# COURSE ASSESSMENT ON ORAL COMMUNICATION INTENSIVE LABORATORY

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Abstract

The Mechanical Engineering Program at Youngstown State University requires its students to take four physical laboratory courses directly related to mechanical engineering. Fluid Dynamics Laboratory and Thermal Fluid Applications Laboratory are the two laboratory courses that cover the area of fluid thermal sciences. The TFA Laboratory deals with topics in the areas of fundamental and applied thermodynamics, fluid power, basic and advanced heat transfer. The laboratory is equipped with a number of commercial bench-top, wall-mounted, and stand-alone experimental equipment which allows students to conduct a variety of experiments on temperature measurement, calorimetry, heat conduction, forced and free convection, heat exchangers, radiation heat transfer, solar radiation, refrigeration system, internal combustion engines, flue gas analysis, pump operation, and turbo machinery.

In a traditional laboratory setup, students are required to submit a written report on each experiment. However, in this oral communication intensive laboratory, a series of spoken and written reports, along with an expert's review on oral communication, group discussions, impromptu reports, observation and critical reviews, and formal oral presentations, are required to present the findings from several selected experiments. The activities related to oral reports and formal presentations are videotaped for later review by individuals and groups. New instruments of assessment have been developed to measure the outcome of the implementation. The assessment found that students were mostly positive on the experience and felt that they gained a significant degree of confidence in technical presentation, public speaking, and oral communication in general.

## I. Introduction

The Mechanical Engineering Program at Youngstown State University offers MECH 4835L Thermal Fluid Applications Laboratory once a year in the Fall semester to students who are mostly seniors seeking a Bachelor of Engineering degree. The course was created two years ago in Fall 2000 when the calendar of the University changed from a Quarter to Semester system. This laboratory course must be taken concurrently with the companion lecture course, MECH 4835 Thermal Fluid Applications. The companion lecture and laboratory courses are the last of the sequential courses in the area of fluid thermal sciences, which students must take to satisfy the graduation requirements [1]. Therefore, the courses are application oriented, although the course offers several experiments that reinforce students' understanding on fundamentals of

thermodynamics and heat transfer. The course emphasizes design of thermal systems and components and experiments that students create for themselves. The laboratory is equipped with a number of commercial bench-top, wall-mounted, and stand-alone experimental equipment which allows students to conduct a variety of experiments on temperature measurement, calorimetry, heat conduction, forced and free convection, heat exchangers, radiation heat transfer, solar radiation, refrigeration system, internal combustion engines, flue gas analysis, pump operation, and turbo machinery.

At the time of the semester conversion, the University also adopted a policy of implementing a much stronger version of general education requirements, whose merits and effectiveness [2] were debated vigorously by the faculty from all segments of the University during the previous two years [3]. Recognizing the importance of good communication as an essential part of professional development, the new GER required that students take two writing and one oral communication courses, along with other traditional GER courses such as mathematics, natural sciences, literature, humanity, and social science courses. In addition to expanded coursework in the whole area of general education, the GER Program required each academic program to develop upper level intensive courses in several key areas that include critical thinking, writing, oral communication, and GER capstone courses. The Mechanical Engineering Program developed two critical thinking intensive, two writing intensive, two oral communication intensive, and one GER capstone courses. The Thermal Fluid Applications Laboratory was designated as an oral communication intensive course. The rationale was that the laboratory course provides better opportunity and flexibility to incorporate a variety of activities related to the oral communication because of three uninterrupted contact hours per each week. In addition, the task of conducting experiments, analyzing the data, and interpreting the results inherently require good spoken communication. The new course was offered for the first time in Fall 2000, and then subsequently in Fall 2001 and 2002. Each time, the laboratory instruction on experiments and oral communication activities has been slightly modified to improve students' learning opportunity and also reflect content changes that were made in the companion lecture course. As seen from the copy of the course syllabus that is attached in the appendix, 40% of the course grade was based on the performance related to oral communication activities.

## II. Tools for Improving Oral Communication

In order to insure consistent implementation, the GER Committee developed general guidelines for the GER and the GER Intensive courses [4]. According to the guidelines, the oral communication course must help students become more effective communicators in their interpersonal, group, and presentational communications situations. Students will be required to:

1) apply skills for effective listening and interviewing.
2) practice effective conflict management skills when participating in decision-making groups.
3) prepare and deliver a seven to nine minute informative presentation.
4) write assignments that may include several drafts of presentation outlines, analysis paper, and a report based on group meetings.
5) use critical thinking during their communication.

The GER Committee also states that each oral communication intensive course will

1) demonstrate oral communication as an integral part of the course.
2) attempt to integrate goals 2 and 3 in addition to goal 1 whenever possible, as research, preparation, and critical thinking are vital parts of effective oral communication.
3) include instruction on the oral communication process- the sequential activities of planning, communicating, and self evaluation.
4) reinforce appropriate interpersonal, group, and/or presentational competencies introduced in the oral communication course.
5) reflect the strategies for evaluating interpersonal, group, and/or presentational competencies introduced in the oral communication course.
6) allocate at least 30% of the course grade to oral communication assignments.
7) require students to participate in at least 15 minutes of graded oral communication assignments.
8) teach students to use oral communication skills as a way of learning and thinking critically in a discipline.

Therefore, the course syllabus was developed to outline new implementation regarding oral communication activities that include review of oral communication, impromptu oral presentation, oral report, group discussion, critical review, and formal oral presentation of design project. The performance of students in each oral activity was evaluated by the instructor and sometimes students themselves, and the feedback was provided to the student for improvement. Each oral activities is summarized as follows:

1) Review on Oral Communication

A faculty member from the Communication Department is invited to the class in the second week to cover general theory of speech making and suggest students with useful skills for better communication. He explained in detail 10 tips suggested by the Toastmasters [5] for making successful public speaking.

2) Impromptu Oral Presentation

Students were required to make an impromptu oral presentation regarding the process, experimental data, and their observation of an experiment. Most students did very well although some students in the beginning were very reluctant to make a presentation and some needed to understand the contents better. The presentation was evaluated by the instructor.

3) Oral Reports

Students were required to present the proposal for the team design project. Each student made an oral presentation of at least 3 minutes in front of their peers, covering part of their project. The presentation was evaluated by the instructor and students from other groups.

4) Group Discussion

The experiment on internal combustion engine was chosen for a topic for group discussion because of familiarity and popularity of content among engineering students so that all students would participate in this free discussion about the process, equipment, data acquisition and analysis. Several small groups were formed. A brief review was made on the role and effect of a questioner, paraphraser, standard setter, synthesizer, listener, and idea person [6]. It was observed that a leader emerged during the discussion, set the tone

of the discussion, and led the group.

5) Formal Oral Presentation
Students are required to make an oral presentation of their group design project, in addition to a formal written report. The presentation must be at least seven minutes long and use PowerPoint as a presentation tool. The multimedia presentation room with modern facility was reserved for this purpose in the final week of the semester. Students did prepare well for the event and performed like professionals.

6) Critical Review on Speech
After the formal presentation, there was a session for critical reviews. It was found that students are very reluctant to make any comments on peer performance. Therefore, preformatted evaluation sheets were distributed for rating each other's oral performance.

## III. Criteria for Assessment of Oral Communication

The criteria for assessment in this course are based on those defined by the North Central Association of Higher Education [7].

1) Criteria for Assessment
Assessment of oral communication should regard competence in oral communication as a gestalt of several interacting dimensions. They should include an assessment of knowledge, an assessment of skills, and an evaluation of the individual's attitude toward communication. Assessment of oral communication should clearly distinguish speaking and listening from reading and writing. They also should be based, in part, on atomistic/ analytic data collected and on a holistic impression.

2) Criteria for Assessment Instruments
The method of assessment should be consistent with the dimension of oral communication being assessed. Instruments for assessing oral communication should describe degrees of competence and clearly identify the range of responses. Assessment instruments should have an acceptable level of reliability and appropriate validity.

## IV. Assessment Instruments

There are two assessment instruments used in this course to measure the performance of students regarding oral communication activities.

1) Evaluation Form for Oral Presentation
The form was developed largely based on the technical and professional speech performance criteria that deal with audience analysis to select appropriate topics, organization, credibility enhanced by presenting evidences, research and knowledge to gather supporting material, and delivery to include eye contact and effective movement and gestures. The form was used to evaluate students' performance of oral reports, impromptu oral presentation, group discussion, and formal oral presentation.

| Criteria | Weight | Rating | Comments |
|---|---|---|---|
| 1. Knowledge of subject | 25 | | |

| | | | |
|---|---|---|---|
| 2. Organization | 15 | | |
| 3. Research | 15 | | |
| 4. Effective use of time | 15 | | |
| 5. Audience analysis | 10 | | |
| 6. Credibility | 10 | | |
| 7. Delivery | 10 | | |
| Total | 100 | | |

2) Survey on oral communication

A survey form was developed as seen in the appendix, which contains questions about each oral communication activity. The survey was given at the end of the last activity. Seventeen of the total 17 students in two sections of the laboratory course responded.

## V. Results

1) The evaluation of students' performance on oral presentations by peers resulted in high ratings in general, averaging 92.5 for the total score.

2) The results of the students' feedback on oral communication in Fall 2002 are tabulated in the following table.

| Activities | Disagree | Neutral | Agree | Average |
|---|---|---|---|---|
| The following activities helped me improve my oral communication skills | | | | |
| 1. Review on speech making | 4 | 4 | 9 | 2.29 |
| 2. Impromptu speech | 0 | 7 | 10 | 2.59 |
| 3. Oral report on proposal | 2 | 3 | 12 | 2.59 |
| 4. Group discussion | 0 | 9 | 8 | 2.47 |
| 5. Formal presentation | 0 | 5 | 12 | 2.71 |
| 6. Critical review | 0 | 13 | 4 | 2.24 |
| The following activities should be expanded further | | | | |
| 1. Review on speech making | 6 | 9 | 1 | 1.69 |
| 2. Impromptu speech | 5 | 10 | 1 | 1.75 |
| 3. Oral report on proposal | 5 | 11 | 0 | 1.69 |
| 4. Group discussion | 7 | 8 | 1 | 1.63 |
| 5. Formal presentation | 10 | 6 | 0 | 1.38 |
| 6. Critical review | 5 | 11 | 0 | 1.69 |
| | | | | |
| Oral activities replacing written reports is a good idea | 3 | 6 | 7 | 2.25 |
| | | | | |
| The course activities improved my oral communications | 2 | 9 | 6 | 2.24 |
| | | | | |
| | Yes | | No | |
| Did you take COMST 1545, Intro to Speech Comm? | 4 | | 13 | |

Rating: 1 = disagree, 2 = Neutral, 3 = Agree

## VI. Conclusion and Recommendation

As seen in the previous table, most students felt that they had a positive experience in oral

communication activities. Students felt that the formal oral presentation was most useful followed by impromptu speech and oral report on proposal, group discussion, review on public speaking, and critical review. As mentioned before, students were not enthusiastic about the critical review on the performance of their peers. Although they had favorable opinion on these activities, the majority of the students did not want expanded activities related to the oral communication. It might be attributed to additional workload associated with the oral communication. It may be interesting to note that, in the Fall 2000 course evaluation, all 16 students who took the course expressed a hundred percent satisfaction with the course and the instructor. This result was somewhat surprising to the instructor who had never experienced such a high rating before. The oral communication activities and design project might be the reason for that high rating.

It may be concluded that the oral communication intensive course provided students with an opportunity to gain experience in oral communication, especially in speech making, and the activities facilitated the students' learning in the laboratory environment.

The following actions are recommended for further improvement and adjustment.

1) The combination of written reports and oral activities produces good results in laboratory learning. The experiments requiring impromptu oral presentation should be modified to deal with qualitative rather than quantitative analysis. Such experiments may include internal combustion engine, turbo machinery, and refrigeration systems.

2) Instructional review on group discussion and critical review should be arranged and have separate evaluation forms dealing with the level of competency. Criteria and the guidelines for these two oral communication activities must be developed to facilitate students' preparation for the activities.

3) It was learned that many students felt an enormous overload of work due to the oral component and, thus, some experiments should be modified from the traditional setup of requiring only written reports in order to accommodate the oral communication activities.

Bibliography


1) Youngstown State University Undergraduate Bulletin, 2002-2003
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3) Brief History, General Education Program, Youngstown State University http://www.ysu.edu/ger.htm
4) General Education Goals http://www.ysu.edu/ger/genedg.html
5) Tips for Public Speaking, Toastmasters International http://www.toastmasters.org/tips.htm
6) Irene W. D. Hecht, Roles in a Group, September 2002
7) Rebecca B. Rubin, Assessing Classroom Oral Presentations, YSU Workshop, April 2001

HYUN W. KIM
Hyun W. Kim is a Professor of Mechanical Engineering and Chair of the Department of Mechanical and Industrial Engineering at Youngstown State University. He has been teaching and developing the Thermal Fluid Applications course and the companion laboratory course for the past few years. He is a registered Professional Engineer in Ohio and is currently conducting applied research in hydraulics and micro gas turbines. He helps the local industry and engineers with his expertise in heat transfer and thermal sciences. Dr. Kim received a B.S.E. degree from Seoul National University, a M.S.E. from the University of Michigan, and a Ph.D. from the University of Toledo.

## Appendix

1. Course Syllabus, MECH 4835L Thermal Fluid Application Laboratory
2. Outcome Assessment for Individual Course, MECH 4835L
3. Survey on Oral Communications

**Appendix 1**
**Course Syllabus**

**MECH 4835L Thermal Fluid Applications Laboratory -- 1 Semester Hour Fall 2002**

**Prerequisites:** MECH 3720, MECH 3725, taken concurrently with MECH 4835
**Classroom:** ESB 1230 **Class Meets:** W 1400 - 1650 (for 5414) or Th 1400 – 1650 (for 5415)
**Instructor:** H. W. Kim, Ph.D., P.E. **Home Phone:**
**Office:** ESB 2515 **E-mail:** *hwkim@ysu.edu* **Office Phone:** 941-3015
**Office Hours:** M T W Th 11:00 - 12:00, W 1:00 - 2:00
**Text:** Design of Thermal Systems, 3rd Ed., W. F. Stoecker, McGraw-Hill, 1989
**Reference:** Engineering Experimentation, Martin Ray, McGraw Hill, 1988
Heat Transfer, Yunus Cengel, WCB McGraw-Hill, 1998
Introduction to Fluid Mechanics, Fox and McDonald, Wiley
Thermodynamics, 3rd Ed., Cengel and Boles, WCB McGraw-Hill, 1998
Probability & Statistics Outline, Dept of Mechanical Engineering, YSU, 1995
**Supplemental Materials:** one 3.5" - 1.44 Mb diskette, Calculator, A three-ring Binder
**Lab Supplies:** None

**Objectives of Course:**

To provide mechanical engineering students with a hands-on experience in conducting and/or designing experiments on thermodynamic properties, heat transfer, heat exchangers, power and refrigeration cycles, head loss in piping systems, prime movers, combustion and energy conversion processes, and other selected thermal-fluid devices. Also to provide the students with an opportunity to improve oral communication skills. On successful completion of this course, students are expected to

1) apply the principles of thermodynamics to analyze sample coals for thermodynamic properties and heating values by proximate and calorimetric analyses
2) utilize a variety of temperature measuring devices and instruments to obtain temperatures, and be able to interpret their accuracy
**3)** understand the principles of thermoelectricity, thermocouples, and thermopiles
**4)** analyze multi-bar 1-D heat conduction by thermal resistance method
**5)** understand clearly the concepts of temperature gradient and contact resistance
**6)** verify the Stephan-Boltzmann's law and net radiation exchange between surfaces
**7)** analyze the performance of double pipe heat exchangers
**8)** analyze the performance of internal combustion engines
**9)** analyze the performance of gas turbines
**10)** analyze the performance of refrigeration systems
11) be capable of applying the principles of thermodynamics, fluid dynamics, and heat transfer
**12)** to design and analyze their own experiments
13) utilize computer software for analysis and design of thermal fluid systems or components
**14)** effectively present their work in written and oral form of communications.

**Topics Covered:**

| Week | Topic (3 contact hours/week) | Report Type/Due |
|---|---|---|
| 1 | Lab orientation | |
| 2 | Exp. 1: Proximate analysis and calorimetry | Written individual / Sep 11/12 |
| 3 | Exp. 2: Temperature measurement | Written group / Sep. 18/19 |
| 4 | Oral and written communication review | Oral discussion / Sept. 18/19 |
| 5 | Exp. 3: Conduction heat transfer | Written individual / Oct. 2/3 |
| 6 | Exp. 4: Radiation heat transfer | Written group/ Oct. 9/10 |
| 7 | Proposal for design project | Oral pres. & review / Oct 16/17 |
| 8 | Exp. 5: Heat exchangers | Written individual/ Oct.23/ 24 |
| 9 | Exp. 6: Refrigeration system | Written group / Oct. 30/31 |
| 10 | Exp. 7: Gas turbine | Written group / Nov. 6/7 |
| 11 | Exp. 8: Design project | Written group / Nov. 20/21 |
| 12 | Exp. 9: Internal combustion engine | Oral impromptu reptor/Nov13/14 |
| 13 | Exp.10: Pump operations | Oral discussion / Nov. 20/21 |
| 14. | No Lab | |
| 15. | Oral presentation for Design Project<br>Course Review | Oral pres.& review/Dec 4/5 |

**Course Contribution to meeting the Professional Components:**

This senior-level laboratory course is part of the required minimum of 1.5 years of engineering topics, and contributes 1 semester hour of engineering sciences and engineering design to mechanical engineering. This course emphasizes utilization of simple devices to confirm and verify a variety of thermal fluid principles and physical laws. The hands-on experience will facilitate students' understanding on abstract concepts and strengthen the capability of these students in applying the principles to problem solving or to real engineering processes in analyzing and designing a variety of thermal-fluid devices, machinery, and systems. It is a companion laboratory course complementing MECH 4835, Thermal Fluid Applications. It requires prior knowledge in thermodynamics, fluid mechanics, and heat transfer.

**Course Relationship to Program Objectives:**

This course is one of the two oral communication intensive courses that the Mechanical Engineering designates to satisfy the University General Education Requirement. Students are expected to develop and improve their oral communication through a variety of activities that include review of speech making, impromptu speech, oral report, group discussion, and formal oral presentation. In addition, it is anticipated that each student completing this course will have developed the knowledge, skills, and capability necessary to partially satisfy 5 of the 7 program outcomes defined in the program educational objectives. They are outcomes 1, 2, 3, 4, and 6. The goals of this course are to strengthen the capability of students in formulating experimental models, finding proper procedure of gathering experimental data, analyzing and disseminating the data by utilizing analytical skills and modern computing tools, interpreting the results, and designing an experiment for thermal fluid systems or components from conceptualization to conclusion. Added benefits acquired in the process are improved critical thinking ability, developing written and oral communication skills, and working with other individuals for team

projects, so that each student attains these essential professional skills to a level acceptable for normal engineering practices.

**Evaluation**

| | | Scale | |
|---|---|---|---|
| Written Reports | 60% | A -- | 90 - 100 |
| Group (C.T., Res., Comm., Teamwork) | 5 x 6 = 30% | B -- | 80 - 89 |
| Individual (CT, Res., Comm.) | 3 x 10 = 30% | C -- | 70 - 79 |
| | | D -- | 60 - 69 |
| Oral Activities | 40% | F -- | below 60 |
| Pres. & Review (C.T., Res., Design, Comm.) | 2 x 10 = 20% | | |
| Impromptu Report (Comm., C.T.) | 1 x 10 = 10% | | |
| Group Discussion (Comm., C. T., T. W.) | 2 x 5 = 10% | | |

**Course Policies**

**Attendance:** Required.

**Class Participation:** Absolutely necessary.

**Missed Exams/Assignments:** No make-up experiment will be arranged.
No late reports will be accepted.

**Lab Safety:** Use eye and ear protection when needed. You must take every precaution for your safety and that of your fellow students.

**Academic Honesty:** Zero points will be given on the exams or assignments if students participate in acts of academic dishonesty. See p.36 of the Undergraduate Bulletin.

**Grade of Incomplete:** No "I" grade will be given unless an official condition is met.

**Support Services:** Computing facility in ESB 2380. See the College computing coordinator or student monitor for further information.

## About Lab Preparation

Laboratory problems are generally open ended by nature. There are discoveries and observations to make. You are expected to apply concepts learned from a variety of engineering courses to the experiment being conducted. The knowledge confirmed from the laboratory must be integrated with information from other classes to gain maximum benefit from the activities. Preparation for experiments is of essential importance for a successful laboratory since time is limited. You should read the laboratory handouts and introductory reference material, if required, carefully and come prepared with a "game-plan" to complete the assigned work. This might include a procedural outline and sample data sheets ready to fill out. In addition, this laboratory will provide you with an opportunity to engage in designing and conducting your own experiment. Use your knowledge and engineering judgment with some imagination in cooperative group efforts to create a new experiment for a special project.

## About Written Laboratory Report

An experiment is supposed to be duplicable if the same procedure is followed, although not all experiments yield the exact same results. Therefore, good documentation is absolutely necessary. For formal reports, document everything that you do and everything you learn. The grading of these formal reports will be based on a systematic presentation of the problem definition, procedure, pertinent data, analysis of data, final results, and your comments or group discussions and observations. The analysis may include diagrams, assumptions, and the applications of fundamental principles. Follow the "Laboratory Report Writing" guidelines. The formal report must be typed on a word processor. Microsoft Word is preferred along with Excel. Computers and the software are available in the Engineering Computer Rooms. Informal reports emphasize the results and require a less stringent format and neatness. They can be hand-written in pencil. Written reports are due one week from the date that the experiment was performed. All reports must contain the data sheet(s) with the instructor's initials to receive credit. Since the experiment requires a group effort and the raw data should be identical for every report filed by group, it is time consuming and repetitious for every person in the group to write a complete individual report each time. Therefore, group reports are required for a majority of experiments except three experiments.

## About Oral Communication Activities

Oral communication is one of the very important areas where students must make significant achievements through this course. There will be a review session for oral communication, two presentations for your special projects and reviews on the presentations, two group discussions, and an oral impromptu report related to experimental activities. Each group must make two major presentations (30 – 40 minutes per each presentation) with all members of the group sharing approximately an equal amount of presentation time.

## About Post Lab

At the completion of each lab, all equipment must be cleaned and returned to its storage place. The responsibility of the task will be a group effort. Consequently, as a motivational tool, 10% will be deducted from the report(s) of the group if the lab is not cleaned after use.

**Appendix 2**

Outcome Assessment for Individual Course

**Course No. & Title: MECH 4835L Thermal Fluid Applications Laboratory**

**Term:** Fall 2002 **Instructor:** H. W. Kim

**Course Objectives:** To provide mechanical engineering students with a hands-on experience in conducting experiments on thermodynamic properties, heat transfer, power and refrigeration cycles, combustion and energy conversion processes, heat exchangers and other heating and cooling devices, piping systems with prime movers, and other selected thermal-fluid devices. On successful completion of this course, students are expected to

1. apply the principles of thermodynamics to analyze sample coals for thermodynamic properties and heating values by proximate and calorimetric analyses
2. Utilize a variety of temperature measuring devices and instruments to obtain temperatures, and be able to interpret their accuracy
3. understand the principles of thermoelectricity, thermocouples, and thermopiles
4. analyze multi-bar 1-D heat conduction by thermal resistance method
5. understand clearly the concepts of temperature gradient and contact resistance
6. verify the Stephan-Boltzmann's law and net radiation exchange between surfaces
7. analyze the performance of double pipe heat exchangers
8. analyze the performance of internal combustion engines
9. analyze the performance of gas turbines
10. analyze the performance of refrigeration systems
11. be capable of applying the principles of thermodynamics, fluid dynamics, and heat transfer to design and analyze their own experiments
12. utilize computer software for analysis and design of systems or components
13. effectively present their work in written and oral form of communications.

**Assessment methods and tools used in this course:**

1. Lab participation
2. Lab written reports
3. Oral presentations and activties
4. Project management and report
5. Survey on oral communication

**Were the course objectives met? Answer this by indicating the percentage of the students who achieved the course objective?**

| Objective | Assessment tools | Less than 50% | At least 65% | At least 80% | More than 80% |
|---|---|---|---|---|---|
| 1 | 1, 2 | | | X | |
| 2 | 1, 2 | | | | X |
| 3 | 1, 2 | | | | X |
| 4 | 1, 2 | | | | X |
| 5 | 1, 2 | | X | | |
| 6 | 1, 2 | | | X | |

| | | | | | |
|---|---|---|---|---|---|
| 7 | 1, 2, 3 | | | X | |
| 8 | 1, 2, 3 | | | | X |
| 9 | 1, 2 | | | X | |
| 10 | 1, 2, 3 | | | X | |
| 11 | 1, 2, 3, 4, 5 | | | X | |
| 12 | 1, 2, 3, 4 | | | | X |
| 13 | 1, 2, 3, 4, 5 | | | | X |

**Program outcomes measured through the assessment tools:**

1. Program outcome 1: successful mechanical engineer
2. Program outcome 2: formulate and solve engineering problems
3. Program outcome 3: modern tools and skills
4. Program outcome 5: design mechanical engineering systems or components
5. Program outcome 6: communicate and function well in teams

**How well were the Program outcomes met? Answer this by indicating the percentage of the students who achieved the Program outcomes?**

| Program outcome | Assessment tools | At least 50% | At least 65% | At least 80% | More than 80% |
|---|---|---|---|---|---|
| 1 | 1, 2, 3, 4, 5 | | | | X |
| 2 | 2, 3, 4, 5 | | | X | |
| 3 | 2, 3, 4 | | | | X |
| 5 | 1, 3, 4 | | | X | |
| 6 | 1, 2, 3, 4, 5 | | | | X |

**What did you do to correct the deficiencies revealed above?**

1 I surveyed the students' opinion on their learning at several different stages of this semester and found that the students need improvements in understanding fundamentals of heat transfer.

1. I made an attempt to follow closely to assess the students' progress. I have improved the process by grading students' reports and revisited the topics. When I found a significant number of students made conceptual or fundamental mistakes, the students were required to resubmit the reports with necessary corrections.
2. I promoted an inquisitive atmosphere for teaching and learning by setting up group discussions and encouraging students' participation in open discussions.
3. I surveyed the students' opinion on their improvement in oral communication.

**What would you change in the future to improve students' performance in your course?**

1. I will allocate additional sessions for reinvestigating and analyzing experimental results for experiments such as the contact resistance, heat exchangers, and design projects.
2. In order to insure more accurate measurement, an extra session examining the measurement systems, measurement techniques, statistical and probability analysis will be added.

3. After each oral communication activity, the students' self-evaluation will be incorporated. The results of the evaluation will be analyzed to find the reinforcement of such activities.

**Appendix 3**
**SURVEY ON ORAL COMMUNICATION**

**MECH 4835L Thermal Fluid Applications Laboratory** **Fall 2002**

MECH 4835L Thermal Fluid Applications Laboratory is one of the two oral communication intensive courses that the Mechanical Engineering Program designates to satisfy the University General Education Requirement. One of the course goals is to strengthen the capability of students in developing written and oral communication skills. In order to achieve this goal and improve students' oral communication skills, a variety of activities are incorporated in this course, which include review of speech making, impromptu speech, oral report, group discussion, critical review, and formal oral presentation.

A short survey form is developed to gather your opinion on these activities in an attempt to improve the process further. Please answer the following questions carefully by circling a number for each question with 1 for disagree, 2 for neutral, and 3 for agree.

| | **Rating** | | |
|---|---|---|---|
| The following activities were interesting to me and helped me improve my oral communication skills: | | | |
| 1) The review of speech making by Dr. Lalumia | 1 | 2 | 3 |
| 2) The impromptu speech session | 1 | 2 | 3 |
| 3) The oral report on the project proposal | 1 | 2 | 3 |
| 4) The group discussion on the refrigeration experiment | 1 | 2 | 3 |
| 5) The formal presentation | 1 | 2 | 3 |
| 6) The critical review | 1 | 2 | 3 |
| I did not have sufficient exposure to the following activities and they should be expanded. | | | |
| 1) The review of speech making | 1 | 2 | 3 |
| 2) The impromptu speech session | 1 | 2 | 3 |
| 3) The oral report on the project proposal | 1 | 2 | 3 |
| 4) The group discussion on an experiment | 1 | 2 | 3 |
| 5) The formal presentation | 1 | 2 | 3 |
| 6) The critical review | 1 | 2 | 3 |
| The oral communication activities replacing the written report requirement was a good idea. | 1 | 2 | 3 |
| The course activities, in general, helped me improve my oral communication skills. | 1 | 2 | 3 |
| Did you take COMST 1545 or an equivalent speech course? | Yes | or | No |

Please list any suggestions that you would like to make for the improvement of oral communication in this course. If you need more space, please write on the back of this sheet. Thanks!