable</strong></td>
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<td><strong>Poor</strong></td>
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<td><strong>Acceptable</strong></td>
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<td><strong>Good</strong></td>
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<td><strong>Excellent</strong></td>
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<table>
<thead>
<tr>
<th>Question</th>
<th>Score 1-5</th>
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<tbody>
<tr>
<td>1 Overall, the presentation was well prepared and professionally presented. (consider the quality of visuals, participation of all, length of presentation, oral communication, etc.)</td>
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<tr>
<td>2 The project description and technical approach were clear to the audience. (consider continuity and clarity in describing the technical details)</td>
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<tr>
<td>3 The team applied appropriate techniques, skills, and modern engineering tools in generating concepts.</td>
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<tr>
<td>4 The team applied appropriate techniques, skills, and modern engineering tools in performing analysis and design.</td>
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<tr>
<td>5 The team applied appropriate techniques, skills, and modern engineering tools in producing hardware.</td>
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<tr>
<td>6 The team demonstrated critical thinking skills, initiatives, and innovation. (consider cleverness of solutions, ideas, products, and impact on business/society)</td>
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<tr>
<td>7 The team demonstrated adequate progress within budget limitations. (consider schedule, tasks completed and remaining, budget status)</td>
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<tr>
<td>8 The team demonstrated ability to function as a group. (consider organizational structure, contributions of individuals, multidisciplinary approach used)</td>
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<tr>
<td>9 The presentation stimulated participation by the audience. (consider the question and answer session)</td>
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</tbody>
</table>

**Total Score**

**Comments:** Discuss your overall impression of the presentation, and provide your recommendations on how the team might improve (a) the presentation, and (b) the methodologies used in this project.

---

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POSTER/DISPLAY FAIR – SAMPLE OF JUDGES’ SCORING SHEETS

Name of Judge: __________________________________________________________

Poster/Display Fair Evaluation Form

<table>
<thead>
<tr>
<th>Rating Scale:</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<td>Unacceptable</td>
<td>Poor</td>
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<td>Good</td>
<td>Excellent</td>
<td>These questions are given as guidelines ONLY.</td>
</tr>
</tbody>
</table>

Question 1. Overall, the poster/display was well prepared and professionally displayed. (consider the quality of visuals, oral communication, etc.)

Question 2. The project details and technical approach were clearly presented. (consider continuity and clarity in describing the technical details)

Question 3. The team applied appropriate techniques, skills, and modern engineering tools. (consider concepts generated)

Question 4. The team applied appropriate techniques, skills, and modern engineering tools. (consider analysis and design performed)

Question 5. The team applied appropriate techniques, skills, and modern engineering tools. (consider solutions and deliverables provided to the sponsors or users)

Question 6. The project demonstrated critical thinking skills, initiatives, and innovation. (consider cleverness of solutions, ideas, products, and impact on business/society)

Question 7. The project demonstrated satisfactory accomplishment within budget limitations. (consider schedule, tasks completed and remaining, budget status)

Question 8. The project demonstrated quality in performing tasks. (consider the quality of the design and product)

Question 9. The project demonstrated team efforts and team coordination.

Question 10. The presentation stimulated interest and participation by the audience. (consider the discussion session)