Program Self-Study Report for:

Mechanical Engineering

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New Mexico State University
College of Engineering

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Self-Study Report

BACKGROUND INFORMATION

ABET 2006 SELF-STUDY PART A

The Mechanical Engineering (ME) Department at New Mexico State University has a long tradition of educating students to be competent and productive engineers to fill positions within the state and beyond. Accredited by ABET since 1938, the ME Department's program prepares graduates to apply engineering science, mathematics, computational methods, modern experimental methods, and effective communication skills to problems of interest in industry and government or to scholarly topics.

The ABET program review conducted in 2000 resulted in a six year accreditation, with no identified deficiencies, weaknesses, or concerns. The 2000 NMSU ME self-study document presented a plan for defining and assessing program outcomes. The program outcomes, the metrics to be used to evaluate achievement of these outcomes, and the process to be used for outcome assessment were stated. During the period 2001 – 2005, data were gathered in accordance with the stated assessment tools. However, the systematic analysis of these data in a formally defined outcomes and assessment process, as well as the use of such analyses to determine and implement needed program improvements, was not done during this period. There were, nonetheless, numerous improvements made to the academic program by individual faculty and through recommendations of the undergraduate committee and others. In October 2005 a departmental "Outcomes and Assessment Committee" was formed. This committee has completed a significant amount of work, and NMSU ME now has in place a functioning, systematic assessment process, as documented in Chapter 4 of this report.

The 2000 self-study made note of a period of leadership transition that seemed to be resolving. A new university president took over in Fall 2000, and the interim dean of Engineering became permanent in 1999. However, those positions and the position of ME department head have all again been in transition during the period since 2000.

Dr. Michael Martin became NMSU president in 2004, and Steven Castillo took over as dean of the College of Engineering in 2004 after two years of changing interim leadership. The position of department head became vacant in summer 2003 but recruitment did not begin until the new Engineering dean took over. Dr. Thomas Burton assumed the position of ME department head in June 2005.

Lack of leadership in these key positions, while not an absolving excuse, was a detriment to fully developing the foundations laid by the 2000 plan. We have now made significant progress in implementing the ABET 2000 accreditation criteria.

As we began to organize and examine the data collected, it was quickly obvious to the Outcomes and Assessment Committee that the assessment tools defined in 2000 were not providing enough pertinent data. We have now refined and implemented the tools.

The 2000 plan linked program outcomes to specific required courses without defining how achievement would be demonstrated. Our syllabi now reflect links with outcomes, and are accompanied by outcome flow charts that define the specific course objectives so linked, measures to demonstrate achievement, assessment goals, evaluation, and improvements to be implemented.

More important, the process has invigorated the self-reflection that is integral to continuous quality improvement, and the department faculty have become actively involved in the process of program evaluation and assessment.

A.1 Degree Titles

The ME Department awards a Bachelor of Science in Mechanical Engineering degree upon completion of 129 credit hours encompassing required general education, basic science, and engineering courses supplemented by electives in these areas. In addition, a student must maintain a minimum grade of C in ME courses for degree eligibility.

A.2 Program Modes

The program mode is day with co-op option. Most of the courses for the Mechanical Engineering degree program are offered during daytime hours, Monday through Friday, and are intended primarily for full-time or nearly full-time students.

A small number of students complete our program in four years. For the majority, the average time to graduation is approximately 5.5 years. These times are typical for undergraduate engineering programs at other universities.

The primary reasons for longer times to graduation are the following:

- **A need for coursework preparatory to pursuing engineering studies.**A significant number of our first-time freshmen are not ready to take their first calculus course when they arrive at NMSU. For example, of the 82 freshmen enrolled at this time for Fall 2006, only 37% are qualified for Math 191 (Calculus I). Because mathematics courses are direct or indirect prerequisites to nearly all engineering courses, these students are inevitably delayed. Many incoming students are also not ready to begin Freshman Composition.

- **The need to work.** Approximately half of our students have jobs while attending school. Our average upper division student works 10-20 hours per week during the school year. A majority of our students have part-time jobs or internships in engineering related firms, which helps them better understand the practical application of their classroom studies. This experience often offsets the disadvantages of a delayed graduation time.

- **The rigor of our engineering curriculum**. Even students who are fully prepared and do not work during the school year find it difficult to complete our engineering curriculum in four years. To do so would require taking an average of 16-17 units of coursework per semester, but our average upper division student takes 12-15 units of coursework per semester.

- **Co-op Education.** After two semesters of satisfactory academic work (2.5 GPA), an engineering student may go on a work phase with one of the many companies or governmental agencies with which the university has co-op agreements. ME students are encouraged to avail themselves of this opportunity to enhance their college education and prepare themselves for the world of work. A co-op student can be on work phase for 4-7 months while employed in a career-related experience. Student status is maintained during the work phase.

A.3 Actions to Correct Previous Shortcomings

No program deficiencies, weaknesses, or concerns were identified by the EAC during the previous (2000) evaluation.

Accreditation Summary

The Department of Mechanical Engineering has gathered the appropriate material required for the ABET 2006 visit in compliance with the information contained in the ABET publication, “Criteria for Accrediting Engineering Programs,” that is effective during the 2006-2007 accreditation cycle. The ME faculty has taken part in gathering materials for the

Self-Study report. They periodically collected sample homework assignments, tests, and other pertinent materials. Faculty also took part in preparing course descriptions, course assessment plans, resumes, and laboratory equipment lists.

A.4 Contact Information

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CRITERION 1: STUDENTS

ABET 2006 SELF-STUDY PART B

New Mexico State University, established in 1888 and known from 1890-1960 as the New Mexico College of Agriculture and Mechanic Arts, is a comprehensive institution dedicated to teaching, research, and service at the graduate and undergraduate level. It is the only land-grant institution that is also classified as Hispanic-serving by the federal government and ranked by the Carnegie Foundation in the top research category, Research-Extensive. The university is also home to New Mexico's Space Grant Program.

The Mechanical Engineering (ME) Department has been continuously accredited by ABET since 1938. Graduates of the program enjoy opportunities in a wide range of professional engineering careers, and are also prepared for continuing their education at the graduate school level. Employment opportunities in New Mexico and nationwide are extensive. These include energy and utility, manufacturing, automotive, aerospace, defense and space, research and development, and many others.

The student body of the ME Department mirrors that of the university: the majority of students are residents of New Mexico; they are of varying backgrounds and abilities. The state of New Mexico offers good financial support to encourage its high school graduates to continue their education. In accordance with the land-grant mission, the ME Department provides these students the opportunity to achieve success in the mechanical engineering profession.

Enrollment in Mechanical Engineering has been relatively stable over the past 20 years. During this period, ME enrollment has consistently been approximately 20% of the total College of Engineering enrollment. Table B1.1 shows ME enrollment by class for the period 2000 – 2005.

Table B1.1 Mechanical Engineering Undergraduate Enrollment 2000 - 2005

Fall Semester	Freshman	Sophomore	Junior	Senior	New Transfer	Total
2000	88	77	46	98	3	**312**
2001	116	56	55	79	6	**312**
2002	125	72	47	83	1	**328**
2003	124	93	57	73	1	**348**
2004	106	101	64	83	3	**357**
2005	102	82	69	87	8	**348**

Source: NMSU Institutional Research

Most of the students in the program are full-time. The breakdown of full vs. part-time is provided in Table B1.2

Table B1.2. Status of Students in Mechanical Engineering

Fall Semester	Undergraduate			Graduate			Total		
	Full-time	Part-time	% Part-time	Full-time	Part-time	% Part-time	Full-time	Part-time	% Part-time
1999	340	15	4.2%	16	14	46.7%	356	29	7.5%
2000	287	25	8.0%	23	10	30.3%	310	35	10.1%
2001	295	17	5.4%	22	11	33.3%	317	28	8.1%
2002	309	19	5.8%	28	7	20.0%	337	26	7.2%
2003	327	21	6.0%	29	12	29.3%	356	33	8.5%
2004	336	21	5.9%	22	15	40.5%	358	36	9.1%
2005	320	28	8.0%	22	14	38.9%	342	42	10.9%

Source: NMSU Institutional Research

Retention rates for our students are summarized in Table B1.3. A significant number of ME students are in the co-op program, which is open to sophomores, juniors and seniors. Many ME students also work part-time both at NMSU and in the community. Both the co-op program and part-time employment contribute to the longer completion time in the program. A typical student takes 5.5 years to graduate. However, the work experience (co-op and otherwise) is a valuable component of the students' education. In many cases, companies hire graduates because of their participation in the co-op program.

Table B1.3. Mechanical Engineering Retention Rates

Cohort	Head Count	ACT Avg	1yr Ret Rate		2yr Ret Rate	3yr Ret Rate	4yr Grad Rate	4yr Cont Rate	5yr Grad Rate	5yr Cont Rate	6yr Grad Rate	6yr Cont Rate
1999	75	22.3	73.3%		62.7%	53.3%	8.0%	52.0%	30.7%	26.7%	42.7%	9.3%
2000	59	23.3	64.4%		62.7%	59.3%	8.5%	49.2%	32.2%	23.7%		
2001	89	21.9	78.7%		66.3%	55.1%	7.9%	46.1%				
2002	90	22.8	71.1%		60.0%	56.7%						
2003	83	21.7	83.1%		74.7%							
2004	76	23.2	67.1%									

Source: NMSU Institutional Research

B1.1 a Evaluation of Students

Students are evaluated, advised and monitored in a manner consistent with program objectives and as required by Criterion 1.

Instruction is performed by full-time faculty or qualified part-time professionals. Graduate Teaching Assistants participate in instruction by assisting faculty primarily in instruction of the laboratory courses. Instruction is conducted according to the departmental syllabi.

Evaluation of students takes several forms:

- Evaluation at the time of admission
- Evaluation in courses
- Evaluation of progress towards the BSME

Evaluation at the time of admission

The admissions office is responsible for admitting students into the university and determining their level of preparation to enter the university. Students are evaluated for placement in freshman courses in Mathematics, English and Chemistry. Many students must take remedial Mathematics and English courses before they can start in ME required courses. Students receive advising from the admissions office regarding when and where they can register for remedial courses. They can make up the deficiencies at a number of universities and community colleges before attending NMSU. Table B1.4 shows the ACT scores for incoming freshmen.

Table B1.4 ME First-time Freshman Cohorts
ACT Composite and Mathematics Score

Fall Semester	N	Composite ACT Score		Mathematics ACT Score	
		Mean	Std. Dev.	Mean	Std. Dev.
1999	76	22.3	4.02	23.7	4.09
2000	58	23.3	4.03	24.1	4.55
2001	89	21.9	3.49	23.0	4.07
2002	91	22.8	3.62	23.4	4.04
2003	83	21.7	3.71	22.8	4.54
2004	75	23.2	3.98	23.5	4.83
2005	76	23.8	4.41	24.6	4.80

Source: NMSU Institutional Research

Evaluation in courses

Evaluation of students in courses is the responsibility of the faculty. Faculty may vary the number and nature of evaluation tools (e.g., exams, quizzes, homework, projects, design projects, computer assignments, student presentations, etc.) but they are expected to conduct adequate evaluation of their students including final examinations. Specific processes are in place for instructors to track students' progress on specific content related to program outcomes (fully described in Chapter 4).

Evaluation in courses consists of homework, projects, quizzes, two or more mid-semester examinations, and a final examination. Student evaluation in each course is based on the total performance of the student in all homework, projects, and examinations. Students receive a grade for the course in the A-F range (A, B, C, D, or F). Only a grade of C or better constitutes satisfactory performance in mechanical engineering or prerequisite courses. The Department Head receives a report at the beginning of each semester regarding grade distributions in each course during the prior semester. The Department Head assures that there is consistency across the curriculum and takes corrective action in cases where anomalies are observed.

In the laboratory courses , which are distributed throughout the curriculum, students regularly submit individual and group reports. The reports are graded for technical content, grammar, style, and English usage. The laboratory courses contribute to the students' technical communications skills. Students are also expected to make oral presentations of their group projects for both design and laboratory courses.

Evaluation of progress in the curriculum

Evaluation of progress in the curriculum is based on student's GPA and satisfactory performance (grade of C or better) in all prerequisite courses and all Mechanical Engineering topics. Students who do not meet the requirements are required to retake courses where their performance was not satisfactory. Students must apply for a final degree check leading to graduation no later than their last semester of studies. A degree check is an audit of all of the courses taken by the student to assure that they have met all program requirements.

B1.1b Advising

A team of departmental faculty is given the primary responsibility for academic advising. This team is headed by the Associate Department Head who takes the lead during organized activities such as summer orientations and pre-registration. All members of the team are available for student advising informally throughout the year. Figure B1.1 shows that the students are generally satisfied with the quality of advising they receive, especially in the area of academic planning.

Each student's file is kept within the department. A Mechanical Engineering Program flow chart (see Figure B1.2) is kept on file for each student and is updated prior to each advising/pre-registration period. As transcripts from the previous semester become available, each course that has been satisfactorily completed is highlighted on the flow chart. Courses being taken in the current semester are partially highlighted. This gives both the student and the advisors a picture of the student's progress toward graduation.

Student files are reviewed by the Associate Department Head prior to advisement time in the semester when the student will complete 90 to 100 credits toward the degree (a "records check"). Specific course requirements for graduation in two semesters are noted for advising purposes. All students are personally advised by the Associate Department Head during the pre-registration period prior to their expected final semester.

The policy of the department is to discourage substitution for required courses. In unusual cases, an exception may be made with the approval of the Department Head for departmentally required courses, and with the approval of the Associate Dean for courses required by the College of Engineering or the University.

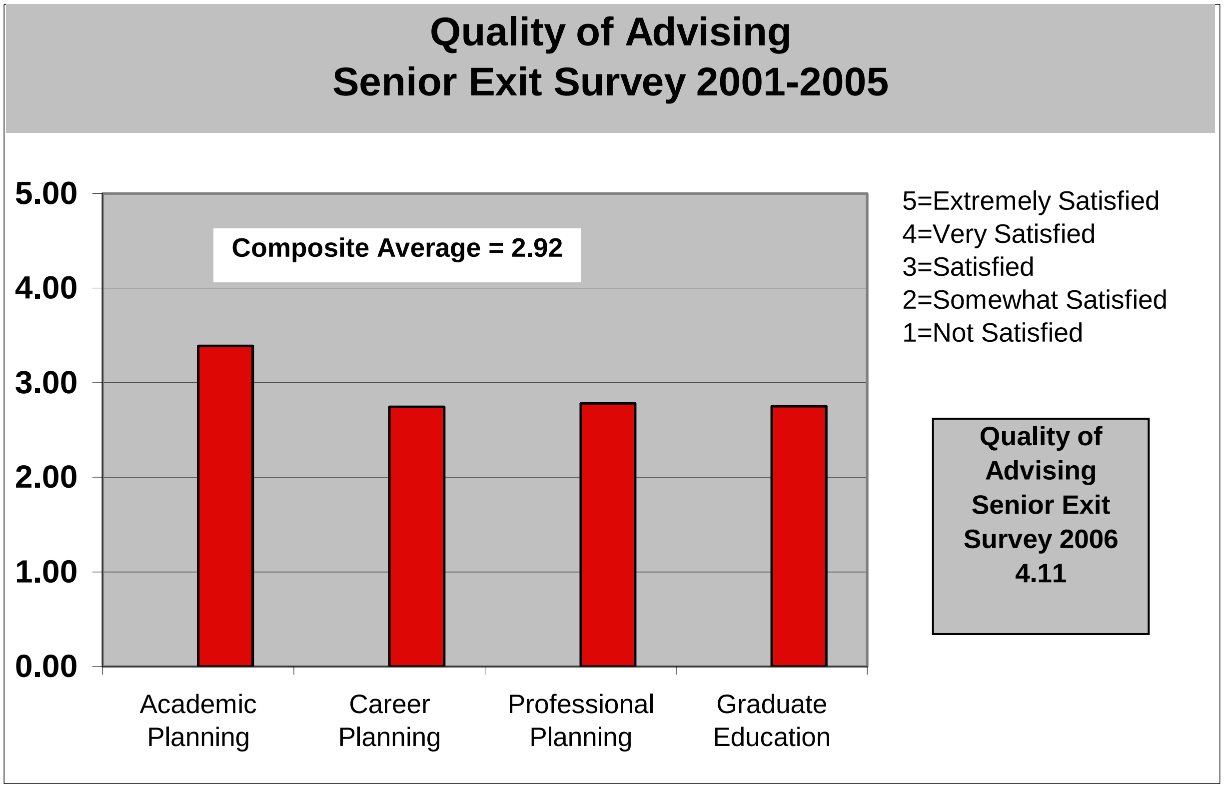

Figure B1.1 Assessment of Quality of Advising

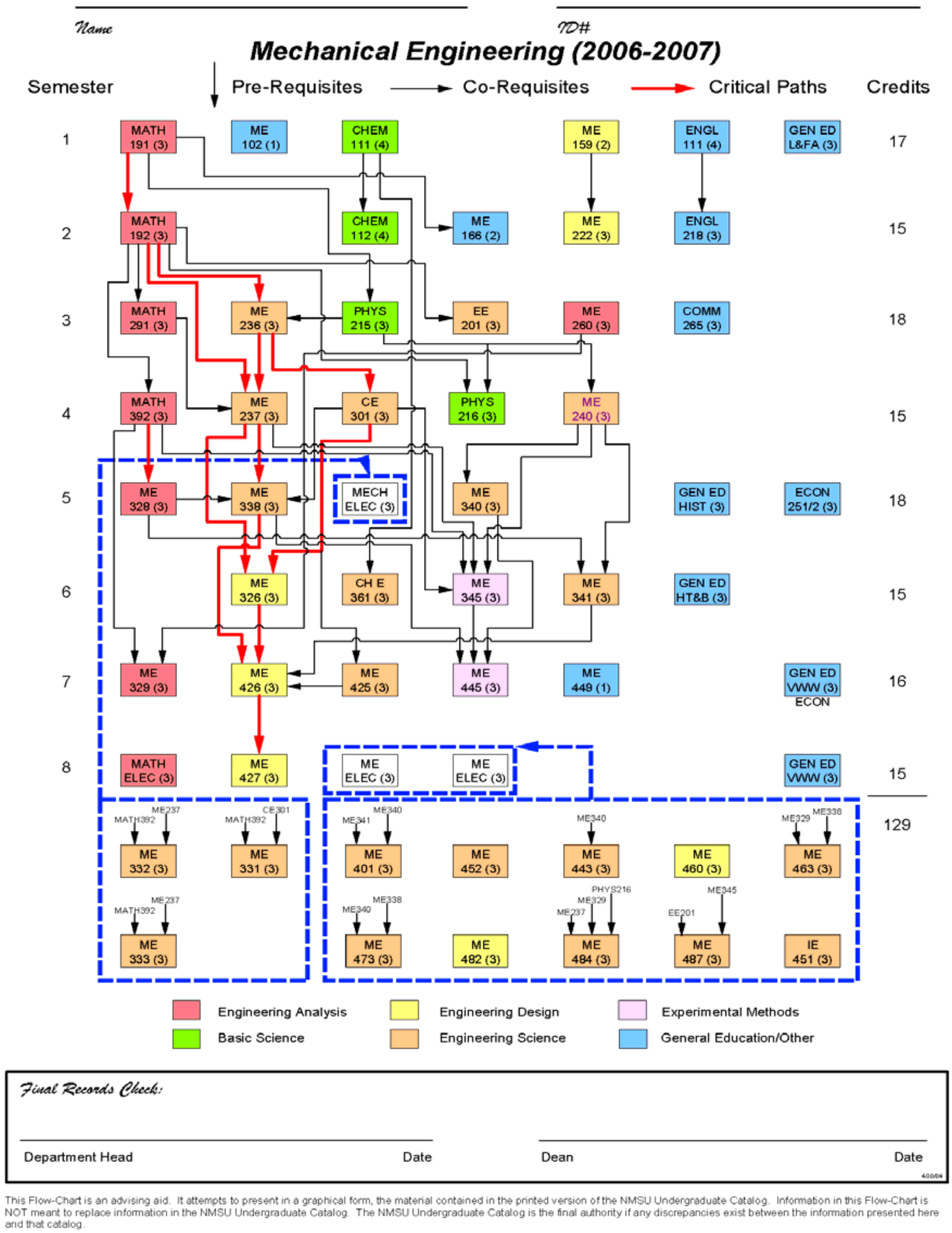

Figure B1.2 Advising Flow Chart

B1.1c Monitoring Student progress toward degree completion

Progress of students towards achievement of program outcomes and degree requirements is monitored through a number of ongoing mechanisms. As mentioned in the previous section, the ME flow chart for each student is updated prior to the pre-registration period for each semester. Also, at the beginning of each semester, a list of students registering for any given course for the third or more time is supplied to the Associate Department Head. The situation for each student is reviewed, and many of the students are called in for consultation. This provides an opportunity to understand special circumstances for these students, and to suggest alternative strategies for them to handle the curriculum.

Process to Ensure All Students Meet All Program Requirements

The Associate Department Head and the Associate Dean confirm that all degree requirements have been met and all ABET criteria are satisfied. A final records check is done at both the department and college level in the semester in which the student applies for graduation. When both have verified that the student has met all program requirements, the student is cleared for graduation.

Each student has a personal version of the flow chart shown in Figure B1.2. The progress of the students is tracked using the flow chart. The final degree check is based on student transcripts provided by the registrar's office.

B1.2 Policies for Acceptance of Transfer Students and Enforcement Methodology

Policies for acceptance of transfer students are established by the admissions office, the Dean of Engineering, and the Department Head.

Admission of domestic students transferring into NMSU is handled by the admissions office. If the students meet transfer qualifications, they are admitted without departmental review of the application. Transfer students from other colleges or universities may be accepted for undergraduate studies if they have at least a C (2.0) cumulative grade-point average and are eligible to return to the college or university last attended. Transfer students who would not have met admission requirements as first-time freshmen must have completed at least 30 graded credits to be considered for admission.

Admission of international transfer students is routed through the department. Applications are sent to the Department by the Center for International Programs for review and decision for admission.

B1.3 Process for Validation of Transfer Credits

Transfer credit is established by the registrar's office. Credit is accepted only from institutions which are listed in "Accredited Institutions of Post Secondary Education" published by the American Council on Education. Only grades of C or better in courses applicable to program requirements are accepted toward program completion.

Initial course equivalency is established by comparing the catalog description of the courses in question. This initial evaluation is published on the VISTAS student record system that is available to all advisors within the department, and a printed copy is sent to each department for review/approval. The departmentally approved list goes to the Associate Dean for further review/ approval. After approval by the department and Associate Dean, the registrar enters the transfer credits into the student's permanent university record. A copy is included in the student file kept in the department office for advisement reference. If a question arises regarding a particular course, the registrar's office contacts the Associate Dean and/or the Department Head.

The same process for validation of credit is used for NMSU matriculating students taking courses at other educational institutions.

In the case of Exchange Student programs, courses eligible for transfer credit must be approved prior to actual participation in the Exchange program.

Student Environment and Non-curricula Resources

The ME Department boasts a strong faculty covering all engineering requirements and ample elective options. They further support students through special projects, extracurricular activities, and opportunities for research participation.

Research Opportunities

By nature of the space-grant status, ME students have valuable opportunities to participate in NASA programs. In line with Hispanic-serving status, New Mexico Alliance for Minority Participation (AMP) provides employment and undergraduate research options for qualifying students. Sponsored by the National Science Foundation, AMP supports many of our Hispanic students in the fields of science, mathematics, engineering and technology through relevant work-study, and a summer student research program. Many ME students and faculty participate; our students have placed well in the annual conferences highlighting the work. BRIDGE to the DOCTORATE, an outgrowth of AMP, has enabled a number of ME students the opportunity to continue on to graduate work.

The university's Crimson Scholar program includes student research support which has also led to student involvement in research with ME faculty mentoring participants.

Student Professional Organizations are an active presence contributing to the overall learning environment for mechanical engineering. Among these are : American Society of Mechanical Engineers (ASME), Society of Hispanic Professional Engineers (SHPE), Society of Women Engineers (SWE), Society of Automotive Engineers (SAE), and Pi Tau Sigma honor society.

Student Professional Development

A special program was initiated during the 2005-2006 academic year to familiarize ME students with non-technical issues intended to prepare them for life after graduation. The program was organized by the Mechanical Engineering Academy in collaboration with the ME Department Head. A series of ten seminars, open to all ME undergraduates, was presented during the 2005-2006 academic year. The dates, topics, and presenters are summarized in Table B1.5 below. This series of talks was given the informal title, "Industry 101."

Table B1.5 Schedule of Industry 101 Seminars 2005-2006

Seminar Topic	Presenter	Date
Everything You Wanted to Know About Industry but were Afraid to Ask	Doug Lockwood Cabot Corp. (retired)	Sept. 7, 2005
An Engineer's View from the Launch Pad	Bob Wicke USAF (retired)	Oct. 13, 2005
Basic Accounting Principles for Engineers	Floyde Adams Owner, Adams Automotive	Oct. 20, 2005
Working for the Government	Bob Skaggs LASL (retired)	Oct. 26, 2005
Everything You Wanted to Know About Industry but were Afraid to Ask	Doug Lockwood Cabot Corp. (retired)	Jan. 25, 2006
Aerospace Engineering-the Gateway to Revolutionary Technology	Ray Preis McDonnell Douglas (retired)	Feb. 8, 2006
Product Development	Bill Medcalf Applied Kinetics	Feb. 22, 2006
Career Paths are Seldom Straight	Terry Lockwood Motorola	Feb. 23, 2006
If Edison Had Only Known About Enron	Rod Seidel TXU (retired)	Mar. 9, 2006
Measuring and Simulating Reality: Technical Careers Involving Experimentation and Numerical	Mike Steinzig, Rodman Linn LANL	Apr.20, 2006

These talks were typically attended by 15-25 students, and the interest among attendees was high. Because of the success of this program, the Industry 101 series will be integrated into two non-technical ME classes during the 2006-2007 academic year: ME 102, a required one credit introductory course for freshmen, and ME 449, a required one credit senior seminar. The incorporation of Industry 101 content into these courses will strengthen student exposure to professional aspects of the mechanical engineering profession. In addition, the content will contribute to program outcomes (f), (h), (i), and (j).

Placement and Career Services

The Placement and Career Services office provides students with assistance in their employment search, both for professional employment after graduation and for cooperative education opportunities while undergraduates. Career Fairs which bring employers and interested students together are held regularly (at least 6 times per year) throughout the fall and spring semesters, varying in size and scope from fall's Career Expo to those targeting specific fields such as education and HRTM. According to PCS records, 149 ME students registered for the 2005 Career Expo.

ME students also use Placement and Career services for referral for employment and cooperative education.

Placement and Career Services supplies the department with annual reports on ME student activity. Data includes interviews, referrals, and co-op participants, as well as job placements and salary range. These reports will be available for review during the site visits. The cooperative education program is a valuable experience for students. After two semesters of satisfactory academic work, an engineering student may go on a work phase with one of the many companies or governmental agencies with which the university has co-op agreements. ME students are encouraged to avail themselves of this opportunity to enhance their college education and prepare themselves for the world of work. A co-op student can be on work phase for 4-7 months while employed in a career-related experience. Student status is maintained during the work phase. Tables B1.6 and B1.7 show the total number of students involved in the co-op program and the total number of students on the work phase over the last five years.

Table B1.6 Cooperative Education Registrant Activity
Mechanical Engineering Department

Co-Op Registrants 2000-2005	
Year	**Total**
2000-2001	90
2001-2002	66
2002-2003	57
2003-2004	64
2004-2005	103

Source: NMSU Placement and Career Services

Table B1.7 Cooperative Education Workphase Students
Mechanical Engineering 2000-2005

Year	Total
2000-2001	33
2001-2002	40
2002-2003	29
2003-2400	24
2204-2005	32

Source: NMSU Placement and Career Services

ME students are well prepared to work in the engineering field after graduation, or to continue professional studies. Tables B1.8 shows the number of graduates from the program and Table B1.9 shows their status at the time of graduation. According to our Senior Exit Survey, graduating seniors are more than satisfied with the preparation they have received. The students' self-assessment of their preparation as they leave the program (from senior exit interviews) is summarized in Figure B1.3.

Table B1.8 Degrees Awarded by the ME Department
(1999-2000 through 2004-2005) College of Engineering

Degree Year	Bachelor	Master's	Doctorate
1999-2000	67	8	4
2000-2001	67	9	1
2001-2002	46	14	1
2002-2003	54	6	2
2003-2004	37	11	0
2004-2005	38	11	2

Source: NMSU Institutional Research

Table B1.9 Senior Exit Interview Results 2001-2006 - Grads with Jobs

Semester	Total respondents	# to grad school	% of total grad school	# w/job	% of total w/job	sch + job
Fall 2001	13	3	23%	8	62%	1
Spring 2002	18	9	50%	9	50%	3
Fall 2002	15	4	27%	5	33%	1
Spring 2003	14	7	50%	6	43%	3
Fall 2003	7	2	29%	4	57%	1
Spring 2004	12	3	25%	8	67%	2
Fall 2004	20	5	25%	11	55%	1
Spring 2005	13	5	38%	9	69%	4
Fall 2005	15	2	13%	10	67%	
Spring 2006	15	5	33%	7	47%	
Totals	**142**	**45**	**32%**	**77**	**54%**	**16**

Comparison to # of graduates

Academic Yr	Total graduates	Total respondents	% respond/grad
2001-2002	46	31	67%
2002-2003	54	29	54%
2003-2004	37	19	51%
2004-2005	38	33	87%
2005-2006	39	30	77%
Totals	**214**	**142**	**66%**

Source: ME Senior Exit Surveys

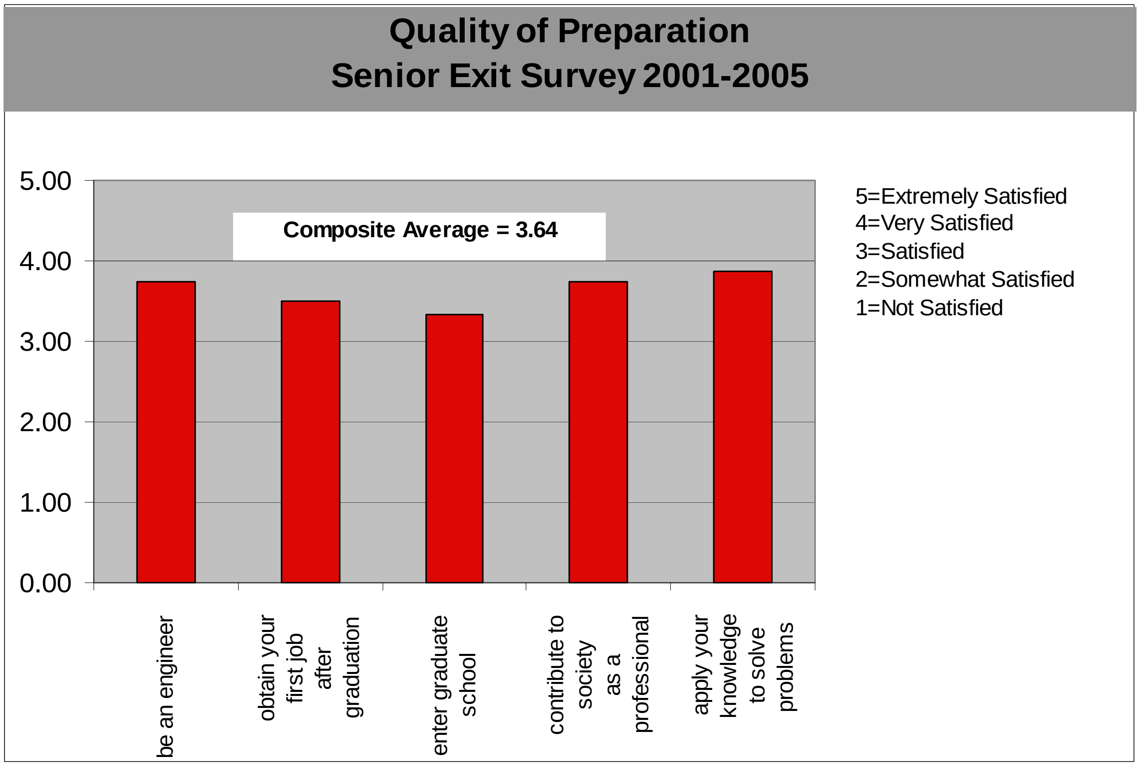

Figure B1.3 General Assessment of Preparation *ME Senior Exit Surveys*

2

CRITERION 2: PROGRAM EDUCATIONAL OBJECTIVES

ABET 2006 SELF-STUDY PART B

The mission of the Mechanical Engineering Department at New Mexico State University is threefold:

- to educate those who will advance knowledge and become the future leaders of industry and academia;
- to conduct both basic and applied research in mechanical engineering and related interdisciplinary areas; and
- to provide service to the profession, to the state of New Mexico, to the country and to the future development of engineering worldwide.

The mission of the Undergraduate Program, under review here, is to serve the state of New Mexico by providing students with a strong background in mechanical engineering, and by producing highly sought after graduates.

Educational objectives and program outcomes derive from this mission, and reflect NMSU's university-wide mission, objectives, and standards.

B2.1 Mechanical Engineering Program Educational Objectives

A critical focus within the Department is to afford undergraduates of varying backgrounds and abilities every opportunity to achieve success in the mechanical engineering profession. To address this focus, the faculty of the Mechanical Engineering Department, with input from our constituents, have established the following **educational objectives** for the undergraduate program:

- to prepare students for successful careers and life-long learning;

- to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems;
- to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively;
- to teach students to use modern experimental and data analysis techniques; and
- to instill in our students an understanding of their professional and ethical responsibilities.

The mechanical engineering program prepares students for a wide range of professional engineering careers in such areas as research and development, design, facilities operation and maintenance, management, and production. Graduates of the program will be prepared to apply engineering sciences, mathematics, computational methods, modern experimental methods, and effective communication skills to problems of interest in industry and government or scholarly topics. Employment opportunities for graduates are extensive. These include energy and utility, manufacturing, automotive, aerospace, defense and space, research and development, and many others. The emphasis in the curriculum is on engineering sciences (solid mechanics, dynamics and controls, thermal sciences, fluid mechanics, and materials science), mathematics, engineering analysis, engineering design, general sciences, and communication balanced with general education topics and electives. Graduates of the program will also be prepared for graduate studies (subject to grade-point and standardized test qualifications). Students will be prepared to take the Fundamentals of Engineering examination (and are encouraged to do so) as a step towards professional registration.

Relationship of Mechanical Engineering Program, College of Engineering, and NMSU Program Educational Objectives

The Mechanical Engineering Program educational objectives are consistent with and supportive of the College of Engineering educational objectives which in turn are consistent with and supportive of New Mexico State University educational objectives.

Educational objectives must be consistent with the overall University strategic direction as well as those objectives defined in our accreditation plans submitted to the New Mexico Commission Higher Education and the North Central Association (NCA). Figure B2.1 graphically represents the linkage between the University, the College, and the ME Program.

Relationship of Program Educational Objectives to Accreditation Criteria

Our current educational objectives were incorporated in the 2000-2001 catalog after strategic planning begun in 1999. The planning activity began by developing a vision and mission for the program. A subsequent self-study that involved faculty and our other constituencies led to a strategic plan that includes our educational objectives. These are a component of the overall education, research, and service activities presented in the strategic plan.

B2.2 Mechanical Engineering Program Constituency includes:

- Students
- ME faculty and staff
- Alumni
- Employers (industry, academia, government)
- Mechanical Engineering Academy/Industrial Advisory Committee

B2.3 Processes to Establish and Review Program Educational Objectives

Each constituency group plays an important role in determining, evaluating, and redefining our educational objectives. We include our constituencies in our assessment activities at appropriate opportunities.

Adjustments and improvements to the educational objectives are based on quantitative surveys as well as qualitative assessment by the program faculty on the performance of our graduates. In accordance with the timeline adopted by the O&A committee, program educational objectives will be reviewed annually.

Alumni and employer surveys as well as performance of our BSME graduates in graduate school provide information and insight into the effectiveness of our program educational objectives.

The Mechanical Engineering Program's educational objectives are consistent with and supportive of the ABET 2006 criteria. Specifically, Table B2.1 shows the relationship of the ABET criteria to our educational objectives.

Mission of New Mexico State University

New Mexico State University is the state's land grant university, serving the educational needs of New Mexico's diverse population through comprehensive programs of education, research, extension education, and public service.

Mission of the College of Engineering

The mission of the College of Engineering is to uphold the land grant mission of NMSU and achieve national recognition while serving the educational needs of New Mexico's diverse population through unique programs of education, research, and public service while graduating world-class engineers for industry, government and education.

Mission of the Mechanical Engineering Program

The mission of the Mechanical Engineering Program at NMSU is threefold: to educate those who will advance knowledge and become future leaders of industry and academia; to conduct both basic and applied research in mechanical engineering and related interdisciplinary areas; and to provide service to the profession, to the state of New Mexico, to the country, and to the future development of engineering worldwide.

Figure B2.1 Relationship between the University, College and ME Program missions. Mission statements are published in the Course Catalog, respective web sites, Strategic Plans, and marketing materials.

2006 Review: The Outcomes and Assessment committee reviewed the educational objectives and affirmed their appropriateness for the ME program. The educational objectives will be revisited as part of global review in the fall of 2006.

A comprehensive description and timeline for assessment activities is presented in Chapter 3. Though educational objectives refer to skills related to early years in the marketplace while program outcomes articulate skills that should be demonstrable at graduation, these objectives and outcomes are intrinsically linked and must be assessed together.

Table B2.1 Relationship of Program Outcomes to Program Educational Objectives

ME Program Educational Objectives	ABET/ME Program Outcomes
To prepare students for successful careers and lifelong learning	(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (i) a recognition of the need for, and an ability to engage in lifelong learning (j) a knowledge of contemporary issues
To educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems	(a) an ability to apply knowledge of mathematics, science and engineering (e) an ability to identify, formulate and solve engineering problems (k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice
To develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively	(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (d) an ability to function on multi-disciplinary teams (g) an ability to communicate effectively
To teach students to use modern experimental and data analysis techniques	(b) an ability to design and conduct experiments, as well as to analyze and interpret data
To instill in our students an understanding of their professional and ethical responsibilities	(f) an understanding of professional and ethical responsibility

B2.4 Program Curriculum and Processes Ensure Achievement of Program Educational Objectives

The curriculum offered by the ME Department includes the professional components required by ABET: science and math; engineering topics; and general education. ME426/427 Design Project Laboratory, our capstone course, is a major design experience in which student teams work for a "client" on a specific engineering problem or challenge. In addition to design work, the students are involved in all aspects of product planning, progress reports, and budgets. A comprehensive record is maintained, and a detailed report submitted to the client on completion of the project. The course will be described in detail under Criterion 4.

B2.5 Assessment of Achievement of Educational Objectives

According to ABET definition, educational objectives are "broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve." Assessment must also rely significantly on "broad" indicators. Sources, such as alumni and employers, have no responsibility to provide information we request. Surveys, at best, elicit a small percentage of return. The ME Department looks to its Mechanical Engineering Academy for significant input on what is important in the marketplace, and how our students need to be prepared for successful participation.

Alumni Survey

The Assessment Plan developed for ABET 2000 called for assessment through Alumni surveys directed at 2 and 5 year graduates. The process included a 6 page questionnaire mailed to targeted participants with phone contact to those not returning the survey. Subsequently, the format was incorporated in College of Engineering process. A postcard mailing encouraged the recipient to fill out the survey on the College of Engineering web site.

2006 Review: The Outcomes and Assessment Committee found the information collected from these surveys (2001-2005) to be inadequate. First, the document itself is not satisfactory for the desired purpose; information requested did not directly align with ABET requirements. Also, the length of the survey discouraged completion. In addition, the shift to web site entry caused response rate to decrease dramatically.

Recommended Improvement:

1. Revise Survey
2. Revise distribution method

Action Taken:

1. Survey was revised to 3 pages in length (The revised survey is attached as an Addendum to Chapter 3). Content is directly related to Educational Objectives and Program Outcomes, and is constructed for comparison with the Senior Exit Survey.
2. Distribution will be by mail with SASE included for easy response. Telephone follow up will be used as needed to ensure a representative response. The 2006 results will be available by the time of the ABET site visit.

Employer Surveys

2006 Review: Industry representatives are reluctant to comment directly on evaluation of graduates. Understandably, there are issues of employee confidentiality involved. We were unable to gather other than informal comments during career fairs.

Recommended Improvement:

1. Elicit employer input through the co-op program. While this program involves undergraduates, employer needs and satisfaction are based on marketplace values. Information derived would be relevant to both educational objectives and program outcomes, as well as furthering general interaction with industry.

Action Taken:

1. NMSU's Placement and Career Services, who manage the co-op program, already require employer feedback as part of the co-op contract. They are willing to extend this requirement to a survey developed by the ME Department.

   Discussion with other engineering programs has provided examples of their surveys and processes. (Copies of two surveys are included as Addendum at the end of this chapter.) We are developing a survey which will become part of the co-op program beginning in Fall 2006.

IAC/MEA Reviews and Recommendations

The Industrial Advisory Committee (comprised of selected Mechanical Engineering Academy members) performs a program review annually. This occurs in February of each year during the MEA annual meeting. This have been done for approximately 16 years. Interviews with administration, faculty and students, and a tour of facilities, focus on reviewing previous recommendations as well as gathering information on current activities.

Reports are submitted to the MEA and to the Department Head.

2006 Review: IAC reviews provide input but have not been integrated into assessment process.

Recommended Improvement

1. Formalize aspects of review to directly align with educational objectives, program outcomes, and other ABET criteria such as status of facilities.

Action Planned:

1. Following global review in the fall of 2006, ME will create an assessment instrument to obtain input from IAC. This should be completed in time for 2007 MEA annual meeting. Results will be considered by the O&A committee during the spring 2007 assessment, with further discussion and/or action taken during global session in fall.

2. MEA survey – a survey to gather information about marketplace needs and requirements was discussed. MEA members are extremely cooperative in such activities. Consideration is needed to determine appropriate purpose and content. Discussion will be initiated with MEA. Completion of this action, if implemented, would not occur before Spring 2007.

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CRITERION 3: PROGRAM OUTCOMES AND ASSESSMENT

ABET 2006 SELF-STUDY PART B

Overview and History

As noted in the “Background Information” section of Chapter 1, formal assessments of program outcomes and educational objectives were not conducted during the period 2001 – 2005.

Preparation for the ABET 2006 self-study report and site visit began in Fall 2005. Dr. Thomas Burton had assumed leadership as ME Department Head in June 2005, ending a two year vacancy in that position. An Outcomes and Assessment (O&A) committee, composed of the Associate Department Head and three senior faculty members, was formed in October 2005. The committee met approximately 20 times during the 2005/2006 academic year and, in May 2006, produced a set of recommendations for program improvement and for future procedural aspects of the O&A process (This report is attached as *Addendum 1* to this chapter.). The O&A committee’s work was aided by the mock ABET visit that took place in late March 2006. The two mock ABET visitors devoted special attention to outcomes and assessment, which were recognized to be significant issues.

The first step in developing the O&A process was to move from the general course/outcome mappings stated in the 2000 self-study report to specific, demonstrable outcomes for all required courses. With guidance from the O&A committee, all ME faculty reviewed their syllabi for courses offered during the Spring 2006 semester, including electives, for specific examples of course objectives that exemplified program outcomes. The standard used was how clearly the outcome could be demonstrated. Course objectives were mapped to program outcomes for all required courses. Establishing individual metrics for each course was a challenging process that will continue into the future as the O&A committee works with faculty to improve the assessment process.

The O&A committee reviewed the battery of assessment tools proposed in the 2000 self-study. The prescribed data had been collected but not reviewed. The majority of these tools were found to provide only indirect measurements. Analysis of tools (including recommendations and actions taken) relating to educational objectives has been described in Chapter 2: Criterion 2. Tools related to the program outcomes will be detailed later in this chapter. During the 2005/2006 academic year considerable attention was devoted by the O&A committee to refinement and improvement of the assessment tools. A number of assessment tool-related recommendations were made by the committee in its May 2006 report. Some of these recommendations have been implemented, and others are planned for implementation in the 2006/2007 academic year.

B3.1 Statement of Program Outcomes

The Mechanical Engineering Department has adopted ABET program outcomes (a) through (k) to foster achievement of the program educational objectives

These outcomes ensure that students have the skills, knowledge and behavior at the time of degree completion that will enable them to realize the educational objectives in their professional lives. **Program outcomes are stated below**

a. an ability to apply knowledge of mathematics, science and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in lifelong learning
j. a knowledge of contemporary issues
k. an ability to used the techniques, skills and modern engineering tools necessary for engineering practice.

B3.2 Relationship of Program Outcomes to Program Educational Objectives

Table B3.1 describes the relationship of the Program Outcomes to our Program Educational Objectives.

Table B3.1 Relationship of Program Outcomes to Program Educational Objectives

ME Program Educational Objectives	ABET/ME Program Outcomes
To prepare students for successful careers and lifelong learning	(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context (i) a recognition of the need for, and an ability to engage in lifelong learning (j) a knowledge of contemporary issues
To educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems	(a) an ability to apply knowledge of mathematics, science and engineering (e) an ability to identify, formulate and solve engineering problems (k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice
To develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively	(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (d) an ability to function on multi-disciplinary teams (g) an ability to communicate effectively
To teach students to use modern experimental and data analysis techniques	(b) an ability to design and conduct experiments, as well as to analyze and interpret data
To instill in our students an understanding of their professional and ethical responsibilities	(f) an understanding of professional and ethical responsibility

The Mechanical Engineering Department has adopted the requirements (a) through (k) of Criterion 3 as its Program Outcomes.

B3.3 Assessment of Program Outcomes

There are two primary levels of activity in the assessment of program outcomes. The first level is individual faculty assessment of achievement of student outcomes in specific courses, the results of which comprise one assessment tool; the results of the individual course assessments are forwarded to the Outcomes and Assessment Committee. The second level is the broader, overall assessment by the Outcomes and Assessment Committee, utilizing all of the assessment tools to be described in this chapter. The assessment of outcomes and objectives involves use of the Continuous Improvement Loop process depicted in Figure B3.1. This process is adapted to each level of activity, and this schematic forms the assessment format for each program outcome.

For example, faculty responsible for specific courses will develop a chart of this type for targeted program outcomes applicable to that course. In this process, the faculty member defines the measures of student accomplishment to be used. The faculty member then specifies how the assessment measures will be employed to judge student outcomes. Actual student performance is compared to the assessment metric. Based on this analysis, the faculty member recommends changes/improvements in learning strategies, teaching methods, and/or class content. Each such faculty-generated analysis is later considered as one of several assessment tools in the overall outcomes assessment performed by the O&A committee.

A set of outcomes assessment materials for the Spring 2006 Engineering Mechanics I (Statics) course, ME 236, is attached to this chapter as *Addendum 2*. The course syllabus states the program objectives, program outcomes, professional components, and program specific criteria that are relevant to this course. For each program outcome targeted (in this case (a), (e), and (j)) the assessment chart of Figure B3.1, as completed by the instructor, is presented. The block labeled "Improvement" is the instructor assessment of steps needed to improve the quality of the course. The faculty-generated assessment results for those courses to be assessed in a given semester are provided to the O&A committee for further review. The implementation of these individual course assessment tools, tied directly to the course syllabus, provides better quality control of course content than previously existed, because the same syllabus applies no matter who teaches the course.

As noted, the aforementioned individual course outcome assessments provide one assessment tool. The complete set of assessment tools that are used by the O&A committee are summarized in Table B3.2, and these are described in detail in section B3.4. Some of these assessment tools have been implemented and some of them are planned for implementation in the 2006/2007 academic year. The timeline for the assessment that is done by the O&A committee is shown in Table B3.3; the status of each assessment tool (i.e., whether it has been implemented or is planned) is indicated in this table.

The Outcomes and Assessment Committee conducts its program analyses according to the timeline shown in Table 3.3. In performing these assessment activities, the committee has established and uses a matrix that describes the relationship of a given assessment tool to a given program outcome. This matrix is presented in Table 3.4. In addition, individual faculty and the O&A committee utilize the mapping of mechanical engineering courses to program outcomes, professional components, and ME specific criteria shown in Table 3.5.

The following section B3.4 provides descriptions of the assessment tools listed in Table B3.2 and B3.3. Section B3.5 then summarizes the overall data collection and analysis done by the O&A committee. Section B3.6 summarizes the results and recommendations of the recently completed O&A analysis.

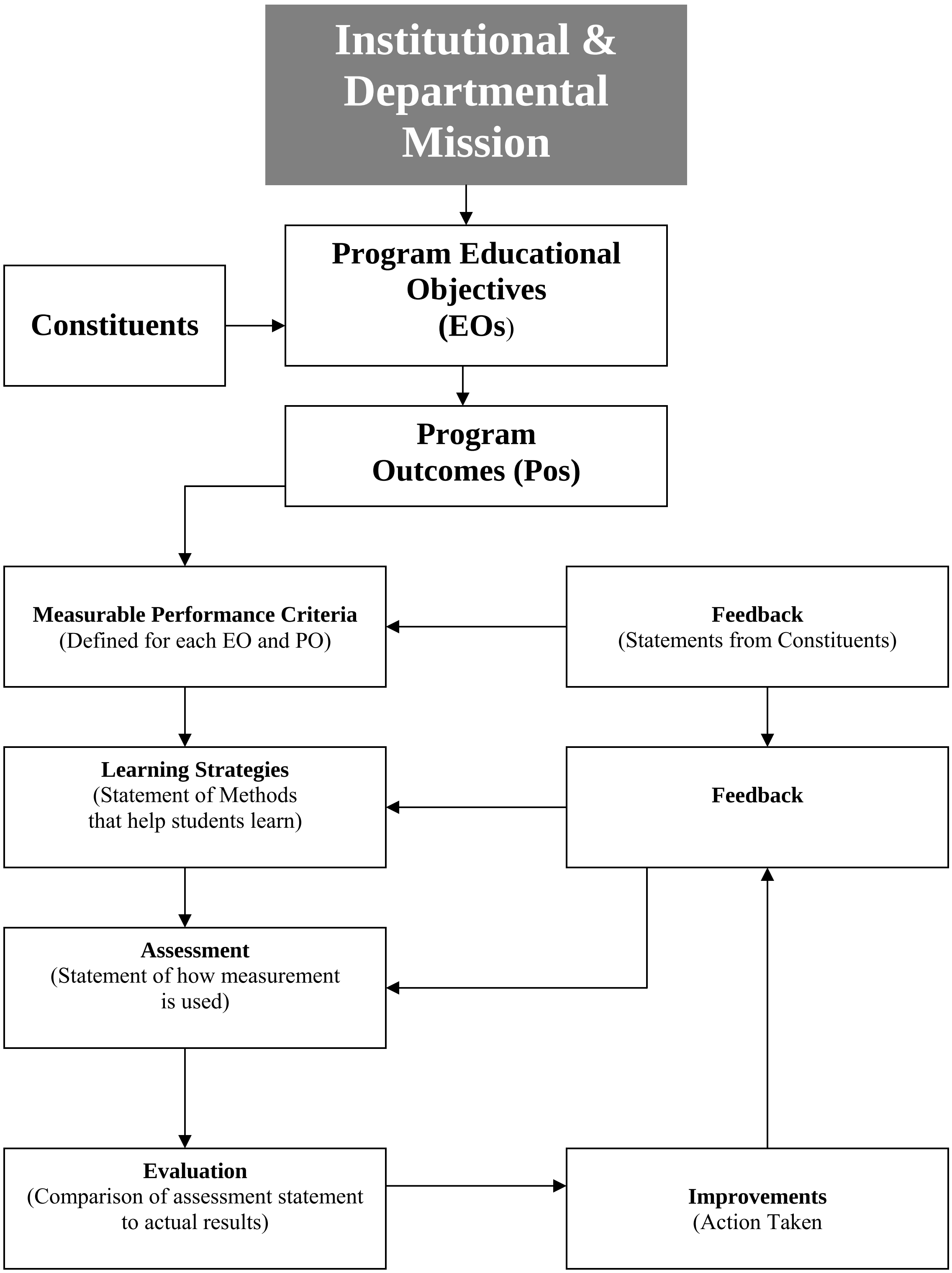


Figure B3.1 Continuous Improvement Process Flow Chart

Table B3.2 Summary of Assessment Tools

Tool	Primary Use	Secondary Use
Faculty Assessment in courses	Course outcome improvements	Overall curriculum assessment
FE Exam results	Assess outcomes in specific content areas	
Senior Exit Survey	Student assessment of outcome achievement Feedback on facilities, e.g. labs Curriculum Overview Backup to other outcome assessments	Comparison with Alumni surveys
Capstone Reviews by clients, IAC	Capstone Design evaluation, Outcomes Assessment	
Placement & Career Services, Co-op Reports	Educational objectives, co-op evaluation, program outcomes	Improvement in co-op, intern programs
Performance in project work and activity based learning – club functions, competitions, conferences (1)		Outcomes Assessment
IAC recommendations	Educational Objectives, curriculum	
Mechanical Engineering Academy, Alumni Survey	Assessment of Program Educational Objectives, Outcomes	Comparison with similar sections of Senior Exit Survey
Transcripts	Monitor student progress in required courses, prerequisites, academic standing	
Course/Instructor Evaluations	Dept. Head – evaluation of faculty instruction	Used by individual faculty for improvement of instruction (documentation needed).

(1) examples: Competitions and design contests such as Min-Baja, Raytheon, NASA, Zero Gravity, ASME

Table B3.3 Timeline for Assessment Activities

ASSESSMENT ACTIVITIES AND TIMELINE					
Assessment Activity	**How Often**	**Collection Date**	**Responsible**	**Complete**	**Status ***
Faculty Assessment in courses	Each semester	End of each semester	O & A Committee	May	(1)
FE Exam Results	Yearly	Fall, Spring	O & A committee	May	(2)
Exit Interviews	Yearly	Fall, Spring	O & A committee	May	(1)
Placement & Career Services, Co-op Reports	Yearly	Continuous	O & A committee	May	(2)
Capstone Reviews by clients, IAC	Yearly	Fall, Spring	Design faculty, O & A committee	May	(1)
Performance in Project work, competitions	Yealy	As appropriate	Design faculty, O & A committee	May	(2)
IAC Recommendations	Yearly	February	Dept. Head, O & A committee	May	(1)
Mechanical Engineering Academy, Alumni Survey	Yearly	Continuous	O & A committee	May	(2)
Transcripts	Each semester	Continuous	Assoc. Dept. Head faculty advisors		(1)
Course/Instructor Evaluations	Yearly	Fall, Spring	Dept. Head, faculty	Following Spring	(1)
Review					
Program Educational Objectives	Yearly	Spring	Faculty, O & A committee, MEA	April/May	
Program Outcomes	Yearly	Spring l	Faculty, O & A committee	April/May	
Assessment Process	Yearly	Spring	Faculty, O & A committee, MEA	April/May	

* Status: (1) currently being done; (2) planned

Table B3.4 Matrix of Assessment Tools Mapped to Program Outcomes

	ASSESSMENT TOOLS							
	Faculty assessment in courses	FE Exam results	Exit Interviews	Capstone Reviews by clients, IAC	Alumni Survey (revised)*	Co-op Employer Survey*	Course Evaluations*	Performance in project work
Program Outcomes (Criterion 3: a-k)								
(a) an ability to appy knowledge of mathematics, science, and engineering	x	x	x		x	x	x	secondary assessment of outcomes as applicable
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	x	x	x		x	x	x	
(c) an ability to design a system, component, or process to meet desired needs	x	x	x	x	x	x	x	
(d) an ability to function on multi-disciplinary teams	x		x	x	x	x	x	
(e) an ability to identify, formulate, and solve engineering problems	x	x	x	x	x	x	x	
(f) an understanding of professional and ethical responsibility	x	x	x		x	x	x	
(g) an ability to communicate effectively	x		x		x	x	x	
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	x	x	x	x	x	x	x	
(i) a recognition of the need for, and an ability to engage in life-long learning	x		x		x	x	x	
(j) a knowledge of contemporary issues	x		x		x	x	x	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	x	x	x		x	x	x	

***** These tools are in the process of being revised, and will be implemented in Fall/Spring 2007.

Table B3.5 Mapping of Mechanical Engineering Curriculum to Program Outcomes

		Contribution to Program Outcomes											Professional Components				ME specific Program Criteria			
		ability to apply knowledge of math, science, and engineering	ability to design anad conduct experiments/analyze and interpret data	ability to design a system, component, or process	ability to function on multi-disciplinary teams	ability to identify, formulate, and solve engineering problems.	understanding of professional and ethical responsibility	ability to communicate effectively	broad education needed to understand impact in a global and societal context	recognition of the need for, and ability to engage in lifelong learning	knowledge of comtemporary issues	ability to used techniques, skills and modern engineering tools for engineering practice	major design experience	1 year math and basic science	1 1/2 years engineering topics (engineering science and design)	general education component	knowledge of chemistry and calculus-based physics with depth in at least one	ability to apply advanced mathematics- multivariate calculus and differential equations	familiarity with statistics and linear algebra	ability to work professionally in both thermal and mechanical systems areas
Curriculum Area	**Credits**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**PC1**	**PC2**	**PC3**	**PC4**	**ME1**	**ME2**	**ME3**	**ME4**
Required Mechanical Engineering Courses																				
ME 102	1			X				**X**			X		X		X	Fulfilled by NMSU General Education Requirements				
ME 159	2			X								X			X					
ME 166	3	X			X	x	X			X	X	**X**			X					
ME 222	3											**X**			X					
ME 236	3	**X**				**X**						**X**			X					
ME 237	3	X		X						X					X					
ME 240	3					X									X					
ME 260	3	X				X						**X**			X					
ME 326	3			**X**			**X**				**X**	X	X		X					**M**
ME 328	3	X				X									X			**X**	**X**	
ME 329	3	**X**										**X**			X			X	**X**	
ME 338	3	X	X	X		**X**									X					
ME 340	3	X				**X**									X					
ME 341	3	**X**				**X**						**X**			X					T
ME 345	1	X	**X**			x	X	X	X	X		X			X				**x-s**	
ME 425	3			**X**											X					M
ME 426/427	6			**X**	**X**			**X**					X		X					
ME 445	3	X	**X**			X		**X**							X				**x-s**	T
ME 449	1						X	X		**X**	X				X					
CHEM 111														X			X			
CHEM 112														X			X			
PHYS 215														X			X			
PHYS 216														X			X			
MATH 191														X				X		
MATH 192														X				X		
MATH 291														X				X		
MATH 392														X				X		
MATH Elective														X				X		

x	- ABET outcome
x (shaded)	- evaluated for S2006

B3.4 Description of Outcome Assessment Tools

The outcome assessment tools are summarized in Table B3.2. These tools and their uses are briefly described here in the order in which they appear in Table B3.2. The schedule for data collection and evaluation is presented in Table B3.3. The status (e.g., implemented, planned) for each tool is indicated.

Outcome Assessment Tools

1. Faculty outcomes assessment in courses (implemented) This will be a primary tool in the assessment of outcomes. For each required mechanical engineering course, the relevant program outcomes are listed in the course syllabus. For targeted outcomes, an assessment flow chart similar to the overall assessment plan (Figure B3.1) defines the measures and assessment metrics used to assess the level of attainment of that outcome in that course. An example is shown in Addendum 2 at the end of this section. For the course, ME 236 Mechanics I, the syllabus notes that outcomes (a), (e), and (k) are addressed in this course. For each of these three outcomes, there is a flow chart stating a specific outcome, how that outcome is measured, assessment metrics, an evaluation, and plans, if any, for improvement. Faculty perform these evaluations for each required course each semester. The results for all of the courses for a given semester are collected and are used by the O&A committee, according to the evaluation schedule shown in Table B3.3. Table B3.5 maps outcomes to required course with shading indicating which courses are being assessed in the current year.

2. FE Exam results (planned, partially implemented). The FE Exam provides a valid benchmark for performance comparisons of NMSU students to the national norms in specific content areas related to program outcomes (a), (b), (c), (e), (h) and (k). The average NMSU FE scores in the technical subject areas are measures of attainment of outcomes (a – apply knowledge of math, science and engineering) and (e – identify, formulate and solve engineering problems); scores in the Measurements & Instrumentation section are measures of attainment of outcome (b – design and conduct experiments). NMSU ME scores in Mechanical design, Fans/pumps/compressors, Refrigeration and HVAC, and Energy Conservation provide an assessment of the design outcome (c), while Ethics scores provide an assessment of outcome (f - …professional and ethical responsibility). Engineering Economics addresses outcome (h- broad education to understand global impact); outcome (k- ability to use techniques and skills). The appropriate use of the FE exam results to assess attainment of outcomes will be addressed by the O&A committee during 2006/2007.

3. Senior Exit Survey (implemented): At the end of the Fall and Spring semesters, graduating seniors complete an exit survey that is followed by an interview with the Department Head, the Associate Department Head, or a faculty member.

Prior to Spring 2006, the department used a 17 page exit interview survey. Information collected through this survey will be applied to a number of ABET criteria, including Criteria 2 (Educational Objectives), 3 (Program Outcomes), 4 (Professional Component), and 6 (Facilities).

Effective Spring 2006, the O&A committee implemented a shorter survey that is intended to obtain feedback directly tied to ABET outcomes assessment. (This new survey is attached as Addendum 3.) Student feedback from Spring 2006 was used by the O&A committee to make several specific recommendations that are stated in Section B3.6

4. Capstone Reviews by IAC (implemented) - Senior Capstone Design Course Project Review – Students in ME 426/427, the Capstone Design course, present their work to the Industrial Advisory Committee and other ME Academy members as part of the annual ME Academy meeting each February. The teams and their projects are rated for presentation components rather than content. This aspect is a directly observed demonstration of outcome g: ability to communicate effectively. The committee considers:

- Project Objective(s) was clearly described
- Presenter's ability to convey knowledge about the project
- Organization of the presentation
- Presenter's attitude toward the subject was professional
- Presenter's visuals/tools were effective
- Overall Presentation

Each IAC member in attendance completes a rating form for each senior design project presented, according to the above listed items to be evaluated. The summary of the Spring 2006 ME Academy/IAC evaluation of student presentations is attached to this chapter as Addendum 4.

5. Placement and Career Services, Co-op reports (planned, not yet implemented).
This assessment tool will primarily be used for evaluation of educational objectives. It will also address program outcomes as far as relevant for the particular co-op position. During the past five years, approximately 35 NMSU ME students per semester worked on co-op assignments. This is a good statistical sample. As a part of the co-op program in the future, we plan to implement an employer survey that will enable us to obtain an independent, external assessment of outcomes and educational objectives. Depending on the nature of the co-op assignment individual students may do work that is relevant to many of the outcomes (a) – (k). The employer co-op assessment form will be intended to address all outcomes that are meaningful for a given co-op assignment. This will be implemented in the 2006/2007 academic year.

Placement and Career Services currently provide a variety of reports to the department, including:

- # of MEs registering with P & C services
- # of employment referrals
- # of interviews arranged
- average salary compared to national
- Co-op info: # participating, employers

6. Performance in project work and activity based learning (implemented) - Projects, competitions and other such activity occur with varying frequency and level of participation making this is a secondary assessment tool that will be used as relevant.

7. IAC recommendations (planned) – The Industrial Advisory Committee is a subcommittee of the Mechanical Engineering Academy (The ME Academy consists of individuals who have excelled in the profession as leaders of industry, academia, and government research centers.) The IAC and the ME Academy meet annually in February during Engineers Week with the department faculty and students, the ME Department Head, and the Dean of Engineering in a full day of comprehensive review of the department and its educational activities. They submit a written report of their findings and recommendations to the Department Head. As described in Chapter 2, the O & A Committee will work with the IAC and ME Academy to produce a survey which directly relates to educational objectives, as well as continuing to review facilities and general curriculum concerns. The revised assessment tool will be completed and ready for implementation at the 2007 ME Academy meeting in February 2007.

8. ME Alumni Survey (survey revised; implementation in Summer/Fall 2006)
The Assessment Plan developed for ABET 2000 called for assessment through Alumni surveys directed at 2 and 5 year graduates. The process included a 6 page questionnaire mailed to targeted participants with phone contact to those not returning the survey. Subsequently, the format was incorporated in the College of Engineering survey process. A postcard mailing encouraged the recipient to fill out the survey on the College of Engineering web site. The Outcomes and Assessment Committee found the information collected from these surveys (2001-2005) to be inadequate. First, the document itself is not satisfactory for the desired purpose; information requested did not directly align with ABET requirements. Also, the length of the survey discouraged completion. Second, the shift to web site entry caused response rate to decrease dramatically.

Accordingly, the survey was shortened to 3 pages (see Addendum 5 to this chapter). Content is directly related to Educational Objectives and Program Outcomes and is constructed for comparison with the Senior Exit Survey.

Distribution of the survey will be by mail during the summer of 2006 with SASE included for easy response. Telephone follow up will be used as needed to ensure a statistically meaningful response. The 2006 survey results will be available by the time of the ABET site visit.

9. Transcripts (implemented) – Transcripts are used mainly to monitor progress in fulfilling degree requirements, in both completion of required courses and grades awarded.

10. Other (Course/instructor evaluations)
Student evaluations are conducted every semester for all (ME) courses offered during that semester. (The evaluation form is attached to this chapter as Addendum 6.) Part I of the evaluation is an assessment of goals as particularized by the course instructor; Part II is a quantitative evaluation of effectiveness and is common to all courses; Part III, also common to all courses, is for individual student comments in response to a select number of questions.

Each instructor is provided a copy of the collated responses. This tool, in particular Parts II & III, is primarily used by individual instructors to monitor and improve course particulars. Part I of the evaluation deals with course objectives, and is used to illustrate student feedback as appropriate to other outcome measurements. Part IV involves questions about preparation through previous courses and is, at times, valuable in examining curricular flow.

Evaluations by the Department Head as part of the annual review process are used to identify improvements appropriate for some faculty/courses. Student numerical evaluations and written comments allow individual instructors to improve the educational experience in specific courses. This will improve outcomes.

B3.5 Outcomes and Assessment – Data Collection and Analysis (Spring 2006)

During the 2005/2006 academic year assessment data were assembled by the Outcomes and Assessment Committee. A significant component of the data generation was the set of individual course assessments done by ME faculty. These faculty generated data were considered, along with available data for those assessment tools described in Section B3.4. The overall data were separated by program outcomes (a) – (k), and for each outcome a summary was prepared (examples of these outcome summaries are attached to this chapter as *Addendum 7*). The information contained in the summary sheets was then analyzed, as per Tables 3.4 and 3.5, to determine recommendations for needed improvements, if any, to the ME program. Because this was the first formal evaluation conducted by the O&A Committee, the committee also made recommendations for improvement of the outcomes assessment process. We anticipate that further changes in the evaluation process will continue during the next several years. We also anticipate that it will require one more year of data collection, including data from assessment tools that are in the planning stages, to approach a steady state in the evaluation process and to ensure that the faculty involvement that was initiated in 2005/2006 will become normal operating procedure.

B3.6 Outcomes and Assessment – Recommendations (Spring 2006)

The Outcomes and Assessment Committee report for the first formal O&A evaluation conducted is attached to this chapter as *Addendum 1*. Listed below in several categories are specific changes and committee recommendations following the extensive 2005/2006 committee analysis of the O&A assessment data.

Changes implemented

- The student shop and its management were reconfigured
- As a result of previous IAC recommendations, the department and IAC instituted an IAC communications evaluation of senior design project teams in the spring semester.

Specific curricular/content related recommendations

- Increase the emphasis on thermal systems design.
- Include additional topics in statistics.
- Improve the integration of CAE tools into the curriculum.
- Consider requiring a controls course.
- Change the senior seminar course to better cover the societal impact of engineering.
- Increase the emphasis on the licensure process in senior courses.

General Recommendations

- Work with IAC to develop a rubric to assess the level of achievement of Program Educational Objectives; to be implemented at the February 2007 annual meeting.
- Review the general education requirements in light of current educational objectives and outcomes.
- Continue to direct resources to laboratory and shop facilities.

B. 3.7 Materials Available During the ABET Site Visit

Binders for each outcome (and objective) containing
    Course assessment flow charts
    Examples of measurements

Performance records of measurements

Course Materials
Syllabus and Assessment Plans
Teaching materials
Examples of student work

Reports (and source data if generated in department)
Surveys and Evaluations
FE Exam raw data and analysis charts
IAC recommendation reports
IAC Capstone review reports
Capstone “Client” reviews
Placement & Career Services reports

Addendum materials:

1. ABET Outcomes and Assessment Committee Report – Spring 2006
2. Course syllabus and assessment flow charts for ME 236 - Spring 2006
3. New Senior Exit Interview Survey Form (Revised Spring 2006)
4. Summary of IAC communications evaluation of capstone design projects, Spring 2006
5. New Alumni Survey Form (revised Spring 2006)
6. Forms for Student Course Evaluation
7. Sample assessment sheets for program outcomes (a)- (k)

Addendum to Chapter 3
Criterion 3: Program Outcomes and Assessment

Addendum materials:

1. ABET Outcomes and Assessment Committee Report – Spring 2006
2. Course syllabus and assessment flow charts for ME 236 - Spring 2006
3. New Senior Exit Interview Survey Form (Revised Spring 2006)
4. Summary of IAC communications evaluation of capstone design projects, Spring 2006
5. New Alumni Survey Form (revised Spring 2006)
6. Forms for Student Course Evaluations
7. Sample assessment sheets for program outcomes (a)- (k)

Addendum 1:

ABET Outcomes and Assessment Committee Report

Spring 2006

Mechanical Engineering Department

New Mexico State University
Box 30001, MSC 3450
Las Cruces, New Mexico 88003-8001
Telephone: (505) 646-3501
FAX: (505) 646-6111

Memorandum

Date: December 1, 2008

To: Thomas D. Burton
Department Head

From: The ABET Outcomes and Assessment Committee
R. Pederson, E. Conley, R. Hills, I. Leslie

Re: ABET Outcomes and Assessment Committee Report – Spring 2006

The ABET Outcomes and Assessment Committee met numerous times during the months of April and May, 2006, and arrived at the following conclusions.

1. Committee Timeline:
   a. The Committee will meet each semester prior to beginning of classes in order to review the outcomes assessments and the student course evaluations for ABET relevant courses from the previous semester.

   b. Committee will meet at the end of the spring semester in order to review the materials related to assessment processes, direct and indirect measures, and overall program goals and direction.

2. ME Program Outcomes (a-k):
   a. The Committee revised the matrix relating program outcomes to specific courses.
   b. From this matrix, a subset of courses was selected as "focus" courses, i.e., courses whose assessments the Committee would review each semester as indicators of ABET program outcomes a-k.
   c. The Committee solicited and reviewed all ABET assessment flowcharts for all focus courses. As a result, the Committee recommended revisions in measures, assessments, evaluations, and course improvements. These revisions have been substantially implemented; the remaining revisions will be addressed prior to the fall 2006 semester.
   d. The Committee recommends that course assessment criteria in all courses should be based solely upon those students who pass the course. The logic is that students who re-take the course will be part of a future course assessment.
   e. The Committee recommends that assessment activities in all non-focus courses be reviewed by the ME Undergraduate Curriculum Committee yearly.

This review should include the development of assessment flow charts for these courses.

3. Professional Component (PC1-PC4):
   The Committee recommends a review of the general education requirements in light of the current program Educational Objectives and Outcomes.

4. Program criteria specific for mechanical engineering programs (ME1-ME4):
   a. The Committee recommends increased emphasis on thermal systems design.
   b. The Committee also recommends additional topics in statistics be included throughout the curriculum.

5. Fundamentals of Engineering (FE) exam:
   a. Overall, NMSU ME students appear to perform lower than the national average. The Committee recommends a more detailed review of FE exam results including:
      i. peer institution comparisons, NMSU departmental comparisons, and
      ii. review of specific topic areas such as electrical circuits, thermodynamics, and fans, pumps, and compressors.
   b. Committee recommends that department consider requiring a controls course.

6. Senior exit interview:
   a. The exit interview form was significantly revised for both conciseness and increased relevance to ABET program Educational Objectives and Outcomes.
   b. Based on exit interview results, the Committee notes that students' self-assessment of their ability to use computers in design is low. The Committee concurs, and recommends the department considers improved integration of CAE tools in our curriculum. The suggestion was made that certain faculty may be able to develop examples/homework for colleagues teaching the courses in order to help introduce the software and methods.
   c. Based also on exit interview results, the Committee notes that students' understanding of the societal impact of engineering is inadequate. The Committee recommends changes to senior seminar course in order to address this issue.
   d. Students indicate a lack of understanding of the Professional Engineers (PE) licensure and its impact on their professional career. The Committee also notes a relatively small number of students taking the FE exam this past semester. Therefore the Committee recommends increased emphasis on the licensure process to be implemented in senior courses.
   e. The exit interviews (along with previous IAC reports) indicate that upgrades to the undergraduate laboratory and shop facilities are necessary. Improvements to the shop are addressed herein (see 9a), and the committee recommends that the department continue to direct resources to the laboratory and shop facilities.

7. The ME alumni survey:
   The alumni survey form was significantly revised for both conciseness and increased relevance to ABET program Educational Objectives and Outcomes.

8. ME Co-Op employer survey:
   Implement the use of a survey for feedback on Educational Objectives and Program Outcomes, current marketplace needs and requirements. Preliminary discussion with the NMSU Placement and Career Services confirms that such a survey can be added to existing Co-Op procedures.

9. ME Industrial Advisory Committee (IAC) review:
   a. Former IAC reports recommended significant improvements in student shop management. As a result the shop and its management were reconfigured with new management and upgraded equipment.
   b. Former IAC reports recommended that our students receive external assessment of their communication skills. As a result, members of the IAC provide such an assessment in the Capstone Design course during the IAC spring annual meeting.
   c. The Committee recommends that we work with the IAC to develop a short, concise rubric to assess the level of achievement in meeting program Educational Objectives and Outcomes, and to assess whether our curriculum provides students with the background to meet objectives after graduation. This rubric would be implemented at the Annual Meeting in 2007.

Addendum 2:

Course Syllabus and Assessment Flow Charts for ME 236

Spring 2006

Course Information	ME 236 Engineering Mechanics-I
INSTRUCTOR:	Igor Sevostianov Office: JH 628 Phone: 646-3322 Email: igor@me.nmsu.edu
ASSISTANT:	N/A
OFFICE HOURS:	We 10:30-11:30 or by appointment
TEXT:	*Engineering Mechanics, Statics* R.C. Hibbeler., 10-th ed Prentice Hall
CLASS SCHEDULE:	Lecture 9:30 – 10:20, Mo, We, Fr JH 209
GRADES:	Homeworks and Quizzes 15%; Test #1 15%; Test #2 20%; Test #3 20%; Final Exam 30%
COURSE OBJECTIVES	**After completing this course, a student should be able to:** • Determine resultants of concurrent force systems using both force triangle and component methods (a). • Apply equilibrium conditions to force systems (a). • Construct free body diagrams of particles, rigid bodies, and structures, and identify all external forces and moments acting on them (k). • Use principles of equilibrium to determine forces and moments acting on individual members of trusses, and other structures (k). • Apply concepts of friction to a variety of problems including ramps, sliding vs. tipping, wedges, and belts (e). • Determine the centroid and moment of inertia of cross-sectional areas, including structural shapes (a).
TOPICS COVERED:	• Vectors • Particle equilibrium • Equivalent force systems • Rigid body equilibrium • Structural analysis • Centroids, distributed load systems, fluid pressure • Area and mass moments of inertia • Friction • Internal forces • Principle of virtual work
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems. Program Objective C – to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information and to work collaboratively.
RELATIONSHIP TO PROGRAM OUTCOMES:	a - ability to apply knowledge of math, science, and engineering e – ability to identify, formulate and solve engineering problems k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME 4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems.

Course Information	**ME 236 Engineering Mechanics-I**
HOMEWORKS POLICIES:	• Overall grade for HW will be based on all assignments excluding the one with the worst grade. • Every student has the right to skip one HW assignment. However, having used this right, one cannot exclude the worst HW
AUTHOR/DATE:	Igor Sevostianov 1/18/2006

ME 236: Engineering Mechanics I **Spring 2006**

Outcome a:

An ability to apply equilibrium conditions to force systems

Measure

- Homeworks # 7-16
- Quizzes # 2-3
- Midterm exam #1
- Final exam

Feedback

Quizzes and tests results

Students monthly questionnaires

Students' course evaluation

Learning Strategies

- Lectures
- Questions and answers
- Homeworks

Feedback

Quizzes and tests results

Students monthly questionnaires

Students' course evaluation

Assessment

75% demonstrate score corresponding to B (75/100, 22/30, or 7/10) or higher for quiz, homeworks, and tests

Evaluation

6/10 homeworks met goal; 2/2 quizzes; final exam.
53% met goal for mid-term

The assessment is satisfactory for quizzes and homeworks.
Improvements required for the midterm exams

Improvements

1. Make more Tutorial and Review Sessions. (applied before the final exam - substantial improvement as compare to exam II).
2 Pay more attention in class on problems solving strategy
3. Organize (or use existing) interactive web site for problems solution.

Display Material Reference:

- **Course Syllabus;**
- **Assignment schedule;**
- **Examples of Homeworks, quizzes and exams;**
- **Grades for Homeworks #7-16, Quizes 2 and 3, Exam 1 and Final Exam.**

ME 236: Engineering Analysis I — Spring 2006

Outcome e:

An ability to apply concepts of friction to a variety of problems including ramps, sliding vs. tipping, wedges, and belts

Measure

- Homeworks # 26-28
- Quize # 5
- Midterm exam #3
- Final exam

Feedback

Quizzes and tests results

Students monthly questionnaires
Students' course evaluation

Learning Strategies

- Lectures
- Questions and answers
- Homeworks

Feedback

Quizzes and tests results

Students monthly questionnaires

Students' course evaluation

Assessment

75% demonstrate score corresponding to B (75/100, 22/30, or 7/10) or higher for quiz, homeworks, and tests

Evaluation

Goal met for homeworks, quizzes and Exam 3

71% met goal for final exam

The assessment is satisfactory for quizzes and homeworks. Some improvements required for the exams

Improvements

1. Make more Tutorial and Review Sessions. (comparison of the results of exam 3 and final exam with those of exams 1 and 2 is noticeable)
2 Pay more attention in class on problems solving strategy (compare with the results in the beginning of the semester - remarkable)

Display Material Reference:

- **Course Syllabus;**
- **Assignment schedule;**
- **Examples of Homeworks, quizzes and exams;**
- **Grades for Homeworks #26-28, Quizes 6 and 7, Exam 3 and Final Exam.**

ME 236: Engineering Analysis I — Spring 2006

Outcome k:

An ability to use principles of equilibrium to determine forces and moments acting on individual members of trusses, and other structures

Measure

- Homeworks # 17-21
- Quiz # 4
- Midterm exam #2
- Final exam

Feedback

Quizzes and tests results

Students monthly questionnaires

Students' course evaluation

Learning Strategies

- Lectures
- Questions and answers
- Homeworks

Feedback

Quizzes and tests results

Students monthly questionnaires

Students' course evaluation

Assessment

75% demonstrate score corresponding to B (75/100, 22/30, or 7/10) or higher for quiz, homeworks, and tests

Evaluation

75% met goal on 3/5 homeworks,
71% met goal on quiz 2
35% met goal on Exam 2 (mid-term)
71% met goal on final exam

Substantial improvement required for the midterm exams. Some improvements need for the homeworks.

Improvements

1. Make more Tutorial and Review Sessions. (applied before the final exam - substantial improvement as compare to exam II).
2. Increase the off-class time for meeting with the students.
3. Organize (or use existing) interactive web site for problems solution.

Display Material Reference:

- **Course Syllabus;**
- **Assignment schedule;**
- **Examples of Homeworks, quizzes and exams;**
- **Grades for Homeworks #17-21, Quize 4, Exam 2 and Final Exam.**

Addendum 3:

New Senior Exit Survey

(Revised Spring 2006)

Senior Exit Interview Survey
(Revised Spring 2006)

The Mechanical Engineering Department at New Mexico State University wants to maintain contact with you as you graduate and proceed through your career. Also, we are committed to continuous assessment and improvement of the baccalaureate curriculum leading to the BSME degree. The information that you provide is essential to the success of our continuous improvement process. Thank you for assisting your department by participating.

Keeping in contact with you (information valid for next year):

Name: Date:

Address:

(street) (city) (state) (zip code)

Phone: E Mail:

Current Status and Future Plans:

☐ I plan to take some time off before I get serious about seeking a job or graduate school.

☐ I have accepted a job with the following organization:

Name of organization: ____

Location of organization:_______________________________________

Position title: ____

How many resumes did you hand out or email? ____________

How many offers of a position did you receive? ____________

What is the range of salary offers you have received? _______________

☐ I am still seeking a position.

Would you like to be receive e-mails from the ME Department about engineering employment opportunities?

☐Yes ☐ No

☐ I plan to attend Graduate School right away.

Name of university (ies) at which I applied or have been accepted:

____

____

Field of study: ____

☐ I plan to attend Graduate School sometime in the future.

Quality of the Mechanical Engineering program at NMSU

According to the following scale, please circle the number that reflects your opinion.

5=Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

The ME program provided me with sufficient knowledge and experience to:					
Apply knowledge of mathematics, science, and engineering	5	4	3	2	1
Design and conduct experiments, analyze and interpret data	5	4	3	2	1
Design a system, component, or process	5	4	3	2	1
Function on multi-disciplinary teams	5	4	3	2	1
Identify, formulate and solve engineering problems	5	4	3	2	1
Understand professional and ethical responsibility	5	4	3	2	1
Communicate effectively	5	4	3	2	1
Understand the impact of engineering solutions in a global and societal context	5	4	3	2	1
Engage in lifelong learning	5	4	3	2	1
Recognize contemporary issues	5	4	3	2	1
Use techniques, skills and modern engineering tools for engineering practice	5	4	3	2	1

Please rate the following using a scale of 1-4:
4=Excellent 3=Good 2=Average 1=Poor

Students' ability to handle real-world engineering problems	4	3	2	1
Quality of instruction in the ME program	4	3	2	1
ME department's system for advising students	4	3	2	1
NMSU's Placement & Career Services system	4	3	2	1
Physical facilities (such as classrooms, labs, etc.)	4	3	2	1
Computer facilities	4	3	2	1
ME Shop	4	3	2	1

Please provide written comments on this sheet as you feel appropriate:

Quality of instruction in any specific course(s) you wish to mention:

Other Comments:

Addendum 4:

Summary of IAC Communications Evaluation of Capstone Design Projects

Spring 2006

Outcome Assessment g Evaluation
SP 2006

Capstone Project Evaluation by
Mechanical Engineering Industry Advisory Board

(1) For each of the following questions, allot the number that reflects your opinion according to the following scale.

5=Strongly Agree 4=Agree 3=Neutral

2=Disagree 1=Strongly Disagree NA=Not Applicable

The student showed his/her knowledge and ability to:

(1.1) Project objectives were clearly described
(1.2) Presenters' ability to convey knowledge about the project
(1.3) Organization of the presentation was well organized
(1.4) Presenters' attitude toward the subject matter was professional
(1.5) Presenters' visuals/tools were effective
(1.6) Overall, this was a very informative presentation

		No. of reviewers awarding score of:						
Team	**Question No.**	**1 pt.**	**2 pt.**	**3 pt.**	**4 pt.**	**5 pt.**	**Total**	**Overall Ave**
Autonomous Balloon	Q (1.1)				4	1	21	3.73
	Q (1.2)			2	1	1	15	
	Q (1.3)			2	2	1	19	
	Q (1.4)			1	2	2	20	
	Q (1.5)			2	2	1	19	
	Q (1.6)			3	2		17	
Black Steamer	Q (1.1)			3	1	2	23	4.33
	Q (1.2)				3	3	27	
	Q (1.3)			1	2	3	26	
	Q (1.4)			1	1	4	27	
	Q (1.5)		1		1	4	26	
	Q (1.6)				3	3	27	
Biomass	Q (1.1)			1	4	1	24	3.94
	Q (1.2)		1	1	2	2	23	
	Q (1.3)			2	3	1	23	
	Q (1.4)			1	2	3	26	
	Q (1.5)			3	3		21	
	Q (1.6)			2	1	3	25	
Cooling	Q (1.1)			4	1	1	21	3.86
	Q (1.2)			1	5		23	
	Q (1.3)			1	5		23	
	Q (1.4)			2	3	1	23	
	Q (1.5)			1	3	2	25	
	Q (1.6)			1	4	1	24	

		No. of reviewers awarding score of:						
Team	**Question No.**	**1 pt.**	**2 pt.**	**3 pt.**	**4 pt.**	**5 pt.**	**Total**	**Overall Ave**
Interior Cargo	Q (1.1)				3	3	27	4.19
	Q (1.2)			2	2	2	24	
	Q (1.3)			3	2	1	22	
	Q (1.4)				3	3	27	
	Q (1.5)			1	2	3	26	
	Q (1.6)			1	3	2	25	
Nanosat	Q (1.1)			1	2	3	26	4.25
	Q (1.2)				4	2	26	
	Q (1.3)			1	3	2	25	
	Q (1.4)			2	2	2	24	
	Q (1.5)			1	2	3	26	
	Q (1.6)				4	2	26	
PAH	Q (1.1)			3	2	1	22	3.78
	Q (1.2)		1	2	2	1	21	
	Q (1.3)			2	2	2	24	
	Q (1.4)			1	3	2	25	
	Q (1.5)			2	3	1	23	
	Q (1.6)			3	3		21	
Raytheon								**N/A**
SRI	Q (1.1)		1	4			14	2.33
	Q (1.2)		3	2			12	
	Q (1.3)		2	3			13	
	Q (1.4)			4	1		16	
	Q (1.5)			4	1		16	
	Q (1.6)		2	3			13	
Border Gateway	Q (1.1)			3	1	2	23	3.92
	Q (1.2)			2	2	2	24	
	Q (1.3)			2	2	2	24	
	Q (1.4)			1	3	2	25	
	Q (1.5)		1	2	2	1	21	
	Q (1.6)			2	2	2	24	

Assessment Measure	75% teams receive 3.8 out of 5 for MEA evaluation	
AG (Assessment Goal)	3.8 out of 5 for MEA evaluation	
	No. of Teams	Percentage
Team > AG	6	66.7%
Team < AG	3	33.3%

Addendum 5:

New Alumni Survey Form

(Revised Spring 2006)

Alumni Survey
(Revised Spring 2006)

The purpose of this survey is to determine whether you feel that your education in Mechanical Engineering at New Mexico State University adequately prepared you for your career. Your responses will assist us in making decision about our program and curriculum design.

Name:
Address:
(street) (city) (state) (zip code)

Phone: E Mail:

Graduating Class: Major: Mechanical Engineering Degree:

Your Professional Status:

1. Are you presently employed?

☐ Yes ☐ No Skip to question 8

2. Who is your employer: ____

3. What is your position title: ____

4. How long have you worked for your present employer:________________

5. How many individuals do you supervise: ____________________________

6. In your present position, do you participate on any teams, or multi-disciplinary projects?

☐ Yes What disciplines (for example, other types of engineers, scientists, businessmen) are represented on these project ____

☐ No

7. Please briefly describe your primary job responsibilities: ________________________________

____

____

8. How many positions have you held since graduating from NMSU: ________

Of these, how many are directly related to the ME education you received at NMSU: ___

9. Did you pursue graduate studies after receiving your degree from NMSU?

☐Yes Where: ___________________________________
Degree: ________ Field: ____________________
☐No

10. What are the three most important factors for success in your career?

Factor & why it is important

1.

2.

3.

The Mechanical Engineering Department has been guided in the design of its program and curriculum by the goals listed in the table below. Please rank how important you believe these goals to be as they relate to your professional career. Also, please rate how successfully we prepared you in these areas.

Please rank the goals below by importance with 1 being the most important and 5 being the least important	On a scale of 1-5 5=totally prepared 1= totally unprepared				
To prepare students for successful careers and lifelong learning.	5	4	3	2	1
To educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems.	5	4	3	2	1
To develop the students' skills pertinent to the design process, including the ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively.	5	4	3	2	1
To teach students to use modern experimental and data analysis techniques.	5	4	3	2	1
To instill in our students an understanding of their professional and ethical responsibilities	5	4	3	2	1

Quality of the Mechanical Engineering program at NMSU

According to the following scale, please circle the number that reflects your opinion.

5=Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

The ME program provided me with sufficient knowledge and experience to:

Apply knowledge of mathematics, science, and engineering	5	4	3	2	1
Design and conduct experiments, analyze and interpret data	5	4	3	2	1
Design a system, component, or process	5	4	3	2	1
Function on multi-disciplinary teams	5	4	3	2	1
Identify, formulate and solve engineering problems	5	4	3	2	1
Understand professional and ethical responsibility	5	4	3	2	1
Communicate effectively	5	4	3	2	1
Understand the impact of engineering solutions in a global and societal context	5	4	3	2	1
Engage in lifelong learning	5	4	3	2	1
Recognize contemporary issues	5	4	3	2	1
Use techniques, skills and modern engineering tools for engineering practice	5	4	3	2	1

Alumni Survey Spring 2006 page 3

Please rate the following using a scale of 1-4:
4=Excellent 3=Good 2=Average 1=Poor

	4	3	2	1
Students' ability to handle real-world engineering problems	4	3	2	1
Quality of instruction in the ME program	4	3	2	1
ME department's system for advising students	4	3	2	1
NMSU's Placement & Career Services system	4	3	2	1
Physical facilities (such as classrooms, labs, etc.)	4	3	2	1
Computer facilities	4	3	2	1
ME Shop	4	3	2	1

11. Are you a member of any professional associations?

- ☐ Yes Which ones: ______________________________
- ☐ No

12. Have you ever received, or are you in the process of pursuing any special engineering licenses or certifications?

- ☐ Yes Which ones: ______________________________
- ☐ No

13. Approximately how many continuing education courses, workshops or seminars have you taken since graduating from NMSU? ______________________

14. While a student at NMSU, did you participate in any activities or programs that were particularly helpful in preparing you for your career?

- ☐ Yes Examples: ______________________________
- ☐ No

15. Can you suggest any courses/topics not offered in the ME program that would have better prepared you for your career?

- ☐ Yes Examples: ______________________________
- ☐ No

16. Do you have any suggestions for the ME Department that will help us better prepare our students for the workplace? ______________________________

____

____

____

Thank you so much for taking the time to assist us with this interview.

Use the enclosed self-addressed stamped envelope to return the survey

to the Mechanical Engineering Department.

Addendum 6:

Student Course Evaluation Form

Spring 2006

Course Evaluation

Course# Course Title

Semester Year **Instructor: Instructor**

The **Course#** course syllabus presented a number of objectives for this semester's plan of study. This is an opportunity for you to evaluate how well these objectives were met. There are four parts of this evaluation. The purpose is to determine:

1) To what level the educational objectives were met;
2) How effective the course instruction was;
3) The strengths and weaknesses of the course instruction;
4) How well this course fits into the Mechanical Engineering curriculum.

Ultimately, the results of this evaluation will assist in refining the content and delivery of this course.

Part 1 - Achievement of Educational Goals: Course#

For each of the following topics, please circle the number that best describes your proficiency level on a scale of 1 to 5. The rating one (1) means "no understanding" of the topic area, and the rating five (5) means "basic proficiency" in that topic area.

Topic Area							
		Circle One					
	No Understanding	1	2	3	4	5	**Basic Proficiency**
	No Understanding	1	2	3	4	5	**Basic Proficiency**
	No Understanding	1	2	3	4	5	**Basic Proficiency**
	No Understanding	1	2	3	4	5	**Basic Proficiency**
	No Understanding	1	2	3	4	5	**Basic Proficiency**
	No Understanding	1	2	3	4	5	**Basic Proficiency**
	No Understanding	1	2	3	4	5	**Basic Proficiency**

Part II - Effectiveness of Course Instruction:

Evaluate the course design, the instructor's knowledge level, and the methods used by circling a number from one (1) to five (5).

		Circle One					
2.1) The course objectives were clearly communicated by instructor.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.2) A close relationship existed between stated objectives and classroom instruction.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.3) The organization of the course was good.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.4) The instructor's apparent familiarity with the material presented was extensive.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.5) The instructor's ability to convey knowledge about the subject was excellent.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.6) The instructor's attitude toward the subject matter was enthusiastic.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.7) The instructor's teaching materials were effective.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.8) The instructor was responsive to student questions.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.9) The instructor motivated me to do my best.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.10) The instructor's willingness to help outside the classroom was good.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.11) Instructor's grading was fair.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.12) The instructor's availability during office hours was good.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.13) I have learned a great deal from this course.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.14) The presentation of material in the course was well paced.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.15) The homework helped me to learn the course material.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.16) The textbook and/or class handouts helped me to learn the course material.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
2.17) I would recommend this instructor to another student.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**

Part III - Strengths and Weaknesses of Instruction:

In this section of the evaluation, you are asked to comment on the instructor's strengths and weaknesses with respect to the teaching of this course. **Use additional paper if necessary.**

3.1) What do you think are the strengths of this course?

3.2) What do you think are the weaknesses of this course?

3.3) What do you think is the instructor's greatest strength in teaching this course?

3.4) How could the instructor improve this course? (You may consider, for example: course content, presentation, utilization of class time, etc.) What would you change for future offerings of this course?

3.5) Is there anything else you would like to add to your evaluation of this course?

Part IV - Curriculum Review: Course#

Evaluate in this section how well you think this course fits into the Mechanical Engineering curriculum. Please evaluate how well your previous coursework prepared you for this class. Since we are evaluating the curriculum, this may not be the same as how easy or difficult you found this course or what grade you expect.

Consider the level of preparation provided by:

- Previous **Mechanical Engineering** courses
- Previous **Engineering (out of department)** courses
- Previous **Mathematics** courses
- Pre/Co-requisites for **Course#**:
  Pre-requisite(s): **PreReqs**
  Co-requisite(s): **CoReqs**

(Note: When evaluating the level of preparation provided by a specific course, please take into consideration only the subject matter of that course.)

		Circle One					
4.1) In general, I was well prepared for this course.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
4.2) Previous **Mechanical Engineering** courses prepared me well for this course.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
4.3) Previous **Engineering (out of department)** courses prepared me well for this course.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
4.4) Previous **Mathematics** courses prepared me well for this course.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**
4.5) The course P**re/Co-requisite(s)** prepared me well for this course.	**Strongly Disagree**	1	2	3	4	5	**Strongly Agree**

4.6) If you answered "Strongly Disagree" in any of the above, please identify specifically where a lack of preparation exists?

____

____

____

4.7) Do you have any other curriculum-related comments or suggestions?

____

____

____

Addendum 7:

Sample Assessment Sheets for Program Outcomes

Spring 2006

Program Outcome (a):
ability to apply knowledge of math, science and engineering

Faculty Assessment in Courses

ME 236 Englineering Mechanics I

Evaluation	Goal partially met; significantly below for mid-term exam
Improvement:	Learning strategies revised and expanded

ME 260 Mechanical Engineering Problem Solving - Fall 2005

Evaluation	Goal A met; Goal B not met (-2%)
Improvement:	Learning strategies revised

ME 260 Mechanical Engineering Problem Solving - Spring 2006 (different instructor)

Evaluation	Goals not met (70% receive 80%)
Improvement:	Adjust goal to align with other courses (80% receive 70%)
	Learning strategies revised

ME 329 Engineering Analysis II

Evaluation	Goals not met
Improvement:	Specific additions to learning strategies identified

ME 341 Heat Transfer

Evaluation	Goals slightly below desired
Improvement:	Change textbook

Fundamentals of Engineering Exam:
Comparison of ME average to National average 2001-2005

Subject areas addressing outcome (a), General AM & PM questions:

>/= 90% National Average	< 90% National Average
Chemistry	Electrical Circuits
Dynamics	Mechanics of Materials
Fluid Mechanics	Statics
Mater. Sc/Str Mater	Thermodynamics
Mathematics	

Subject areas addressing outcome (a), General PM questions:

>/= 90% National Average	< 90% National Average
	Chemistry
	Dynamics
	Electrical Circuits
	Fluid Mechanics
	Mater. Sc/Str Mater
	Mathematics
	Mechanics of Materials
	Statics
	Thermodynamics

Subject areas addressing outcome (a), Mechanical PM questions:

	>/= 90% National Average	< 90% National Average
	Dynamics systems	Automatic Controls
	Fluid Mechanics	Energy Conservation
	Heat Transfer	Fans/Pumps/Compr
	Mechanical Design	Measurement & Instr
	Mechanical Design	Stress Analysis
	Mater. Behav. & Process	Thermodynamics
	Refrigeration & HVAC	
New 2005	Thermo & Energy Conservation	

Program Outcome (b):
ability to design and conduct experiments/analyze and interpret data

Faculty Assessment in Courses

ME 345 Experimental Methds I

Evaluation	Goal met
Improvement:	More specific grading; divide into lab grade and report/presentation grade

ME 445 Experimental Methods II

Evaluation

Improvement:

Fundamentals of Engineering Exam:
Comparison of ME average to National average 2005

Subject areas addressing outcome (b), General AM & PM questions (introduced in 2005):

>/= 90% National Average	< 90% National Average
Engineering Probability & Statistics	

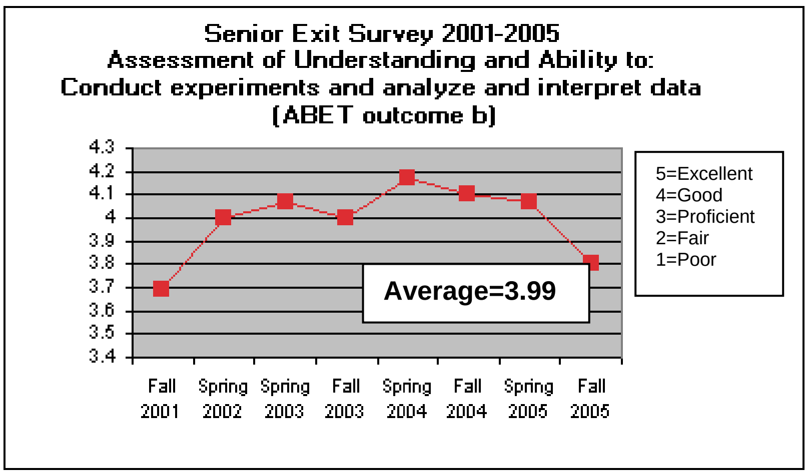
Senior Exit Survey 2001-2005

Table 4 Assessment of Understanding and Ability

to conduct experiements and analyze and interpret data

Average = 3.99/5

Senior Exit Survey 2006 = 4.2



Program Outcome (c):
ability to design a system, component or process

Faculty Assessment in Courses

ME 326 Design of Machine Elements

Evaluation	Goal 5% below desired
Improvement:	Learning strategies

ME 426/427 Design Project Lab I/II

Evaluation	Goal met
Improvement:	No improvement needed

Fundamentals of Engineering Exam:
Comparison of ME average to National average 2001-2005

Subject areas addressing outcome (c), Mechanical PM questions:

	>/= 90% National Average	< 90% National Average
	Fans/Pumps/Compressors	
	Mechanical Design	
	Refrigeration & HVAC	
New 2005	Refrigeration & HVAC	Mechanical Design & Analysis

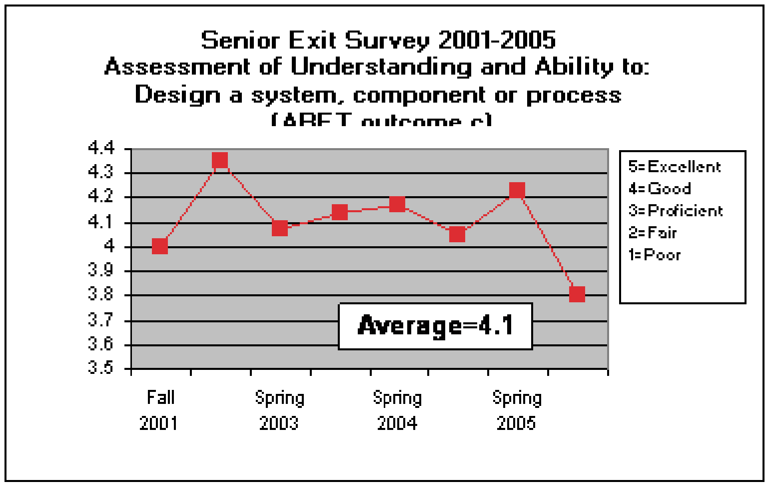
Senior Exit Survey 2001-2005

Table 4 Assessment of Understanding and Ability

ability to design a system, component or process

Average = 4.1/5

Senior Exit Survey 2006 = 4.07



Program Outcome (d): ability to function on a multidisciplinary team

Faculty Assessment in Courses

ME 426/427 Design Project Lab I/II

Evaluation	Goal met for collaborative work; goal not met for # of multidisciplinary teams
Improvement:	Recruit more students & project from other departments (EE & CE)

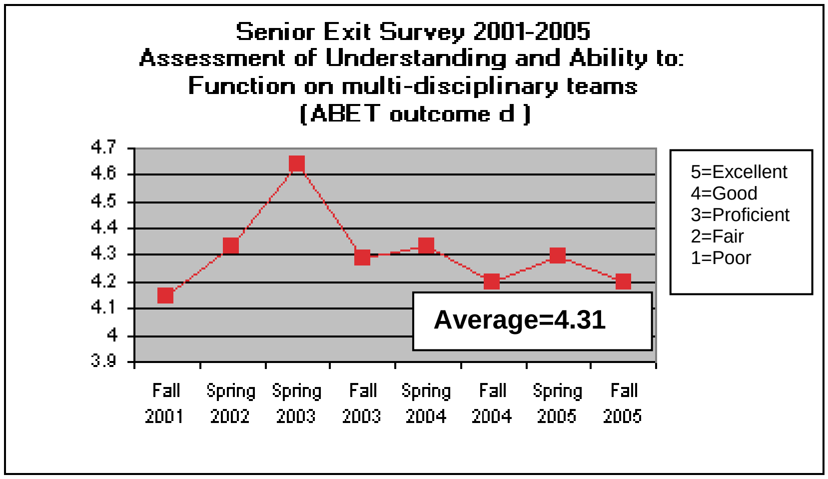
Senior Exit Survey 2001-2005

Table 4 Assessment of Understanding and Ability

to conduct experiements and analyze and interpret data

Average = 4.31/5

Senior Exit Survey 2006 = 4.33



Program Outcome (e):
ability to identify, formulate and solve engineering problems

Faculty Assessment in Courses

ME 236 Englineering Mechanics I

Evaluation Goal met for homework/quizzes met; exams 4% below desired goal

Improvement: Learning strategies revised and expanded

ME 240 Thermodynamics

Evaluation Goal met; low assessment goal; 50% achieve 50%

Improvement:

ME 338 Fluid Mechanics

Evaluation Goals met for homework; not met for final exam

Improvement: Raise assessment goal for homework

Special Note: Medical emergency caused change of instructor mid-semester; renders evaluation questionable

ME 340 Applied Thermodynamics

Evaluation Goal not met by 50%

Improvement: Learning strategies; re-evaluate measurement

ME 341 Heat Transfer

Evaluation	Goal for 2/3 measures met
Improvement:	Learning strategies

Fundamentals of Engineering Exam:
Comparison of ME average to National average 2001-2005

Subject areas addressing outcome (e), General AM & PM questions:

>/= 90% National Average	< 90% National Average
Dynamics	Electrical Circuits
Fluid Mechanics	Mechanics of Materials
Mater. Sc/Str Mater	Statics
	Thermodynamics

Subject areas addressing outcome (e), General PM questions:

>/= 90% National Average	< 90% National Average
	Dynamics
	Electrical Circuits
	Fluid Mechanics
	Mater. Sc/Str Mater
	Mechanics of Materials
	Statics
	Thermodynamics

Subject areas addressing outcome (e), Mechanical PM questions:

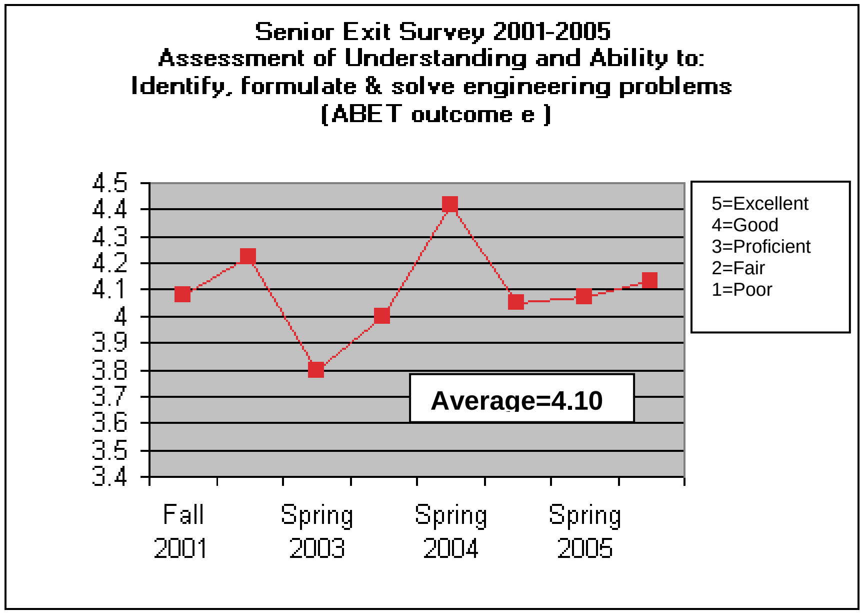
	>/= 90% National Average	< 90% National Average
	Dynamics systems	Automatic Controls
	Fluid Mechanics	Energy Conservation
	Heat Transfer	Stress Analysis
	Mater. Behav. & Process	Thermodynamics
	Refrigeration & HVAC	
	Thermo & Energy Conservation	
New 2005	Thermo & Energy Conservation	Mechanical Design & Analysis
	Refrigeration & HVAC	Fluid Mechanics & Fluid Machinery
		Heat Transfer

Senior Exit Survey 2001-2005

Table 4 Assessment of Understanding and Ability

to identify, formulate and solve engineering problems

Average = 4.1/5
Senior Exit Survey
2006 = 4.40



Program Outcome (f):
understanding of professional and ethical responsibility

Faculty Assessment in Courses

ME 326 Mechnical Design

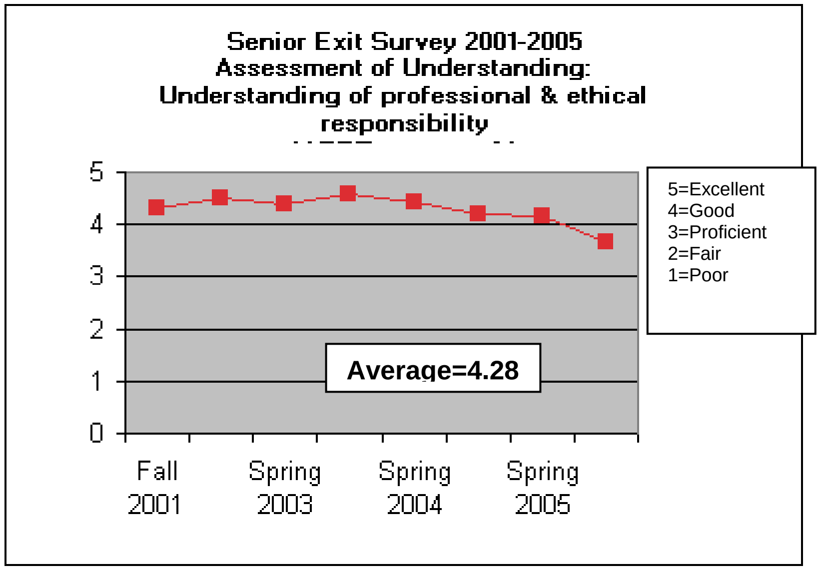
Evaluation	Goal met
Improvement:	No improvement necessary

Senior Exit Survey 2001-2005

Table 5 Assessment of Understanding

Professional and Ethical Responsibility

Average = 4.28
Senior Exit Survey 2006 = 4.47



Program Outcome (g):
ability to communicate effectively

Faculty Assessment in Courses

ME 102 ME Orientation

Evaluation	1 goal met; 2 within 10%
Improvement:	Learning strategies

ME 426/427 Design Project Lab I/II

Evaluation	Goal met for design report; goal not met for oral presentation for MEA/IAC
Improvement:	Videotape MEA review presentations and use as a learning tool

ME 445 Experimental Methods II

Evaluation	goals met for both written and oral reports
Improvement:	No improvement needed

Senior Exit Survey 2001-2005

Table 4 Assessment of Understanding and Ability to communicate orally

Average = 4.17/5

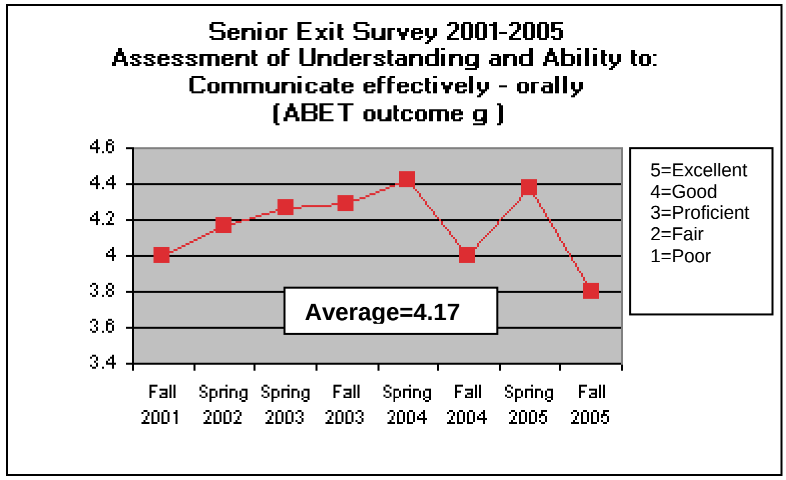
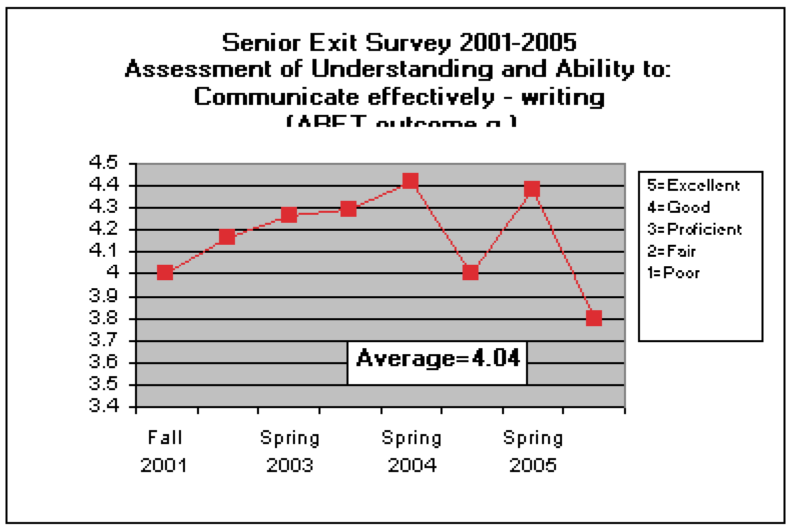


Table 4 Assessment of Understanding and Ability to communicate in writing

Average = 4.0/5



Senior Exit Survey 2006 = 4.33 (Combined to "communicate effectively")

Program Outcome (i):
recognition of the need for, and ability to, engage in lifelong learning

Faculty Assessment in Courses

ME 449 ME Senior Seminar

Evaluation	Goal met
Improvement:	Expand learning strategies

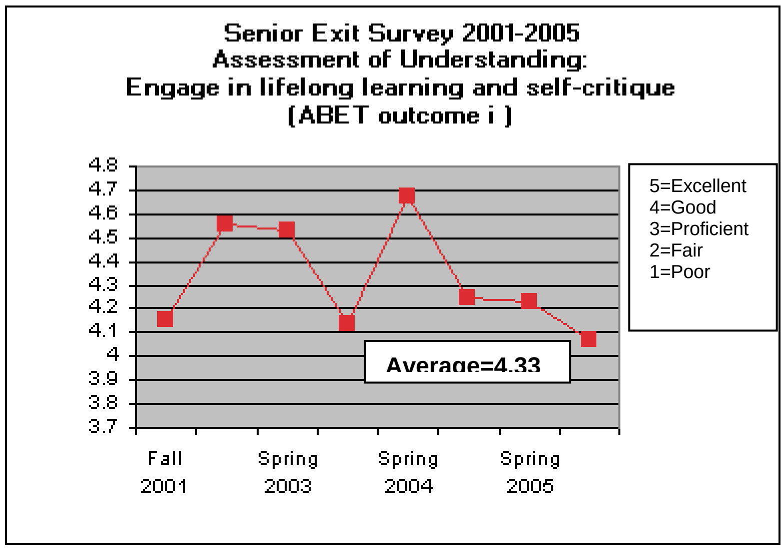
Senior Exit Survey 2001-2005

Table 4 Assessment of Understanding

Engage in lifelong learning and self-critique

Average = 4.33

Senior Exit Survey 2006 = 4.53



Program Outcome (j): knowledge of contemporary issues

Faculty Assessment in Courses

ME 326 Mechanical Design

Evaluation	Goal not met
Improvement:	Re-define requirement

ME 449 ME Senior Seminar

Evaluation	Goal not met
Improvement:	Expand, formalize learning strategies

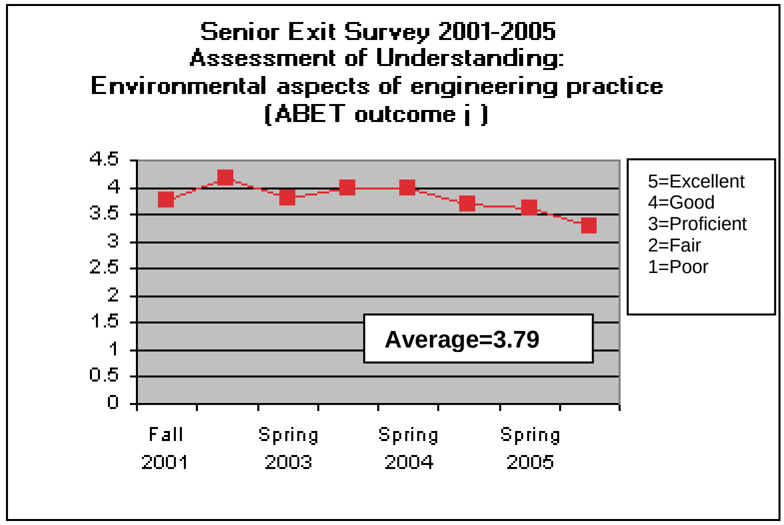
Senior Exit Survey 2001-2005

Table 4 Assessment of Understanding

Environmental Aspects of engineering

Average = 3.79

Senior Exit Survey 2006 = 4.27



Program Outcome (k):
ability to use techniques, skills and modern engineering tools for enginering practice

Faculty Assessment in Courses

ME 166 Introduction to Mechanical Engineering

Evaluation	Goal met
Improvement:	No improvement needed

ME 222 Introduction to Product Development

Evaluation	2/3 goals met
Improvement:	Learning strategies

ME 236 Engineering analysis I

Evaluation	Goal for homework met; slightly below for qizzes & final; significantly below for mid-term
Improvement:	Expand learning strategies

ME 260 ME Problem Solving - Fall 2005

Evaluation Goal not met

Improvement: Learning strategies

ME 329 Engineering Analysis II

Evaluation Goal not met

Improvement: Learning strategies; use computer lab for quizzes

ME 341 Heat Transfer

Evaluation Goal not met

Improvement: Learning strategies; adjust grading weight for homework

Fundamentals of Engineering Exam: Comparison of ME average to National average 2001-2005

Subject areas addressing outcome (e), General AM, PM and PM Mech questions:

>/= 90% National Average

Computers

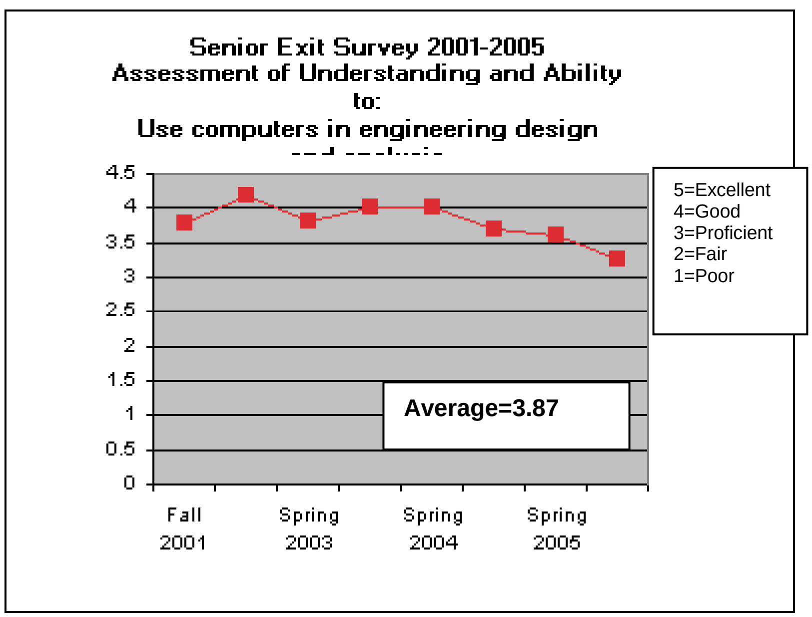
Senior Exit Survey 2001-2005

Table 4 Assessment of Understanding and Ability

Use computers in engineering design and analysis

Average = 3.87/5

Senior Exit Survey 2006 = 4.33



4

Criterion 4: Professional Component

ABET 2006 SELF-STUDY PART B

The Mechanical Engineering curriculum described in this chapter prepares our students for engineering practice by integrating mathematics, science, engineering mechanics, thermal sciences, communications, humanities, social sciences, economics, and ethics and professionalism. In addition, the curriculum develops skills in problem solving and in design of thermal and mechanical components and systems. The curriculum sequence culminates in a major design project experience.

Table B4.1 lists the courses in the order they are given. A total of 129 semester credit hours are currently required for graduation. The science sequence consists of eight credit hours in chemistry and six credit hours in physics.

B4.1 One year of Mathematics and Basic Sciences

The one year of a combination of college level mathematics and basic sciences required by Criterion 4 is satisfied by the 35 credit hours of Mathematics, Chemistry and Physics required in the Mechanical Engineering curriculum. The mathematics sequence begins with Calculus I (MATH 191). Students not ready for Calculus I must take algebra, trigonometry, and analytic geometry before enrolling in Calculus I. A diagnostic test places entering students in the appropriate math course. Students are encouraged to take an elective math course in probability and statistics.

The basic science sequence begins with General Chemistry I (CHEM 111) followed by General Chemistry II (CHEM 112) during freshman year. During sophomore year, students take Engineering Physics I (PHYS 215) followed by Engineering Physics II (PHYS 216). Table B4.2 summarizes the basic science and math courses. A total of 35 credit hours (more than one year) is required. The mathematics electives are shown in Table B4.3.

Table B4.1 Mechanical Engineering Curriculum

Semester	Course (Department, Number, Title)	Category (Credit Hours) Math & Basic Sciences	Engineering Topics	General Education
Semester 1	ME 102: Mechanical Engineering Orientation		1	
	MATH 191: Calculus & Analytic Geometry I	3		
	CHEM 111: General Chemistry I	4		
	ME 159: Graphical Communication & Design		2	
	ENGL 111G: Rhetoric & Composition			4
	Approved Gen. Ed. Lit. & Fine Art elective			3
Semester 2	ME 166: Introduction to Mechanical Engineering		2	
	MATH 192: Calculus & Analytic Geometry II	3		
	CHEM 112: General Chemistry II	4		
	ENGL 218G: Technical & Scientific Communication			3
	ME 222: Introduction to Product Development/Lab		3	
Semester 3	ME 260: Mechanical Engineering Problem Solving		3	
	MATH 291: Calculus & Analytic Geometry III	3		
	PHYSICS 215: Engineering Physics I	3		
	EE 201: Networks		3	
	ME 236: Engineering Mechanics I		3	
	COMM 265G: Principles of Human Communication			3
Semester 4	MATH 392: Differential Equations	3		
	PHYS 216: Engineering Physics II	3		
	ME 237: Engineering Mechanics II		3	
	ME 240: Thermodynamics		3	
	CE 301: Mechanics of Materials		3	
Semester 5	ME 338: Fluids		3	
	ME Mechanics elective		3	
	ME 328: Engineering Analysis I	3		
	ME 340: Applied Thermodynamics		3	
	ECON 251 or 252G: Macro-or-Micro-Economics			3
	History elective			3
Semester 6	ME 326: Mechanical Design		3	
	ME 329: Engineering Analysis II	3		
	ME 341: Heat Transfer		3	
	CHE 361: Materials		3	
	ME 345: Experimental Methods I (Mechanics)		3	
Semester 7	ME 425: Machine Elements		3	
	ME 426: Capstone Design Lab 1		3	
	ME 445: Experimental Methods II (Thermo, Fluids, Heat)		3	
	Viewing a Wider World elective			3
	Human Thought & Behavior elective			3
	ME 449: Senior Seminar		1	
Semester 8	ME elective		3	
	ME elective		3	
	ME 427: Capstone Design Lab II		3	
	Mathematics elective	3		
	Viewing a Wider World elective			3
ABET BASIC LEVEL REQUIREMENTS - TOTALS		**35**	**66**	**28**

Table B4.2 Required Mathematics and Basic Science Courses

Course Number, Title, and Description	Credits
CHEM 111 General Chemistry : Descriptive and theoretical chemistry.	4
CHEM 112 General Chemistry II: Descriptive and theoretical chemistry. CHEM 111/112 are General Education alternative to CHEM 110G.	4
PHYS 215 Engineering Physics I: Calculus-level treatment of kinematics, work and energy, particle dynamics, conservation principles, simple harmonic motion.	3
PHYS 216 Engineering Physics II: A calculus-level treatment of topics in electricity, magnetism, and optics.	3
MATH 191 Calculus and Analytic Geometry I: Algebraic, logarithmic, exponential and trigonometric functions, theory and computation of derivatives, approximation, graphing, and modeling. May include an introduction to integration.	3
MATH 192 Calculus and Analytic Geometry II: Riemann sums, the definite integral, antiderivatives, fundatmental theorems, use of integral tables, numerical integration, modeling, improper integrals, differential equations, series, Taylor polynomials.	3
MATH 291 Calculus and Analytic Geometry III: Vector algebra, directional derivatives, Newton's laws, approximation, max-min problems, multiple integrals, applications, cylindrical and spherical coordinates, change of variables.	3
MATH 392 Introduction to Ordinary Differential Equations: Introduction to differential equations and dynamical systems with emphasis on modeling and applications. Basic analytic, qualitative and numerical methods. Equilibria and bifurcations. Linear syste	3
ME 328 Engineering Analysis I: Mathematical methods for exact and approximate solutions of engineering problems.	3
ME 329 Engineering Analysis II: Numerical methods for roots of linear and nonlinear equations, numerical integration, and the solution of ordinary differential equations with emphasis on software design and engineering applications.	3
MATH Elective	3
Total Credits	**35**

Table B4.3 Mathematics Electives

Course Number, Title, and Description	Credits
MATH 391 Vector Analysis: Calculus of vector valued functions, Green's and Stokes' theorems and applications.	3
MATH 471 Complex Variables : A first course in complex function theory, with emphasis on applications.	3
MATH 472 Fourier Series and Boundary Value Problems: Fourier series and methods of solution of the boundary value problems of applied mathematics.	3
MATH 473 Calculus of Variations and Optimal Control: Euler's equations, conditions for extrema, direct methods, dynamic programming, and the Pontryagin maximal principle.	3
MATH 480 Vector Spaces and Matrix Algebra: Matrices, determinants, vector spaces, characteristic values, canonical forms; applications.	3
STAT 371 Statistics for Engineers and Scientists I: Modern probability and statistics with applications to the engineering sciences.	3
IE 310G Continuous Quality Improvement : Deming's philosophy, Malcolm Baldridge national quality award, probability theory, discrete and continuous distributions, parameter estimation, hypothesis testing, control charts, design of experiments, analysis of	3

B4.2 One and One-half Years of Engineering Topics

The core of 66 hours in Mechanical Engineering courses is designed to give students the fundamentals of Graphical Communication and Design, Mechanical Engineering Problem Solving using computers, Mechanical and Thermal Systems Design, Mechanics, Dynamics, Thermodynamics, Fluid Mechanics, Heat Transfer, and Experimental Methods. Students must complete all engineering 300 level courses before proceeding with the capstone design courses. Also required are six credits in mechanical engineering electives, and 3 credits in Mechanics electives.

Table B4.4 shows the engineering topics covered in the Mechanical Engineering curriculum. Table B4.5 contains the Mechanical Engineering electives.

B4.3 General Education Component, Consistent with Program Objectives

General education attempts to foster intelligent inquiry, abstract logical thinking, critical analysis, and the integration and synthesis of knowledge; it strives for literacy in writing, reading, speaking, and listening; it teaches mathematical structures, acquainting students with precise abstract thought about numbers and space; it encourages an understanding of science and scientific inquiry; it provides a historical consciousness, including an understanding of one's own heritage as well as respect for other people and cultures; it includes an examination of values and stresses the importance of a carefully-considered values system; it fosters an appreciation of the arts; and general education provides the breadth necessary to have a familiarity with the various branches of human understanding.

New Mexico State University requires that all students satisfy a General Education requirement consisting of 38 credit hours. The General Education requirement supports the land-grant mission of the university, the ME educational objectives, and complements the technical component of the Mechanical Engineering curriculum. Table B 4.6 shows the general education component of the Mechanical Engineering curriculum and how it satisfies the 38 required credits.

Table B4.4 Engineering Topics Covered in Mechanical Engineering Curriculum	
Course Number, Title and Description	**Credits**
CE 301. Mechanics of Materials: Stress, strain, and elasticity of materials.	**3**
CHE. 361 Engineering Materials: Bonding and crystal structure of simple materials. Electrical and mechanical properties of materials. Phase diagrams and heat treatment.	**3**
EE 201. Networks I: Electrical component descriptions and equations. Kirchoff's	**3**
ME 102 Mechanical Engineering Orientation: Emphasis on tours of ME labs and NMSU facilities that illustrate possible career paths for mechanical engineers.	**1**
ME 159. Graphical Communication and Design: Sketching and orthographic projection. Covers detail and assembly working drawings, dimensioning, tolerance	**2**
ME 166. Introduction to Mechanical Engineering: Introduction to mechanical	**2**
ME 222. Introduction to Product Development: Introduction to modern methods used in realization of products. Traditional manufacturing processes, such as metal	**3**
ME 236. Engineering Mechanics I: Force systems, resultants, equilibrium, distributed	**3**
ME 237. Engineering Mechanics II: Kinetics of particles, kinematics and kinetics or rigid bodies, systems of particles, energy and momentum principles, and kinetics of	**3**
ME 240. Thermodynamics: First and second laws of thermodynamics, irreversibility	**3**
ME 260. Mechanical Engineering Problem Solving: Evolution and application of computers and acomputer hardware/software. Development of problem-solving	**3**
ME 326. Mechanical Design: Design Methodology and practice for mechanical	**3**
ME 338. Fluid Mechanics: Properties of fluids. Fluid statics and fluid dynamics.	**3**
ME 340. Applied Thermodynamics: Thermodynamic cycles, Maxwell relations, Gibbs	**3**
ME 341. Heat Transfer: Fundamentals of conduction, convection, and radiation.	**3**
ME 345. Experimental Methods I: Emphasis on experimental techniques, basic instrumentation, data acquisition and analysis, and written presentation of results.	**3**
ME 425. Design of Machine Elements: Design of machine elements through the	**3**
ME 426. Design Projects Laboratory I: Students address a design problem in which innovation and attention to detail are emphasized. Solution of the problem entails	**3**
ME 427. Design Projects Laboratory II: Continuation of ME 426.	**3**
ME 445. Experimental Methods II: Emphasis on experimental techniques, basic instrumentation, data acquisition in fluid mechanics, heat transffer, and	**3**
ME 449. Mechanical Engineering Senior Seminar: Senior seminar course covering topics relevant to graduating mechanical engineering seniors (job placement,	**1**
Mechanics Elective	**3**
ME Electives	**6**
Total Credits	**66**

Table B4.5 Mechanical Engineering Electives

Course Number, Title and Description	Credits
ME 331. Intermediate Strength of Materials: Covers stress and strain, theories of failure, curved flexural members, flat plates, pressure vesself, buckling, and composities.	3
ME 332 Vibrations: Vibration of single and n-degree of freedom systems considering free, forced, an damped motion. Lagrange's equations. Dynamic stability.	3
ME 333 Intermediate Dtnamics: Three dimensional kinematics and kinetics, orbal motion, Lagrange's equations, dynamic stability, and controls.	3
ME 401 Heating/Air-Conditioning System: HVAC system design including heating and cooling load calculations, psychometrics, piping, duct layout, and system control**.**	3
ME 452 Introduction to Automation and Control System Design: Control system design and implementation. Emphasis on practical applications of traditional control algorithms to mechanical engineering application in thermofluid systems and mechanical system	3
ME 443 Internal Combustion Engines: Cycles, characteristics, and principles of combustion for air breathing engines.	3
ME 460 Applied Finite Elements: Introduction to the practical aspects of structural finite element modeling. Course focuses on providing a working knowledge of how to effectively incorporate finite element techniques into the design process.	3
ME 461 Polymer, Their Comosites and Mechanical Behavior: principles of polymerization, polymer properties and polymer characterization. The fabrication and physical properties of polymer-based composite materials. Synthesis and characterization of polyme	3
ME 463 Low Speed Aerodynamics: Introduction to incompressible aerodynamics using potential flow and boundary layer theories.	3
ME 473 Compressible Flow: Development and application of the principles of compressible flow. Emphasis on one-dimensional, n0nviscous vlow.	3
ME 482 Concepts in Computer-Integrated Manufacturing: Current manufacturing concepts regarding the dta, hardware, and software necessary for a computer integrated manufacturing system.	3
ME 484 Biomechanics: Comprehensive coveragee of mechanical properties of living tissues and fluids, and the relationship between structure and function in living tissues and organs. Students understand the importance of the application of engineering tool	3
IE 451 Engineering Economy: Discounted cash flows, economics of project, sensitivity analysis.	3

Table B4.6 General Education Requirements in the Mechanical Engineering Curriculum		
General Education Requirement	**Credits**	**How satisfied or source**
English Composition	7	ENGL 111G, ENGL 218G
Mathematics	3	Satisfied by ME curriculum
Critical Thinking/Analysis	6	Comm265G/ME260
Historical Background	3	NMSU provided list of courses
Basic Natural Sciences	4	Satisfied by ME curriculum
Human Thought and Behavior	3	NMSU provided list of courses
Social Analysis	3	NMSU provided list of courses
Literature or Fine Arts	3	NMSU provided list of courses
Viewing a Wide World	6	NMSU provided list of courses
Total Credits	**38**	

B4.4 Major Design Experience

The definition of engineering design given by ABET is: "Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision making process (often iterative), in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation."

Mechanical Engineering students are prepared for engineering practice through the curriculum culminating in the ME 426 and ME 427 capstone design courses. The two capstone design courses utilize the knowledge and skills acquired in earlier course work and incorporate engineering standards and realistic constraints that include the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.

We introduce the concepts of engineering design in the freshman engineering design class ME102 in which the students learn the basics of working in a team, oral presentation, and understanding an open-ended design task. They test their completed projects in an end-of-semester competition.

There are two major projects assigned in the next level design course, ME 326 Mechanical Design. The first derives from the annual ASME Student Design Contest. A design challenge, with very detailed parameters and requirements, is set; the students (working in teams) must not only design and construct the solution, but also prepare written and oral presentations on their work. Beyond course requirement and time, teams may then participate in the regional competition – and hopefully progress to the national round. This year, our ME team took first place in the regional and will be competing at the national event in the fall. ME's team of 2001 also won the regional and participated in the national competition. ME 326 also includes a truss design and construction problem.

In the 4th year, students take Design of Machine Elements (ME 425). In this course students use their solid mechanics background to develop rational procedures for determining the dimensions of standard machine components. In addition to being introduced to this necessary and important design related analysis, students also use these new tools to size bearings, shafts, etc. in pursuing the solution of a truly open-ended design problem.

The curriculum includes courses that familiarize the students with design tools, specifically CAD/CAM software. These areas are covered in ME 159 Graphical Communication and Design and ME 222 Introduction to Product Development.

The emphasis on solving open ended design problems continues to evolve as the students progress through the curriculum. Their undergraduate design experience culminates in the senior capstone design projects laboratory. The design projects laboratory is a two semester sequence of 6 lab hours, consisting of the ME 426 and ME 427 courses.
ME 426/427 Design Projects Laboratory I & II

All students participate in a design project for their capstone design experience. Some of the students work on projects that may span several semesters and thus have the experience of changing team members over the course of a design task. In this way, students are exposed to working with a larger number of people and begin to appreciate the dynamic teaming condition present in most engineering workplaces today.

Feedback from ME alumni during the ABET 2000 assessment indicated a need for greater emphasis on multidisciplinary team experience, communication skills, global perspective of the design process, and large-scale project planning and management.

In response, a collaboration between educators from the Colleges of Engineering (Mechanical Engineering and Industrial Engineering departments) and Arts and Sciences (Technical writing master's program) re-designed the capstone course 426/427. *(The following is taken from their promotional course description.)*

Termed "multi-syded" (multidisciplinary synergy in designing disciplines), the originators describe the primary course objective as:

- to participate fully in a multidisciplinary team-oriented design project

Teams composed of mechanical engineering and industrial engineering and technical communications students (when available) work on a design project sponsored by a client. The projects are similar to those commonly found in industry, projects that are addressed by cross-functional employees working together to share the range of specializations (e.g., engineering, writing, managing, marketing) required to make give projects successful.

They cite as a secondary course objective the opportunity

- to synthesize the various tools and skills you have learned over the course of your college careers, and apply these tools and sills in undertaking a “real” design project sponsored by a corporate partner.

The course is highly structured to these ends. Steps in the process towards design package completion are clearly defined and used as a checklist.

- Need Identification and problem definition
- Gathering information
- Concept generation
- Concept evaluation
- Engineering modeling and analysis
- Design for X
- Drawing, sketches, blue prints

A simplified flow chart of the process is shown in Figure B4.1 below.

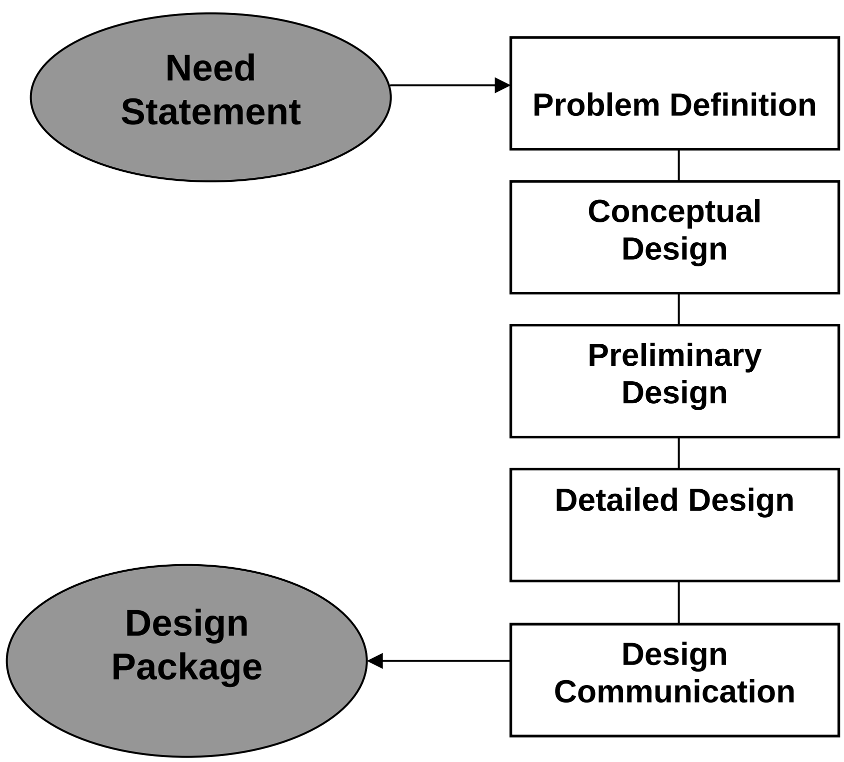


Figure B4.1 Flow chart of design package process

Progress towards completion is monitored and evaluated throughout the experience by built-in assessment stages:

- Weekly lectures
- Weekly team meeting
- Weekly mentor meeting to report on progress and challenges
- Oral presentation to MEA/IAC committee in mid-spring semester

The course instructors have developed (and modified as necessary) assessment rubrics that are applied to the various stages of the design package.

Comprehensive records of each semester's work are maintained and reviewed. A library of the projects is kept in the ME department and will be available for inspection by the ABET assessment team.

The course demonstrates achievement towards many of the program outcomes:

(a) ability to apply knowledge of math, science and engineering

(c) ability to design a system, component or part

(d) ability to function on multidisciplinary teams

(e) ability to identify, formulate and solve engineering problems

(g) ability to communicate effectively

(j) knowledge of contemporary issues

(k) ability to use techniques, skills and modern engineering tools for engineering practice

In particular projects, the remaining outcomes may also be addressed, (b), (f), (h) and (i).

For the current assessment period, the O&A committee has focused on outcomes (c), (d) and (g).

The course also contributes to Criterion 8:

- ME4 the ability to work professionally in both thermal and mechanical systems areas including the realization of such systems

And to the Educational Objectives:

- A: to prepare students for successful careers and lifelong learning
- C: to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively.

Projects have covered a wide range of thermal and mechanical design experiences and have been sponsored by a wide range of customers. The projects have historically had a strong interdisciplinary nature, with the focus on interdisciplinary learning increasing each year. Projects for 2006 are summarized in Table B4.7.

Table B4.7 Capstone Design Projects for 2006

Project Title	Description	Mentor
Autonomous Balloon	Develop of an autonomous blimp capable of flying around the campus guided by GPS and other sensors. Supported in part by Boeing.	Dr. Ou Ma, NMSU
Biomass	Investigate and analyze of the efficacy of generating power using biomaterial such as cow manure, pecan slush, burning tires.	Dr. Burl Donaldson, NMSU
Black Steamer	Recreate original parts, specifically the boiler, used in steam engine vehicles of the early 20th century.	Dr. Floyde Adams, ME Academy
Border Gateway	An on-going project concerning border security issues,this year's project focused on airport security equipment and processes.	Mr. Noonchester, PSL
Cooling	A GM sponsored project to design a mechanism to cool vehicle seats using a thermoelectric module.	Dr. Burl Donaldson, NMSU Colin Hebert, General Motors
Interior Cargo	A continuing GM sponsored project, this year's challenge is to design a bike rack, and storage cabinet for a truck body.	Dr. Young Ho Park, NMSU
Nanosat	Nanosatellite project sponsored by AFOSR. ME students are designing and fabricating a dual-arm robotic system for satellite inspection and also on-orbit inertia identification.	Dr. Ou Ma, NMSU
PAH	This is a continuing project under Dr. Lara of the Chemistry department, aimed at "management of Polycyclic Aromatic Hydrocarbon," a carcinogen present in factory emissions, using a clay sorbant filtering system.	Dr. Anthony Lara, NMSU
Raytheon	An annual design competition sponsored by Raytheon Missile Systems challenges students to fix a faulty cable release mechanism of a missile storage trigger.	Dr. Thomas Burton, NMSU
SRI	As investigation of potential adaptation of solar generated power, the challenge is to design a photovoltaic module for use as a parking lot canopy. There is a possibilty of marketing a successful design locally.	Andrew Rosenthal, SWTDI

5

Criterion 5: Faculty

ABET 2006 SELF-STUDY PART B

The Mechanical Engineering Department follows NMSU's land-grant mission of teaching, research, and service. All tenured and tenure-track faculty are expected to make contributions in all three of these areas. The ME Department is a medium size ME department with approximately 350 undergraduate students and 35 graduate students. Current faculty numbers are summarized below.

- Fourteen tenured or tenure-track faculty
- Two college professors (with teaching responsibilities)
- One professor emeritus (with teaching responsibility)

The faculty is well-qualified, student centered, and interested in both teaching and research activities.

B 5.1 Faculty Adequacy

The faculty is organized around several technical areas in mechanical engineering in mechanics, thermal sciences, controls and robotics, and engineering analysis and sciences. The number of faculty members in each area allows the department to offer all required core mechanical engineering classes each semester and the elective courses once a year. Three to four of the required core courses are also taught each summer during the two six-weeks summer sessions. Table B5.1 shows a list of the faculty members and their appointment status. Table B5.2 lists the primary interest areas of the faculty.

The ME Department has a strong culture of teaching and a strong commitment to undergraduate education. We are in the process of filling two faculty positions: one vacant position, and a second position mortgaged against the next retirement or resignation. Thus, at full strength the department has 15 FTE positions. In addition, there are three part-time college faculty on the teaching staff to complement the tenure/tenure track faculty. All members of the faculty have earned the Ph.D. in Mechanical Engineering or a closely related field. Many are licensed professional engineers.

Because of the Carnegie Research I status of the university, we seek to hire faculty who are strong in teaching and research. Our retention, tenure, and promotion criteria emphasize excellence in both teaching and research. In addition, because of our emphasis on a practice-oriented curriculum and research, we seek to hire faculty who have both academic and professional backgrounds and an ability to develop and sustain funded research programs.

Table B5.1 Mechanical Engineering faculty

Faculty Member	Rank	Tenure Status	Graduate Faculty
Allen, James	Assistant Professor	Tenure Track	x
Burton,Thomas	Professor	Tenured	x
Choo, Vincent K.	Associate Professor	Tenured	x
Conley, Edgar	Associate Professor	Tenured	x
Donaldson, A. B.	Professor	Non Tenure Track	
Garcia, Gabe V.	Associate Professor	Tenured	x
Genin, Joseph	Professor	Tenured	x
Hardee, Harry	Professor	Tenured	x
Hill, R. Dean	Professor	Non Tenure Track	
Hills, Richard G.	Professor	Tenured	x
Leslie, Ian H.	Associate Professor	Tenured	x
Ou Ma	Associate Professor	Tenure Track	x
Park, Young Ho	Assistant Professor	Tenure Track	x
Pederson, Ronald	Associate Professor	Tenured	
Sevostianov, Igor	Assistant Professor	Tenure Track	x
Shashikanth, Banavara	Assistant Professor	Tenure Track	x
Smith, Phillip	Professor	Emeritus	x

Table B5.2 Faculty Research and Interest Area	
Faculty Member	**Interest Area**
Allen, James	Fluid Mechanics
Burton,Thomas	Dynamics
Choo, Vincent K.	Polymers and Composite Materials
Conley, Edgar	Solid Mechanics, Biomechanics
Donaldson, A. B.	Experimental Methods, Thermal Science
Garcia, Gabe V.	Sollid Mechanics
Genin, Joseph	Solid Mechanics
Hardee, Harry	Thermal Science
Hill, R. Dean	Internal Combustion Engines
Hills, Richard G.	Modeling and Simulation
Leslie, Ian H.	Combustion, Convection Heat Transfer
Ou Ma	Robotics, Mechatronics, Controls, Dynamics
Park, Young Ho	Design Optimization, Solid Mechanics
Pederson, Ronald	Computer Aided Design/Manufacturing
Sevostianov, Igor	Micromechanics, Biomechanics
Shashikanth, Banavara	Fluid Mechanics, Dynamical Systems, Controls
Smith, Phillip	Turbulence, Computational Fluid Mechanics

The Mechanical Engineering student to full-time faculty ratio is approximately 22:1, which is close to the average in the College of Engineering. Consequently, we are able to provide sufficient one-on-one interaction with students.

Our ME class sizes are small, with an average of 28 in lecture sections, and 7 in lab sections. Average class size for other courses (non-ME courses) taken by ME students is about 50. Relatively small ME class sizes mean our students have more access to faculty than do those at most other institutions. When taking courses outside the College of Engineering, our students sometimes encounter larger classes, especially in CHEM 111 (up to 200 students). However, even these courses are taught by regular or adjunct faculty members, not student assistants. Only one engineering science course in Mechanical Engineering (ME 260) is currently taught by a Teaching Assistant who is a Ph.D. Candidate.

B 5.2a Faculty – Student Interaction

ME students at NMSU enjoy a great deal of access to faculty, especially in view of the relatively large enrollment typical of land-grant universities which often isolates students. Faculty participates in this effort, mostly because they consider it an enjoyable aspect of academic life. Faculty and students interact both in the classroom and outside in several different forms.

Many faculty members include and supervise undergraduate students in their research activities. Many research activities are funded, and inclusion of undergraduates provides the students with a source of income as well as research experience. Specific research programs for students provided through Crimson Scholars and the Alliance for Minority Participation (AMP) also involve faculty with undergraduates.

Crimson Scholars is NMSU's Honors Program. On average, approximately 40 ME students participate in Crimson Scholar options, one of which is work study on faculty research projects. Drs. Conley and Allen have sponsored honors students within the five year period under consideration here. One of Dr. Allen's sponsored workers was honored by the American Physical Society for photographs taken as part of an experimental fluids research project.

The Alliance for Minority Participation (AMP) provides significant support and opportunity for our students. A major AMP endeavor is an annual Student Research Conference. Typically, students work under a faculty mentor during the summer on a project to be presented at the fall conference. Drs. Allen Choo, Conley, Donaldson, Ma and Leslie have given their time and guidance to our students through this program.

ME's Capstone Design Project relies on the voluntary participation of ME faculty as mentors for the student teams. For example, this year Drs. Donaldson and Ma are each mentoring two projects, while Dr. Burton is mentoring another. Drs. Choo, Garcia and Hill have contributed their efforts also during the past five years.

B 5.2b Student Advising and Counseling

Faculty actively interact with students. A common comment by ME students is that "faculty are always available and their doors are open to students." While all faculty informally advise and counsel ME students, the formal advising is carried out by a group of approximately five faculty members. The advising responsibility rotates every semester among the faculty. The ME Associate Department Head (ADH) is the primary advisor and a non-rotating member of the group of advisors to provide necessary continuity in student advising. The advising groups for pre-registration in the Spring 2006 and Fall 2006 semesters are as follows:

Spring 2006: Pederson (ADH), Conley, Leslie, Hardee, Park, Genin
Fall 2006: Pederson (ADH), Hills, Choo, Ma, Garcia, Sevostianov

Figure B5.1 shows the self-assessment by graduating seniors indicating a general satisfaction with the advising in the department, especially in the academic planning area.

B 5.2c Service Activities

Dr. Edgar Conley is the ASME student chapter advisor. He encourages and mentors students in their organizational activities as well as providing advice and mentorship in regional and national design projects. As ASME Faculty Advisor, he travels twice each year to regional, weekend, student-based conferences. He is accompanied by student groups which range in number from two to twenty. At the ASME Regional Student Design Competition held on 3/24/06 at Colorado State University, the NMSU "Finding Nemo" team was awarded first place for the design of a fishing pole that could be used by quadriplegics. The challenge was a repeat, with significant changes, of the 2001 contest, for which one of our ME teams also won the regional competition

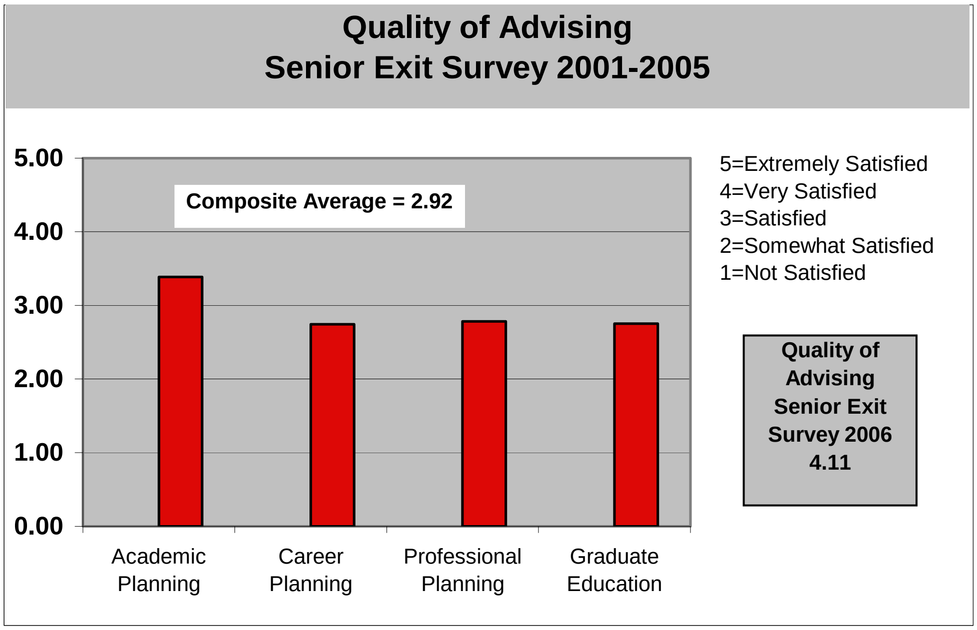


Figure B5.1 Assessment of Quality of Advising

Dr. Burl Donaldson is faculty advisor to the Pi Tau Sigma student organization. The Pi Tau Sigma honor society conducts a range of service activities throughout the year including: proctoring of ME computer labs, helping with the departmental course evaluations, performing community service, and holding an annual banquet during which they recognize one faculty member for outstanding teaching during that academic year. In addition, the department head, Dr. T.D. Burton is National President of Pi Tau Sigma (2005-2007), and he participates actively in the events of the NMSU chapter

B 5.2d Interactions with Industry and Government

ME faculty members have extensive ties to and collaborations with industry and government facilities in the region. These ties and collaborations include funded research projects, other research collaborations, contacts made to find co-op and internship positions for students, contacts through seminars (by faculty to industry/government and by industry/government personnel to NMSU faculty and students), and contacts through senior design projects, among others. Some of these collaborative activities are:

- Four members of the faculty (Donaldson, Hardee, Hills, Sevostianov) have participated in funded research projects with Sandia National Labs, one (Leslie) with the USDA (Forest Service), and one (Ma) with the Air Force Research lab in Albuquerque.

- One faculty member (Burton) serves on review panels at Sandia and Los Alamos National Laboratories for evaluation of The Advanced Simulation and Computing predictive simulation codes.
- Senior design projects with ME faculty advisors have been done with the following external entities: Raytheon, General Motors, NMSU Physical Sciences Laboratory (PSL).
- Seminars have been given to NMSU faculty and students by engineers from Sandia, Los Alamos, and Holloman AFB 46th Test Wing (Rocket Sled).
- Faculty contacts exist with the following entities in addition to those stated above: White Sands Missile Range, NASA White Sands Test Facility, Rocket Racing League, Orion Propulsion, General Dynamics, Eclipse Aviation, Northrop Grumman, Chevron Texaco, Utility Engineering, Fibertek, and Halliburton.

The aforementioned extensive faculty contacts with industry and government facilities ensure that faculty are current in terms of their understanding of today's working environment in engineering industry.

B 5.3 Faculty Competence and Professional Development

Shown in Table B5.3 is a "Faculty Background and Activity" summary. This table contains information on faculty education, professional experience, academic experience, teaching loads, research accomplishments, etc.. Resumes of all faculty members are provided in Appendix I. Table I-4, "Faculty Analysis (Mechanical Engineering Program)"and Table I-3, "Faculty Workload Summary (Mechanical Engineering Program)" summarize additional information regarding faculty and teaching loads.

The number of faculty in mechanical engineering, their educational backgrounds, their industrial and academic experiences and involvement in research, all attest to the overall excellence of the program. In every respect, the faculty and program satisfy the ABET engineering criteria.

Faculty professional development activities include: attending seminars and lectures, participation in training workshops, attending professional conferences, professional writing activities, review activities, and conducting new and original research. These activities are included in Table 5.3.

Table B5.3 Faculty Background and Activity Summary
Department of Mechanical Engineering, New Mexico State University

Name	Rank	Tenure Status	Graduate Faculty	Teaching Load 2005-2006 (credits)	Interest Area	Highest Degree	Institution from which Highest Degree Earned	Year	Years of Experience			State in which Registered	Professional Development last 5 years					
									Govt./Industry Practice	Total Faculty	This Institution		Journal Publications	Conference Papers/Other	Editorial Boards, ASME committees, etc.	Technical/research conference	Educational Conferences	Other Professional Activities
Allen, James J.	Ast. P	TT	X	6	Fluid	Ph.D.	U of Melbourne	96	6	3	2		update unavailable-medical leave					
Burton, Thomas D.	P	T	X	3	Dynamics	Ph.D.	U of Pennsylvania	76	8	29	1		2/2rev	2	5	5	1	
Choo, Vincent K.	Asc P	T	X	6	Poly & comp	Ph.D.	Nottingham U.	82	1	23	21		1	1				
Conley, Edgar G.	Asc P	T	X	13	Solids & Bio	Ph.D.	Michigan State U	86		20	18	MI	2	3	2	15	1	
Donaldson, A. B.	CP	NT		12	Thermal	Ph.D.	New Mexico State U	69	20	20	11	NM	6	8		4	1	
Garcia, Gabe V.	Asc P	T	X	12	Solids & Bio	Ph.D.	Texas A&M U	96	3	14	12		1	7	1	7		7
Genin, Joseph	P	T	X	12	Solids	Ph.D.	U of Minnesota	63	7	48	25	MN	7			15	15	2
Hardee, Harry C.	P	T	X	18	Thermal	Ph.D.	U of Texas, Austin	66	28	18	16	NM,TX		4				
Hill, R. Dean	CP	NT		3	Int. Comb.	Ph.D.	Michigan State U	62		44	32							
Hills, Richard Guy	P	T	X	9	Mod & Sim.	Ph.D.	New Mexico State U	79	2	30	30		1	10	1	5		
Leslie, Ian H.	Asc P	T	X	12	Heat Transfer	Ph.D.	Stanford U	84		22	22			7		7	3	1
Ma, Ou	Asc P	TT	X	9	Controls, Dyn	Ph.D.	McGill U	91	11	7	4	PEO	3/3rev	16		14	3	3
Park, Young Ho	Ast. P	TT	X	9	Solids	Ph.D.	U of Iowa	94	9	7	6		10	16	2	4	2	6
Pederson, Ronald	Asc.P	T		12	CAD/CAM	Ph.D.	U of Minnesota	76		30	22			1			2	
Sevostianov, Igor	Ast. P	TT	X	6	Micro & Bio	Ph.D.	St. Petersburg State U	93	7	11	5		31/3rev	6	11	12	2	
Shashikanth, Banavara	Ast. P	TT	X	9	Fluid, Dyn. Sys.	Ph.D.	U of So. California	98	2	13	5		4	1	4	7	1	2
Smith, Phillip	P	E	X	3	Fluid	Ph.D.	U of Kansas	66		42	36	NM		3	5			

Formal opportunities for teaching improvement available at NMSU include monthly workshops organized by the university Teaching Academy, annual workshops organized by the College of Engineering and NM Space Grant Consortium, and the GRASP mentoring program sponsored by the NM Space Grant Consortium. The NMSU Teaching Academy sponsors monthly meetings on teaching techniques. Other workshops offer assistance in proposal writing.

Faculty Teaching Loads

Faculty teaching assignments are made by the Department Head. The number of assigned credit hours per nine-month year typically varies between 6 credits and 18 credits. Individual faculty teaching assignments depend on rank and tenure status, level of service and/or administrative work, level of research accomplishment, and other factors (e. g., sabbatical leave or course buyout using research funds). The guidelines that govern individual faculty teaching loads were disseminated to ME faculty by the ME department head in June 2005. These guidelines appear as Addendum I to this chapter.

Faculty Evaluations

Annual faculty evaluations measure the quality of the faculty activities and performance in teaching, research, and service. Student evaluation of the faculty and courses is a component of the faculty annual evaluations. In addition to the faculty annual evaluations, most of the Mechanical Engineering faculty are members of the graduate faculty. As members of the graduate faculty, they must maintain their currency in graduate research by publishing their work and being active in sponsored research activity. Members of the graduate faculty are reviewed every five years to assess their currency in research. The peer-review process in publishing and the evaluation of research proposals provide valuable feedback to the faculty regarding the quality of their research and scholarly work.

All faculty members are required to submit an annual Faculty Activity Report, which describes accomplishments in the following areas:

- Teaching and contributions to student development
- Scholarly/creative activities and professional development/practice
- Professional, university, and departmental service

This report is reviewed by the Department Head and the Dean of Engineering and is used as the primary basis for granting merit-based salary increases, promotion, and tenure. Appendix I, Table I-4 lists each member of the faculty of the mechanical engineering program. Table I-3 summarizes typical course load and other activities of each faculty member during the 2005-2006 academic year. The model for faculty teaching loads is as follows. Full-time teaching load is 12 credit hours per semester (or four courses). Faculty in the “research track” are those who are active in service, teaching, and research and typically teach two courses per semester. Faculty in the “teaching track” are those who are active in service and teaching and typically teach three courses per semester. Untenured faculty and faculty producing very strong research contributions may teach one course per semester.

The faculty curriculum vitae are provided for each faculty member in alphabetical order in Appendix I.

Addendum to Chapter 5

Memo on Faculty Course Assignment Policy

June 30, 2005

From: TD Burton
TO: ME Faculty
Subject: Teaching Assignments for 2005/2006 academic year

The following are the guidelines I plan to follow in assigning courses for Fall 2005 and Spring 2006. My goal will be to produce equitable overall (classroom teaching plus everything else) faculty workloads for the academic year. The basic guidelines I am following are stated below as **a + b**, with a being the number of 3 credit courses taught in a Fall semester and b being the number of 3 credit courses taught in the spring semester.

1. New, untenured assistant professors: **1 + 1** (first 2 - 3 years)

2. Untenured assistant professors, beyond first 2 – 3 years: **2 + 1** (assuming reasonable progress toward T&P)

3. Untenured associate or full professors: **1 + 1**, **2 + 1**, or same as tenured faculty (see #4 below) as appropriate, or as negotiated at time of hire.

4. Tenured faculty
   - Variable, depending on level of research, service, administrative, and non-classroom teaching contributions (assumes some level of non-classroom contributions): **2 + 2**, **2 + 3**, or **3 + 3**, depending on level of non-classroom contribution*
   - Teaching only, i.e., essentially no non-classroom contributions: **4 + 4** (as per College of Engineering workload policy)
   - Buyout of one course can be negotiated
   - Tenured faculty performing at an exemplary level in research may be assigned a **2 + 1** load.

5. Note: Based on my understanding of how the labs and senior design courses are conducted, I am considering ME 426/427 combined to constitute a 2 course load (i.e., 6 semester credits of load) and ME 345 and ME 445 each to constitute a 1.33 course load (i.e., 4 semester credits).

*In evaluating the non-classroom contribution, I will take into account the myriad non-classroom activities in which faculty may be involved, such as advising student projects and organizations, administrative duties in the department, committee work, graduate student advising, research, professional service, etc. In the research area I will weigh the following contributions: journal publications, conference publications, external funding, proposal writing, research infrastructure and laboratory development, graduate student contributions to research, and other as appropriate. External funding from and proposals to the competitive federal programs (e.g., NSF, AFOSR, ARO, ONR, DARPA, DoE, NIH, etc.) will be viewed especially positively.

6

CRITERION 6: FACILITIES

ABET 2006 SELF STUDY PART B

Progress since last report

Student Project Center: The former ME Shop is now under management by M-Tec, an outreach division of the College of Engineering, primarily engaged in industrial and research contract work. The arrangement is beneficial to ME students as well as students in the other engineering departments. Equipment previously located in a smaller facility used by non-ME students has been moved to the ME location. This provides a much wider range of shop machinery for capstone and other projects. As the Student Project Center, this facility is now available for all engineering student projects.

Under the direction of an M-Tec supervisor, the shop now has regular hours of operation and is staffed by a well-trained student crew who assist with use of shop machinery and the computers available on-site. The computer stations are another new facet of shop capability; they have all the software associated with the student design courses. A listing of the major equipment is included in the lab inventory section of this chapter.

Multimedia Lab and Classroom: A former design lab in Jett Hall was transformed into a state-of-the-art multimedia learning center in 2003. Partially funded by a Title V grant, Room 604 is now equipped with 52 high-end computer stations, dual overhead projectors and audio capability. Eventual installation of movable partitions would also allow the space to be divided into two areas so that a small class could be conducted while the other section is serving another class or purpose.

The technology enhances the teaching environment especially for CAD (Computer Assisted Design) and CAM (Computer Assisted Manufacturing) courses. As a student lab, it provides a full range of software programs to support engineering study and general computer needs.

A report on overall improvements and status of the computing infrastructure appears later in this chapter.

Robotics Lab: Through the efforts of Dr. Ou Ma (who joined the faculty in 2002), a major instrumentation grant for the Army Research Organization (ARO) was used to create a Robotics and Dynamics lab for the ME department. The lab is equipped with a new robotic arm, two mobile robots, and numerous advanced sensor systems. Dr. Ma, with the assistance of graduate students, designed and built a special robotics-based test facility for contact-dynamic research. The lab serves as a solid infrastructure for promoting robotics and contact dynamics research, including collaborative research with faculty from the EE department. So far, the lab has been used by eight ME and EE graduate students. Two pending proposals (one for NSF, the other ARO) were written and submitted based on the capabilities of the lab facilities. The lab has also been used for teaching the robotics courses ME 486 and 526.

Mechatronics Lab: Dr Ma's efforts were also behind the creation of an instructional Mechatronics Lab. The lab features various mechatronics experiment kits and supporting instrumentation. Many of the equipment items and tools were acquired using non-departmental funds (money from funded projects such as Nanosat, Autonomous blimp, mini-grant, etc.) Other items were built in-house by students. The lab has been used beyond its originally purpose (for ME 487 Mechatronics course) by supporting two interdisciplinary capstone design projects, namely the Autonomous Blimp and the NMSU Nanosat.

B 6.1 Adequacy of Facilities

The facilities that are currently available to the Mechanical Engineering Department are adequate to allow the department to accomplish its program objectives. The Mechanical Engineering Department facilities, laboratories and offices are dispersed in several locations both on campus and off campus as follows:

- Jett Hall (West and North Wings)-- Faculty Offices, Laboratories, and Classrooms
- Jett Hall Annex -- Fluids Laboratory, Combustion Laboratory, and Student Projects Machine Shop
- Wind Tunnel Facility (currently in renovation; located 1.5 miles from Jett Hall)

Jett Hall is home to most of the instructional laboratories, classrooms, and faculty offices. A summary of the ME Department's office, classroom, and laboratory spaces is included at the end of this chapter.

B 6.2a Classrooms

The classrooms used by Mechanical Engineering students are primarily located in Jett Hall which is home to the Mechanical Engineering Department. The quality of the classrooms is average to good. Seating is typical of most classrooms at NMSU, ranging from 20 to 60 seats per classroom. Exit interview results indicate that students are generally satisfied with quality of the classrooms.

There are nine classrooms used for traditional lecture classes. There is one seminar room used for senior and graduate seminar classes, and for research seminars. There is one large computer instructional classroom with 52 computer stations and two projection systems, one on each side of the classroom.

Four of the classrooms (Rooms 105, 103, 203, and 604) in Jett Hall are equipped with computer projectors. In addition, three college-wide classrooms have been equipped with projectors (Engineering Complex I, Rooms 210 A and B, and Goddard Hall 100). The number of classrooms exceeds the need of the ME program, and our classrooms are used routinely by other colleges on campus.

Table B6.1 ME Department Laboratories

	Lab Name	Location / Size (sq.ft.)	Associated Courses	Use
1	CAD/CAM Lab	JH 604/1593	ME 159/260/329/460	I
2	Design Lab	JH 601/900	ME 166	I
3	Fluids Lab	JH 18/1161	ME 445	I
4	Heat Transfer Lab	JH 18/1161	ME 445	I
5	Mechanics Lab	JH 16/706	ME 326/425	I/R
6	Instrumentation Lab	JH 602/1108	ME 345	I
7		JH1/2669	ME 445/463	I/R
	Wind Tunnel labs	Remote/~5000	ME 445	I/R
8		JH 607/496	ME 461	I/R
9	Mechataronic Lab	JH 503	ME 487	I/R
10	Robotics Lab	JH 608/633	ME 452	I/R
11	Lego Lab	JH 13/817	ME 102	I
12	PC Lab (19 stations)	JH 21/683	General Use	I/R

B 6.2b Laboratories

Summarized in the Table B6.1 are the departmental laboratories used for undergraduate instruction. Some of these laboratories are dedicated to undergraduate instruction (noted by an “I” in the right hand column), while others are used for both research and instruction (noted by “R/I” in the right hand column).

Equipment and Instrumentation Available in Each Laboratory to Meet Instructional Needs

For each of the aforementioned twelve laboratories, the equipment and instrumentation available are listed below; this equipment is in good working order and meets our instructional needs.

(1) CAD/CAM Laboratory (ME 159/260/329/460) completely revised since 2001

- 55 Dell PCs (2.4 HGHz Pentium 4 PCs) - JH604
- 2 postscript laser printers (tabloid size)

- **Software**
- Microsoft Office 2003
- Microsoft Visio 2003
- Microsoft Project 2003
- ProEngineer Wildfire 2/ProMechanica
- Unigraphics NX3
- Risa 2d
- Chemkin
- National Intruments Labview 7
- MathCAD 13
- MatLab 2006a

(2) Design Laboratory (ME 326)

- CD Set of Thomas Register
- Bench Drill Press
- Bench Grinder
- Soldering gun, 2 Small soldering irons
- 5 sets of Mechanics Tools in Attache Cases
- Assortment of Hand Tools primarily for wood working
- 3 Bench Vises
- 2 Hand Held Power Drills
- 2 Hand Held Power Sanders
- Dremel type Power Tool
- 5 Glue Guns
- Tool Cabinet on Wheels
- 4 Work Benches
- 4 Bookshelves

(3) Fluids Laboratory (ME 445)

- Orifice Plates and Flange - 1" dia, beta 0.6, 0.8
- Venturi Meters - 1-1/4" dia, 3/4" dia, 1/2" dia
- 2 Validyne MC1-10 rach w/CD18 Carrier/Demodulator
- 1 Exact Elec Sweep Function Generator
- 1 Fluke 3335 Digital/Analog Oscilloscope
- 1 Keithley 179 Digital Multimeter
- Aerolab Wind Tunnel
- Technovate 9009 Pipe Flow System
- Venturi/Orifice Meter Calibration Loop

- Concentric Cylinder Viscometer
- Aerodynalog Bench-Top Water Channel
- Brookfield LUT Viscometer
- Trimount 4-Column 90" Manometer
- Dwyer 246 Slant-Tube Manometer - 10in H2O
- Dwyer 1425 Hook Gage
- 2 1531-AB Stobotac/General Radio
- Rosco 1500 fog machine
- Dynamic Fluid Systems Doppler Flowmeter
- Barnant C. Temp Controller
- V12 Power Supply

(4) Heat Transfer Laboratory (ME 445)

- 4 HP 4000 workstaions (1.7GHz dual Zeon)
- Hewlett Packard 8330A radiation flux meter
- Miscellaneous thermocouples
- NESLAB EX-210 oil bath
- Inclinometer
- Orifice flow meter
- 3 Hewlett Packard 34401A Digital Voltmeters
- 2 Extech DC regulated power supply
- Frequency counting flow indicator
- Digital Extech DC Power Supply digital readout
- Wind tunnel dynamometer setup
- 2 Extech Thermo Anemometers 407123
- 4 Rosemount pressure transducers
- Constant temperature bath
- Omega Digital Multimeter
- Omegaette
- Burkert DN 32 flow sensor
- Fluke handheld combiscope
- 2 Fluke infrared thermometers OT-1R
- 4412 NACA aerofoil
- 2 0012 NACA aerofoils
- LED pressure indicator

(5) Mechanics Laboratory (ME 326/425)

- Instron Model 1322 Servo-hydraulic tension-torsion system. This is a closed- loop system in which either load or displacement control can be achieved.
- General radio company strobotac stroboscope, type 1531-A
- Box-ometer model 112 micro measurement torque meter. For the measurement of running torque.
- Metrix mode 5115B vibration analyzer with CRT and stroboscope
- 5 Endevco model 2222B accelerometers
- BLH Electronics SR-4 strain indicator model 100P
- Micro-measurements model RB-200 resistance bridge (for strain gages)
- 2 Vishay model 1011 portable strain indicator (for strain gages)
- Vishay model V/E-21A, switch, balance and calibration module (for strain gages)
- Vishay Model V/E-20A, Digital strain indicator (for strain gages)
- Vishay Model V/E-21 gage terminal box (for strain gages)
- Vishay Model V/E-25 scan controller (for strain gages)

- Vishay Model V/E-22 printer (for strain gages)
- A variety of optical tables, both granite and steel
- A variety of high speed (2GHz) Tektronix scopes
- Automat mechanical system construction kit
- Pneumatic actuated universal testing machine - tension-compression

(6) Instrumentation Laboratory (ME 345)

- 4 HP 4000 workstaions (1.7GHz Zeon)
- MB Electronics Vibrator/Shaker
- 2 General Radio Co. 1531-A Strobe Tachometers
- Fluke Inst. 883AB Differential Voltmeter
- Endevco 4206 Accelerometer Amplifier
- Hewlett-Packard 5326B Timer-Counter-DVM
- Minarik W73 AC Motor Controller
- Minarik 8-213847-02 AC Motor
- Hewlett-Packard 7402A Strip Chart recorder (3)
- Validyne DC-15 Carrier Demodulator for Pressure Transducers (3)
- 3 - Exact Electronics 121 Function Generators (1)
- BK Precision 1801 Frequency Counter
- 3 Ashcroft 1305-B Dead-Weight Testers with Weight Sets (3)
- 3 Endevco 2721B Charge Amplifiers for Accelerometers
- Endevco 4221A Charge Amplifier Power Supply
- 2 Endevco Accelerometers: 2223D, 2270
- 5 Endevco Accelerometers: 213E, 2271A, 7701-50 (2 ea.), and 7702-200
- 2 Endevco 104 Charge Amplifiers
- Endevco 109 Charge Amplifier Power Supply
- 2 Endevco Accelerometers: 2215, 2242
- 2 Kistler 802A Accelerometers
- Sensotec VL7-3000 Linear Variable Differential Transformer (LVDT)
- Hewlett-Packard 3455A Electronic Multimeter
- Measurement Systems Cantilever Flexure Frame with Instrumented Beams
- 2 Measurement Systems Cantilever Flexure Frames with Instrumented Beams
- Validyne MC1 Rack Cabinet with Power Supply for Plug-in Modules
- Validyne DP-15 Pressure Transducer (3)
- Validyne DP-7 Pressure Transducer
- Validyne FC-62 Frequency-to-Voltage Converter
- Harrison Lab 865C DC Power Supply
- EG&G 9505 2-Phase Lock-in Analyzer
- Wallace & Tierman 61A-1B Barometer
- 3 Dwyer w.g. Manometers: 100-5, 104-10, 115
- Hewitt-Packard 34401A Electronic Multimeters
- Slider Crank Mechanism with Offset
- Electronic Angular Speed Transducer
- Tensile Tripod Loading Rig
- 2 Fluke Digital Oscilloscopes
- 2 Fluke ScopeMeters
- 2 Panametrics Pulser/Receivers
- 4 Dell Pentium-3 computers
- 4 National Instruments D/A converters
- 4 National Instruments Signal Conditioners
- Hi-Tech Biaxial Loading Rig

(7) Water Channel / Wind Tunnel Labs)

- PC and Labview data acquisition system
- Cohu CCD camera, Epix frame grabber card and PC
- Sony Digital video camera
- 2 stepper motors and drivers
- 5 watt argon ion laser and fibre optics
- 1,5,10 Torr Baratron pressure transducers
- Nd: YAG double pulse laser
- IDT high resolution digital camera for PIV experiments.
- Validyne pressure transducers and amplifiers, 1050PSI
- Water Channel
- Laptop with data acquisition capability
- Mirrors and lenses

(8) Composites Laboratory (ME 461)

- Differential Scanning Calorimeter
- Thermal Mechanical Analyzer
- Ultrasonic NDE Station
- Hot Press
- Autoclave

(9) Mechatronics Laboratory

- 10 foot RC controlled blimp
- Robix modular robotic arm
- 7 Desktop PC computers
- Agilent 6.5 bit multimeter 34401A
- Quanser mechatronics kit (inverted pendulum)
- Mechatronics project kit 10-400 (robotic vehicle)
- 6 Lego Mindstorm Sets

(10) Robotics Laboratory (ME 452)

- Zebra Zero 6-axis robot
- American 6-axis robot and control station
- Staubli 6-axis robot RX90L and control station
- 2 ActiveMedia wheeled robot 3AT
- NDI Opttrak motion sensor 3020
- IMADA portable force guage ACXT-110DPU
- Agilent oscilloscope 54621A
- 4 desktop PC compouters
- Laptop PC computer
- HP laser printer 4MV
- in-house built contact test interface
- in-house built 3-wheeled robot

(11) Lego Laboratory (ME 102)

- Obstacle course
- Lego parts
- Mindstorm sensors and controllers
- Computers

(12) PC Laboratory (General Use)

- 19 Dell PCs (3.6 GHz Pentium 4)
- 1 postscript laser printer (tabloid size)

New Equipment and Instrumentation to Meet Instructional Needs

The Dean of Engineering periodically receives funds to accommodate these needs and distributes them to the departments for equipment purchases. However, the funding available has been inadequate to meet all of our laboratory needs.

Critical Needs and Plans for Satisfying Those Needs

- **Plans for the continued updating and development of the laboratory component of the program**

  The funding level in recent years has been approximately $30,000 per year. (Fill in numbers from Diana Monteith on 6/7/06).

  Staffing

  The laboratories are staffed with an instructor-in-charge plus a number of Teaching Assistants depending on the course enrollment. A departmental laboratory committee oversees the state of the laboratories as far as equipment and development is concerned. This committee reports to the Department Head with recommendations for staffing, equipment purchases, and development.

  A permanent computer specialist oversees all aspects of the departmental computing facilities including all hardware and software deployment, data backup and retrieval, database applications, and the like. The college has recently centralized these tasks for all computing facilities in the college, and our technician has taken on new responsibilities for the college while still being housed in our department. We are in the process of evaluating the services received from this group compared to the former level of support.

Funding

The Dean of Engineering is seeking to implement a student credit-hour fee for all engineering courses. These funds would be used for the purchase, maintenance, and support of all computational facilities in the college. Such a resource would benefit the Department significantly in keeping present computer facilities working and up to date. It would also allow us to direct more of the present equipment funds toward laboratory equipment in the non-computational labs.

Space

Current laboratory space is barely adequate for existing activities. Additional space requirements are currently met by reviewing utilization of existing space and reallocating project space where projects have ceased or terminated their activity. Space can be particularly tight for the capstone design projects, depending on the scale of the particular projects for the semester.

- **Provisions for Maintaining and Servicing Laboratory Equipment**

  The equipment funds coming from the Dean's office are generally not available for equipment maintenance and repair. To date, the department has been able to overcome this difficulty by using general operating monies on an as-needed basis.

B 6.2c Student Project Center (ME Shop)

As described earlier, the ME Shop has had major remodeling both in terms of function and management. It is currently managed by M-TEC as a college Student Project Center. M-Tec has reorganized the layout of machinery and brought in additional equipment to better serve the department and the college. We are in the first year of operation under the new management and the department will review the overall operation this summer.

The Student Project Center has the following equipment:

- CNC Haas Toolroom-mill
- 2 Manual Bridgeport mills
- Clausing Lathe
- Sharp Precision Lathe
- Eagle Roll Machince
- 55-ton Ironworker
- 2 Vertical Band Saws
- 2 Belt Sanders
- 2 Wire Feed Welders
- Tig welder
- CNC Plasma Torch
- Miscellaneous welding equipment
- Large assortment of power and hand tools

- 3 PC computer stations with relevant software

B 6.2d Computing and Information Infrastructure

The department has three modern computer facilities with approximately 80 workstations available to students. These computer laboratories are adequate for the number of students that need to use those machines for their courses.

- Jett Hall room 21 houses nineteen (19) 3.6 GHz Dell workstations. This facility is available to all students during the day and is available to graduate students during off hours.
- Jett Hall room 504 houses seven (7) 2.4 GHz HP workstations. This facility is available to all students during the day and is available to graduate students during off hours.
- Jett Hall room 604 houses fifty two (52) 2.4 GHz Dell workstations. This facility serves as a computer teaching classroom by day and as a general use student computing lab from 5:00 pm until 11:00 pm. Sunday through Thursday nights.

These Microsoft Windows XP based systems have several engineering software programs installed on them including Pro/Engineer Wildfire and Pro/Mechanica, Unigraphics NX3, Hypermesh FEA Suite, MSC Adams and Nastran, and three EES Thermodynamics calculators.

All of the workstations are also equipped with Microsoft Office 2003 suite of software, including Word, Excel, Powerpoint, Project, and Visio, as well as Mathcad 13, Matlab 2006a, and SigmaPlot, for report writing, analysis of data, statistical analysis, plotting, and preparation of presentations.

The computers and the software are used in several ME classes including: ME 159, ME 222, ME 260, ME 329, ME 460, ME 518, ME 533, and ME 580. The ME 345 (Jett Hall room 602 and ME 445 (Jett Hall room 18) classrooms/labs each have four (4) workstations with the aforementioned software and are primarily used for instructional experimentation and data collection.

The Department upgraded the networks in Jett Hall in 1998 from thin-net Ethernet to category V wiring and fast Ethernet. The new network operates at 100 megabits/s and has reduced the amount of network downtime almost to zero. All faculty offices, graduate student offices are wired with category 5 networking.

The two main computer labs (Jett Hall room 21 and Jett Hall room 604) and the server room were all upgraded to gigabit networking in 2005, providing extremely high speed communications between our computer labs and servers, and all campus WebCT, e-mail, and other IT campus infrastructures.

The College of Engineering is currently centralizing and consolidating all engineering departments into one active directory computer domain to allow for a seamless computer environment for students. This will allow students to "roam" from one department's computers to another department's computers within the College of Engineering and always have their personalized profile (My Documents, Desktop, etc.). The consolidation project is anticipated to be in full operation by the summer of 2006.

B 6.2e Graduating Senior Self-Assessment of Facilities

Figures B61.1 and B6.2 show the self-assessment of graduating seniors from the Senior Exit Survey over the last 6 years. Overall, they are satisfied with the facilities with the Mechanical Engineering laboratories being somewhat lacking. We are working to upgrade the equipment in these laboratories.

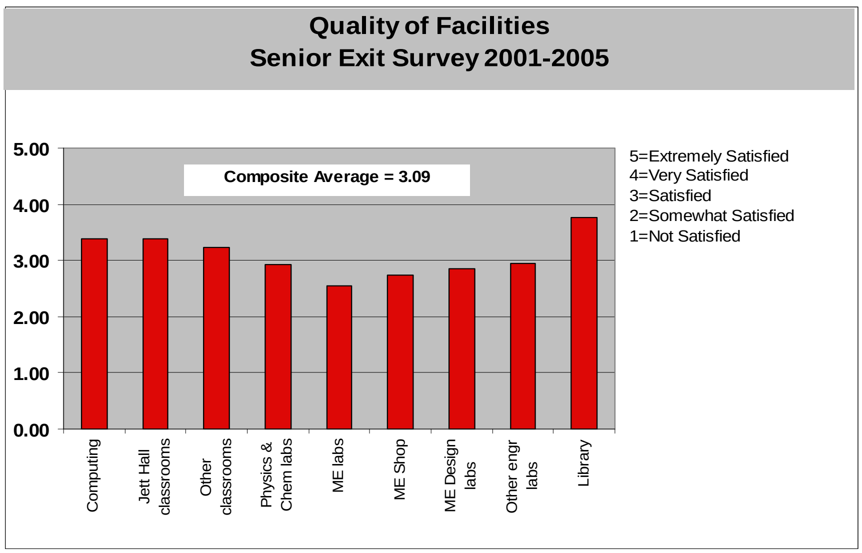


Figure B6.1 Assessment of Quality of Facilities 2001-05

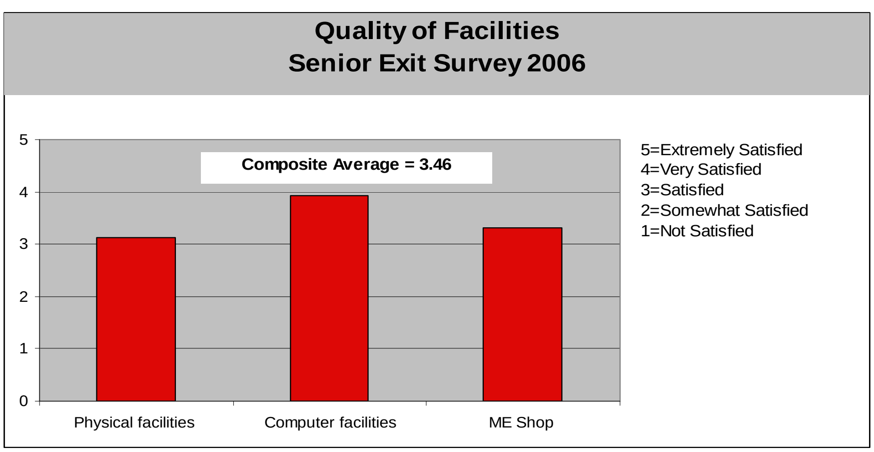


Figure B6.2 Assessment of Quality of Facilities 2006

Table B6.2 Summary of Facilities
Mechanical Engineering Department

Room	Sq. Ft.	Use
Undergraduate Program - Rooms/Labs/Facilities		
103	840	Classroom
105	486	Seminar room
203	865	Classroom
204	885	Classroom
205	755	Classroom
207	435	Classroom
208	432	Classroom
209	878	Classroom
210	473	Classroom
211	397	Classroom
604	1593	Classroom/Computer Instructional
		Lab (52 stations)
21	683	PC lab (19 stations)
502	963	Student Lounge
13	817	Lego Lab (ME 102)
18	1161	Fluids Lab (ME 445)
601	900	Design Lab (ME 326, 345)
602	1108	Instrumentation Lab (ME 326, 345)
3	1844	Student Projects Shop
Sub-Total	**15515**	**Sq. Ft.**
Research and Combined Research/Instructional Labs		
12	480	NDT/NDE - Garcia
16	406	Solid Mechanics/Bone Lab - Conley
1	2,669	Fluids Lab - Allen, Shashikanth
2	370	Engines Lab - Donaldson
176c	1015	"Optics Lab" - vacant
503	669	Mechatronics - Ma
505	725	Interconnections - Hardee
506A	392	Combustion Lab - Leslie
506B	424	Materials Lab - Choo
509	399	Material Science Lab - Donaldson
510A,B	341	Material Science Lab
Air Test Facility	1494	vacant (remote)
Wind Tunnel	5000	Allen (remote); in renovation
607	496	Composites Lab - Choo
608	633	Mechatronics & Robotics Lab - Ma
Sub Total	**15513**	**Sq. Ft.**

Table B6.2 (cont.) Summary of Facilities
Mechanical Engineering Department

Room	Sq. Ft.	Use
Faculty Offices		
512	162	ASME/Pi Tau Sigma
513	162	Visiting Faculty - vacant
514	160	Dean Hill
515	163	Ou Ma
516	162	Vincent Choo
517	162	Ron Pederson
518	161	vacant
519	161	Ed Conley
104	315	Gabe Garcia
110	244	Rich Hills
111	272	Joe Genin
112	241	Ian Leslie
113	234	Harry Hardee
114	349	Tom Burton, Head
115	252	Ron Pederson, Assoc. Head
610	159	vacant
611	159	Banavara Shashikanth
612	159	Burl Donaldson
613	162	Visiting Faculty
614	162	James Allen
615	162	Young Ho Park
628	158	Igor Sevostianov
629	170	Phil Smith
630	144	Helen Stork - ME Publisher
206A	208	vacant
Sub Total	**4843**	**Sq. Ft.**
Total space	**35,871**	**Sq. Ft.**

7

CRITERION 7: INSTITUTIONAL SUPPORT AND FINANCIAL RESOURCES

ABET 2006 SELF-STUDY PART B

B 7.1 Budget Process and Adequacy of Support

Departmental budgets are determined by the University and by the College of Engineering and are based on historical trends in the program and on current resources. The ME Departmental budget has been sufficiently stable to provide program, faculty size, and departmental stability through cyclical enrollment trends. The enrollments in ME have been relatively stable, therefore, the budget has been stable and follows trends for inflationary and cost of living increase/corrections to base budget. The ME Department Head has reasonable flexibility to move funds within the departmental budget to address specific needs.

The base budget figures are provided in Table B7.1 for the past six years. On an overall basis, the budget has been sufficient to assure quality and continuity in the program. The state operating funds, however, are inadequate to cover actual operating expenses, and, as at many state universities, the difference is typically made up through research overhead return.

Table B7.1 ME Department State Budget (in dollars)

Year / Category	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07 est.
Department Administration	215,995	283,307	289,427	306,754	312,249	327,120	339,226
Faculty Salaries	1,007,105	1,013,721	1,016,356	1,022,208	1,064,451	1,070,370	1,170,791
Graduate Assistants	131,642	171,252	156,981	161,690	149,191	152,548	156,362
Department Operating Funds -Educational	45,700	45,700	45,700	45,700	45,700	45,700	45,700
Department Operating Funds Administrative	22,000	22,000	22,000	22,000	22,000	22,000	22,000
Total Budget	**$1,422,442**	**$1,535,980**	**$1,530,464**	**$1,558,352**	**$1,593,591**	**$1,617,738**	**$1,734,079**

B7.2 Support for New Faculty and for Faculty Salaries

During the preceding six years the NMSU ME department has been fortunate in attracting and retaining high quality faculty. However, because of past internal NMSU policies regarding faculty raises, significant salary compression has been created in the senior ranks (associate and full professor salaries are significantly below national norms for research universities). In addition, there are other factors at the university level that are a deterrent to hiring and retaining nationally competitive faculty: 1) the university has no systematic mechanism/policy whereby the university, the college, and the department share the costs of new faculty startup; assembling startup packages is basically up to the department, with typically a small contribution from the College of Engineering; 2) the university has no policy/mechanism for spousal accommodation for new hires. Current circumstances can result in difficulties in hiring and retaining nationally competitive faculty. The hiring/retention challenges involving salaries, startup, and spousal accommodation will continue until the university takes action to address these issues.

B7.3 Support for Faculty Development

The department and the university provide several support mechanisms for faculty development. For newly-hired faculty, especially assistant professors, the department provides, as part of the new faculty startup package, significant travel money (typically $5,000 per year) so that new faculty may attend research-related technical meetings and workshops, and so that they may visit program directors at the federal agencies. Newly-hired faculty also receive light teaching loads in order to enable them to develop effectively as teachers and researchers. Newly-hired faculty also may take advantage of the programs described in the following paragraph, which applies to all faculty.

NMSU provides significant internal support for improvement of instruction. The NSF sponsored ADVANCE Program operates a mentoring program for all faculty, whereby experienced faculty serve as mentors in teaching, research, and academic life to any faculty member wishing to participate as a mentor. The New Mexico Space Grant Consortium operates an instructional program whereby trained Space Grant personnel, for a fee paid by the department, visit classroom sessions and provide feedback suggestions to the instructor. This program is open to any faculty member. Finally, the NMSU Teaching Academy, one of the more active organizations of its type nationally, provided 20 – 30 seminars a year on various aspects of instruction, student learning,, and teaching improvement. The Teaching Academy also provides teaching improvement programs for faculty and graduate students. Several NMSU ME faculty have participated in these programs during the past several years.

In addition to the aforementioned programs, the department and College of Engineering provide support for faculty in general to attend research and/or teaching related meetings and workshops, and to visit funding agency personnel. There are currently no formally allocated funds for travel; rather, on an ad hoc basis the department head allocates travel funds as appropriate, with special consideration given the assistant and associate professors.

B7.4 Operating Funds and Facilities Maintenance

The operating funds and administrative support are adequate to cover the basic needs of the department. While the state funds in themselves are insufficient to cover basic operating expenses, research indirect cost return makes up the difference between actual expenses and state appropriations. Fifteen percent of the research indirect costs are returned to the department by the College of Engineering.

Equipment funds are distributed to the department by the College of Engineering. These funds come to the university from the state (and from student fees). The university passes these funds to the College, and the college in turn redistributes the funds to the departments. These funds are used for instructional laboratory equipment and instrumentation, computing and ancillary hardware for student labs and for faculty, and equipment and tooling for the student projects shop. During the past five years the ME department funding level for equipment has averaged approximately $30,000 per year.

The facilities operating funds are adequate for current departmental needs. Laboratory and classroom improvements are contingent on availability of the equipment funds to the department.

The ME Department does not receive operating funds to maintain the laboratory and computing facilities. Maintenance of equipment is mostly paid for from research overhead return to the department, from gifts, and from departmental operating funds. The special maintenance needs of engineering laboratories and computing facilities are not taken into account by the university administration in budgeting.

Buildings and physical plant facilities are maintained by the Physical Plant Department under the office of Vice President for Facilities. Appendix II provides additional information regarding the university organization and financial processes.

B7.5 Support Personnel

The ME Department has two full time office staff. An administrative assistant is responsible for departmental administrative, personnel, and budgetary matters; a second staff member assists the administrative assistant and handles administrative tasks associated with undergraduate and graduate students. The department also has a part time (currently about 0.75 FTE) staff member who is responsible for the departmental newsletter, departmental brochures, posters, and related materials, and special projects, such as preparation of the ABET self-study report. In addition to the office staff, the department employs one full time computer support person who is responsible for maintaining all departmental software, hardware, and operating systems. Finally, the department supports one full time shop person who is in charge of the student projects shop. The department also employs a number of part time students for office, laboratory, shop, and other support. The staffing level in the department is adequate to support the program at a level that ensures compliance with ABET criteria.

8

CRITERION 8: PROGRAM CRITERIA

ABET 2006 SELF-STUDY PART B

Program compliance with Mechanical Engineering program criteria is described in this chapter.

Curriculum

The Mechanical Engineering curriculum meets both ABET general criteria as well as ME program specific criteria as described in this chapter. Table B8.1 describes specific program criteria and courses in the ME curriculum.

Table B8.1 Mapping of ME Curriculum to Specific Program Outcomes

Specific Criteria	ME1	ME2	ME3	ME4
Course	knowledge of chemistry and calculus-based physics with depth in at least one	ability to apply advanced mathematics- multivariate calculus and differential equations	familiarity with statistics and linear algebra	ability to work professionally in both thermal and mechanical systems areas
ME 102				D
ME 159				D
ME 166				
ME 222				M
ME 236				M
ME 237				
ME 240				
ME 260			X	
ME 326				M
ME 328		X	X	
ME 329		X	X	
ME 338				T
ME 340				T
ME 341				
ME 345				M/T
ME 425				M/D
ME 426/427				D
ME 445				T/D
ME 449				
CHEM 111	X			
CHEM 112	X			
PHYS 215	X			
PHYS 216	X			
MATH 191		X		
MATH 192		X		
MATH 291		X		
MATH 392		X		
MATH Elective		X		
		General Design		D
		Mechanics		M
		Thermal Science		T
		Energy		E

B8.1a Knowledge of Chemistry and Calculus-based Physics with Depth in at Least One

The ME curriculum requires that students take eight credit hours of chemistry (CHEM 111 and CHEM 112) and six credit hours of calculus-based Engineering Physics (PHYS 215 and PHYS 216) for a total of four courses. These four courses (14 credit hours) provide the students with knowledge of chemistry and calculus-based physics, with depth in both.

B8.1b Ability to Apply Advanced Mathematics through Multivariate Calculus and Differential Equations

The Mathematics sequence consists of the following courses:

- MATH 191, 192, and 291 (Calculus I, II, and III)
- MATH 392, Differential Equations
- ME 328, Engineering Analysis I (Analytical Methods)
- ME 329, Engineering Analysis II (Numerical Methods)

These courses, each of which is 3 credits, comprise a total of 18 credits of mathematics course work. In addition to these required courses, a 3 credit mathematics elective is required in senior year. Thus, BSME graduates take 21 credits of mathematics course work.

Application of advanced mathematics through differential equations is integrated into the curriculum in the upper-division 300 and 400 level courses (junior and senior years), particularly in ME 328 (Engineering Analysis I) ME 329 (Engineering Analysis II), ME 338 (Fluid Mechanics), ME 341 (Heat Transfer), and in the ME mechanics elective (each student must take one of the following courses: ME331, Intermediate Strength of Materials; ME 332, Vibrations; or ME 333, Intermediate Dynamics).

B8.1 c Familiarity with Statistics and Linear Algebra

Mechanical Engineering students learn both theory and applications of statistics and linear algebra. Linear algebra and/or statistics are covered in several ME courses, as summarized below:

- ME 260 (ME Problem Solving – linear algebra and matrices, solutions to systems of linear equations, interpolation and curve fitting)
- ME 328 (Engineering Analysis I – determinants, matrix operations, matrix inversion, algebraic eigenvalue problems)

- ME 329 (Engineering Analysis II – linear systems of equations, Gaussian elimination, Gauss-Jordan elimination, iterative methods for systems of linear equations, nonlinear systems of equations, interpolation and curve fitting)
- ME 345 (Experimental Methods I – basic statistics, normal and other distributions, uncertainty analysis of data, least squares)
- ME 445 (Experimental Methods II – statistical analysis of experimental data)

The two laboratory courses, ME 345 and ME 445, introduce and apply principles of statistics as applied to experimental data, data collection, and analysis.

B8.1d Ability to Work Professionally in Both Thermal and Mechanical Systems Areas Including the Design and Realization of Such Systems

The ME curriculum is balanced between mechanical and thermal systems subjects including design and realization of such systems.

The mechanical sequence consists of the following courses:

ME 222 Product Development Laboratory
ME 236 Engineering Mechanics I (Statics, some dynamics)
ME 237 Engineering Mechanics II (Dynamics)
CE 301 Mechanics of Materials
ME 326 Mechanical Design
ME 345 Experimental Methods I (~60% mechanical)
ME 425 Design of Machine Elements

The thermal/fluid sequence consists of the following courses

ME 240 Thermodynamics
ME 338 Fluid Mechanics
ME 340 Applied Thermodynamics
ME 341, Heat transfer
ME 345 Experimental Mechanics I (~40% thermal/fluid)
ME 445 Experimental Mechanics II

Many students take an elective in each of the mechanical or thermal sciences areas. Student placement data indicate that our graduates have the ability to work professionally in both thermal and mechanical systems areas.

We have incorporated into our program, starting with the freshman year, a series of seven required courses that form the core of our students' design experience.

ME 102 – 1 credit (Mechanical Engineering Orientation)
ME 159 - 2 credits (Graphical communication and design)
ME 326 - 3 credits (Mechanical Design)
ME 425 - 3 credits (Design of Machine Elements)
ME 426 - 3credits (Design Projects Laboratory I)
ME 427 - 3credits (Design Projects Laboratory II)
ME 445 – 3 credits (Experimental Methods II)

Each course in this group requires students to engage in one or more design projects, and often these projects involve fabrication of a model or prototype.

In ME 102 student teams of 3-4 students design, fabricate, troubleshoot, and compete Lego "dune buggy" type vehicles that are battery powered and controlled by manually operated servos. At the end of the semester each vehicle must negotiate a demanding obstacle course, with results contributing to the students' grades. Team building exercises are used to enhance student ability to work constructively in a team environment. In ME 159 students do a reverse engineering design project with emphasis on the teamwork aspects of project accomplishment.

In the third year, students are introduced in a more formal way to the determination of design specifications as well as concerns for product liability and safety in Mechanical Design (ME 326). In addition, a higher level of engineering science -- particularly dynamics, and strength of materials -- is exercised in the design projects which are evaluated in part by head-to-head competition between prototypes. Also, technical communication receives specific attention. There are two major projects assigned. The first derives from the annual ASME Student Design Contest. A design challenge, with very detailed parameters and requirements, is set; the students (working in teams) must not only design and construct the solution, but also prepare written and oral presentations on their work. Beyond course requirement and time, teams may then participate in the regional competition – and hopefully progress to the national round. This year, our ME teams took first place in the regional and will be competing at the national event in the fall. ME's team of 2001 also won the regional and participated in the national competition. ME 326 also includes a truss design and construction problem.

In the 4th year, students take Design of Machine Elements (ME 425). In this course students use their solid mechanics background to develop rational procedures for determining the dimensions of standard machine components. In addition to being introduced to this necessary and important design related analysis, students also use these new tools to size bearings, shafts, etc. in pursuing the solution of a truly open-ended design problem.

By the 4th year, students have taken most of their engineering science courses and therefore are in a position to engage a relatively sophisticated level of design problem. The ME 426/427 design projects draw on students' capabilities in dynamics, mechanics of materials, thermodynamics, fluids, heat transfer and other areas and introduce a new, large scale design project. The projects are staffed by large student groups, and concepts of timeline, cost estimation, design review, design documentation and updates, funding sources, and codes and standards are introduced and used in the project implementation. Table B8.2 shows the design area for the ME426/427 course for spring 2006. This breakdown of the design areas is typical for the capstone course over the last several years.

In the senior Thermal/Fluid systems laboratory (ME 445) the final assignment is a month long open ended project in which teams generate proposals to design and conduct experiments on a topic of the students' choosing in thermodynamics, heat transfer, or fluid mechanics. The projects are intended to allow the students to verify a hypothesis or to determine a physical outcome. The project groups are responsible for defining project objectives, using appropriate theory, identifying and configuring the equipment and instrumentation to be used, and defining the scope and methodology of the measurements to be made. The students produce both written and oral reports of their work. During the Spring 2006 semester, the following projects were done by the student teams: 1) Drag altimeter, 2) Effective thermal conductivity of packed glass micro-spheres, 3) Drag forces on a Frisbee, 4) Blimp flight dynamics experiment, 5) Forced salinity gradients by means of a temperature gradient, 6) Natural convection on a heated circular plate at different orientations. This senior laboratory design project ensures that students demonstrate the ability to work professionally in thermal systems, including design and realization of such systems. In addition to this primary experience, thermal/fluid design problems are assigned in ME 341 (Heat Transfer) and in ME 340 (Applied Thermodynamics).

In conclusion, we believe our efforts to introduce students to design in a progressive manner is producing graduates with both an awareness of the true complexity of design, and the experience and knowledge to engage design problems. We believe that our current efforts in the design area are in compliance with ABET standards.

B8.2 Faculty Qualifications

Faculty teaching upper-division courses are active in research and creative activities in their specialty areas, as evidenced in faculty vitae and as described in Chapter 6. All of the faculty in Mechanical Engineering, with the exception of two part-time faculty and one regular faculty, are members of the graduate faculty. Members of the graduate faculty must maintain currency in their field and are reviewed by their peers, the ME Department Head, and the Graduate Dean. Graduate faculty appointments are made for a duration of five years and are subject to renewal.

Table B8.2 Capstone Design Projects for 2006

Project Title	Description	Mentor	Design Area
Autonomous Balloon	Develop of an autonomous blimp capable of flying around the campus guided by GPS and other sensors. Supported in part by Boeing.	Dr. Ou Ma, NMSU	**M**
Biomass	Investigate and analyze of the efficacy of generating power using biomaterial such as cow manure, pecan slush, burning tires.	Dr. Burl Donaldson, NMSU	**T**
Black Steamer	Recreate original parts, specifically the boiler, used in steam engine vehicles of the early 20th century.	Dr. Floyde Adams, ME Academy	**M**
Border Gateway	An on-going project concerning border security issues,this year project focused on airport security equipment and processes.	Mr. Noonchester, PSL	**M**
Cooling	A GM sponsored project to design a mechanism to cool vehicle seats using a thermoelectric module.	Dr. Burl Donaldson, NMSU Colin Hebert, General Motors	**T**
Interior Cargo	A continuing GM sponsored project, this year's challenge is to design a bike rack, and storage cabinet for a truck body.	Dr. Young Ho Park, NMSU	**M**
Nanosat	Nanosatellite project sponsored by AFOSR. ME students are designing and fabricating a dual-arm robotic system for satellite inspection and also on-orbit inertia identification.	Dr. Ou Ma, NMSU	**M**
PAH	This is a continuing project under Dr. Lara of the Chemistry department, aimed at "management of Polycyclic Aromatic Hydrocarbon," a carcinogen present in factory emissions, using a clay sorbant filtering system.	Dr. Anthony Lara, NMSU	**T (Chemical)**
Raytheon	An annual design competition sponsored by Raytheon Missile Systems challenges students to fix a faulty cable release mechanism of a missile storage trigger.	Dr. Thomas Burton, NMSU	**M**
SRI	As investigation of potential adaptation of solar generated power, the challenge is to design a photovoltaic module for use as a parking lot canopy. There is a possibilty of marketing a successful design locally.	Andrew Rosenthal, SWTDI	**E**

Mechanics	**M**
Thermal Science	**T**
Energy	**E**

APPENDIX

I

ADDITIONAL PROGRAM INFORMATION

ABET 2006   SELF-STUDY   PART B

This chapter provides the information requested as part of the Appendix I in the Self-Study document. The tables and other information in this chapter are referenced in the main text in Chapters 1-8.

Tabular Data for Program

Table I-1 Basic-Level Curriculum

Table I-2 Course and Section Size Summary

Table I-3 Faculty Workload Summary

Table I-4 Faculty Analysis

Table I-5 Support Expenditures

Table I-1. Basic-Level Curriculum
Department of Mechanical Engineering, New Mexico State University

Year; Semester or Quarter	Course (Department, Number, Title)	Category (Credit Hours): Math & Basic Sciences	Engineering Topics *Check if Contains **Significant** Design* (✓)		General Education	Other
Semester 1	ME 102: Mechanical Engineering Orientation		1	(✓)		
	MATH 191: Calculus & Analytic Geometry I	3		( )		
	CHEM 111: General Chemistry I	4		( )		
	ME 159: Graphical Communication & Design		2	( )		
	ENGL 111G: Rhetoric & Composition			( )	4	
	Approved Gen. Ed. Lit. & Fine Art elective			( )	3	
Semester 2	ME 166: Introduction to Mechanical Engineering		2	( )		
	MATH 192: Calculus & Analytic Geometry II	3		( )		
	CHEM 112: General Chemistry II	4		( )		
	ENGL 218G: Technical & Scientific Communication			( )	3	
	ME 222: Introduction to Product Development/Lab		3	( )		
Semester 3	ME 260: Mechanical Engineering Problem Solving		3	( )		
	MATH 291: Calculus & Analytic Geometry III	3		( )		
	PHYSICS 215: Engineering Physics I	3		( )		
	EE 201: Networks		3	( )		
	ME 236: Engineering Mechanics I		3	( )		
	COMM 265G: Principles of Human Communication			( )	3	
Semester 4	MATH 392: Differential Equations	3		( )		
	PHYS 216: Engineering Physics II	3		( )		
	ME 237: Engineering Mechanics II		3	( )		
	ME 240: Thermodynamics		3	( )		
	CE 301: Mechanics of Materials		3	( )		
Semester 5	ME 338: Fluids		3	( )		
	ME Mechanics elective		3	( )		
	ME 328: Engineering Analysis I	3		( )		
	ME 340: Applied Thermodynamics		3	( )		
	ECON 251 or 252G: Macro-or-Micro-Economics			( )	3	
	History elective			( )	3	
Semester 6	ME 326: Mechanical Design		3	(✓)		
	ME 329: Engineering Analysis II	3		( )		
	ME 341: Heat Transfer		3	( )		
	CHE 361: Materials		3	( )		
	ME 345: Instrumentation Lab		3	( )		
Semester 7	ME 425: Machine Elements		3	(✓)		
	ME 426: Capstone Design Lab 1		3	(✓)		
	ME 445: Experimental Methods Lab (Thermo, Fluids, Hea		3	( )		
	Viewing a Wider World elective			( )	3	
	Human Thought & Behavior elective			( )	3	
	ME 449: Senior Seminar		1	( )		
Semester 8	ME elective		3	( )		
	ME elective		3	( )		
	ME 427: Capstone Design Lab II		3	(✓)		
	Mathematics elective	3		( )		
	Viewing a Wider World elective			( )	3	
TOTALS-ABET BASIC LEVEL REQUIREMENTS		**35**	**66**		**28**	
OVERALL TOTAL FOR DEGREE	**129**					
PERCENT OF TOTAL		**27.1%**	**51.2%**		**21.7%**	
Totals must satisfy one set	Minimum semester credit hours	32	48			
	Minimum percentage	25%	37.5%			

Table I-2. Course and Section Size Summary Department of Mechanical Engineering, New Mexico State University							
Course No.	Title	No. Sections offered in Current Year	Average Section Enrollment	Type of Class [1]			
				Lecture	Laboratory	Recitation	Other
ME 102	Mechanical Engineering Orientation	4	28	100			
ME 159	Graphical Communication & Design	4	34	50	50		
ME 166	Introduction to Mechanical Engineering	4	21	100			
ME 222	Introduction to Product Development	2	44	67	33		
ME 234	Mechanics & Dynamics	2	24	100			
ME 236	Engineering Mechanics I	4	24	100			
ME 237	Engineering Mechanics ll	3	25	100			
ME 240	Thermodynamics	2	40	100			
ME 260	Mechanical Engineer. Problelm Solving	2	40	67	33		
ME 326	Mechanical Design	2	26	67	33		
ME 328	Engineering Analysis I	2	30	100			
ME 329	Engineering Analysis II	2	26	100			
ME 330	Environmental Management Seminar	1					
ME 331	Intermediate Strength of Materials	1		100			
ME 332	Vibrations	1	36	100			
ME 333	Intermediate Dynamics	1	16	100			
ME 340	Applied Thermodynamics	2	30	100			
ME 341	Heat Transfer	2	30	100			
ME 345	Experimental Methods I	2	22	67	33		
ME 401	Heating/Air Conditioning Systems	1	10	100			
ME 425	Design of Machine Elements	2	20	100			
ME 426	Design Project Lab I	2	20		100		
ME 427	Design Project Lab II	2	20		100		
ME 443	Internal Combustion Engines	1	27	100			
ME 445	Experimental Methods II	2	23	67	33		
ME 449	ME Senior Seminar	2	19	100			
ME 460	Computer Aided Design	1	19	100			
ME 463	Low Speed Aerodynamics	1	12	100			
ME 487	Mechatronics	1	8	100			

Table I-3. Faculty Workload Summary
Department of Mechanical Engineering, New Mexico State University

Faculty Member (Name)	FT or PT (%)	Classes Taught (Course No./Credit Hrs.) Term and Year[1]	Total Activity Distribution[2] Teaching	Research	Other[3]
Allen, James	FT	ME 463/3/Fall 2005	30	60	10
		ME 338/3/Spring 2006			
Burton, Thomas	FT				
Choo, Vincent	FT	ME 237/3/Fall 2005	15	10	75
		ME 345/3/Fall 2005			
		Spring 2006			sabbatical
Conley, Edgar	FT	ME 326/3/Fall 2005, Spring 2006	50	30	20
		ME 425/3/Fall 2005			
		ME 345/3/Spring 2006			
Donaldson, A.B.	FT	ME 340/3/Fall 2005, Spring 2006	60	40	
		ME 445/3/Fall 2005, Spring 2006			
Garcia, Gabe	FT	ME 234/3/Fall 2005	60	30	10
		ME 260/3/Fall 2005			
		ME 460/3/Spring 2006			
		ME 511/3/Spring 2006			
Genin, Joseph	FT	ME 333/3/Fall 2005	60	30	10
		ME 521/3/ Fall 2005			
		ME 237/3/Spring 2006			
		ME 332/3/Spring 2006			
Hardee, Harry	FT	ME 240/3/Fall 2005, Spring 2006	75	20	5
		ME 328/Fall 2005, Spring 2006			
		ME 503/3/Fall 2005			
		ME 540/3/Spring 2006			
Hill, R. Dean	PT	ME 443/3/Spring 2006	100		
Hills, Richard G.	FT	ME 329/3/Fall 2005	50	30	20
		ME 570/3/Fall 2005			
		ME 580/3/Spring 2006			
Leslie, Ian	FT	ME 341/3/Fall 2005, Spring 2006	50	30	20
		ME 449/1/Fall 2005			
		ME 541/1/Fall 2005, Spring 2006			
		ME 329/3/Spring 2006			
Ma, Ou	FT	ME 236/3/Fall 2005	45	40	15
		ME 487/3/Fall 2005			
		ME 234/3/Spring 2006			
Park, Young Ho	FT	ME 426/3/Fall 2005, Spring 2006	50	40	10
		ME 427/3/Fall 2005, Spring 2006			
		ME 524/3/Spring 2006			
Pederson, Ronald	FT	ME 159/2/Fall 2005, Spring 2006	50		50
		ME 222/3/Fall 2005, Spring 2006			
Sevostianov, Igor	FT	ME 502/3/Fall 2005	30	60	10
		ME 236/3/Spring 2006			
Shashikanth, Banavara	FT	ME 338/3/Fall 2005	40	50	10
		ME 530/3/Fall 2005			
		ME 533/3/Spring 2006			
Smith, Phllip		ME 425/3/Spring 2006	100		

Table I-4. Faculty Analysis
Department of Mechanical Engineering, New Mexico State University

Name	Rank	FT or PT	Highest Degree	Institution from which Highest Degree Earned	Year	Years of Experience: Govt./Industry Practice	Years of Experience: Total Faculty	Years of Experience: This Institution	State in which Registered	Level of Activity (high, med, low, none): Professional Society (Indicate Society)	Level of Activity: Research	Level of Activity: Consulting/Summer Work in Industry
Allen, James J.	Ast. P	FT	Ph.D.	U of Melbourne	'96	6	3	2			H	
Burton, Thomas D.	P	FT	Ph.D.	U of Pennsylvania	'76	8	29	1		Pi Tau Sigma	L	C
Choo, Vincent K.	Asc P	FT	Ph.D.	Nottingham U.	'82	1	23	21			L	
Conley, Edgar G.	Asc P	FT	Ph.D.	Michigan State U	86		20	18	MI	ASME,ASEE	M	
Donaldson, A. B.	CP		Sc.D.	New Mexico State U	69	20	20	11	NM		M	I
Garcia, Gabe V.	Asc P	FT	Ph.D.	Texas A&M U	96	3	14	12		ASME	L/M	
Genin, Joseph	P	FT	Ph.D.	U of Minnesota	63	7	48	25	MN	ASME, ASEE, NSPE, AIAA	M	C
Hardee, Harry C.	P	FT	Ph.D.	U of Texas, Austin	66	28	18	16	NM,TX		L	C
Hill, R. Dean	CP	PT	Ph.D.	Michigan State U	62		44	32			NA	
Hills, Richard Guy	P	FT	Ph.D.	New Mexico State U	79	2	30	30		ASME	M	
Leslie, Ian H.	Asc P	FT	Ph.D.	Stanford U	84		22	22		ASME, ASEE	M	
Ma, Ou	Asc P	FT	Ph.D.	McGill U	91	11	7	4	PEO	ASME, AIAA	H	
Park, Young Ho	Ast. P	FT	Ph.D.	U of Iowa	94	9	7	6		ASME, AIAA	M/H	
Pederson, Ronald	P	FT	Ph.D.	U of Minnesota	76	1	30	22	TX	ASME, ASEE	N	
Sevostianov, Igor	Ast. P	FT	Ph.D.	St. Petersburg State U	93	7	11	5		ASME	H	
Shashikanth, Banavara	Ast. P	FT	Ph.D.	U of So. California	98	2	13	5		ASME	M/H	
Smith, Phillip	P	PT	Ph.D.								NA	

Table I-5. Support Expenditures
Department of Mechanical Engineering, New Mexico State University

Fiscal Year / Expenditure Category	1 2003-2004	2 2004-2005	3 2005-2006	4 2006-2007 (est.)
Operations (not including staff)	$67,700	$67,700	$67,700	$67,700
Travel	$6,774	$12,630	$10,450	$12,000
Equipment				
Institutional Funds	$34,763	$31,924	$38,125	$35,000
Grants and Gifts[1]	$100,000	$44,000 + ??	$120,000	$100,000 ??
Graduate Teaching Assistants	$161,690	$149,191	$152,548	$156,362
Part-time Assistance[2]	$18,348	$60,430	$41,177	35000 ??

Course Syllabi

The syllabi for Mechanical Engineering and supporting courses are provided in this section of Appendix I. Syllabi for the following courses are provided:

- CE 301 – Mechanics of Materials
- CHE 361 – Engineering Materials
- CHEM 111 – General Chemistry I
- CHEM 112 – General Chemistry II
- COMM 265 – Principles of Human Communication
- EE 201 – Networks I
- ENGL 111 – Rhetoric and Composition
- ENGL 218 – Technical and Scientific Writing
- MATH 191 – Calculus and Analytic Geometry I
- MATH 192 – Calculus and Analytic Geometry II
- MATH 291 – Calculus and Analytic Geometry III
- MATH 392 – Ordinary Differential Equations
- PHYS 215 – Engineering Physics I
- PHYS 216 – Engineering Physics II
- ME 102 – Mechanical Engineering Orientation
- ME 159 – Graphical Communication and Design
- ME 166 – Introduction to Mechanical Engineering
- ME 236 – Engineering Mechanics I
- ME 237 – Engineering Mechanics II
- ME 240 – Thermodynamics
- ME 260 – Mechanical Engineering Problem Solving
- ME 326 – Mechanical Design
- ME 328 – Engineering Analysis I
- ME 329 – Engineering Analysis II
- ME 331 – Intermediate Strength of Materials
- ME 332 – Vibrations
- ME 333 – Intermediate Dynamics
- ME 338 – Fluid Mechanics
- ME 340 – Applied Thermodynamics
- ME 341 – Heat Transfer
- ME 345 – Experimental Methods I
- ME 425 – Design of Machine Elements
- ME 426-427 – Design Project Laboratory I-II
- ME 443 – Internal Combustion Engines
- ME 445 – Experimental Methods II
- ME 449 – Mechanical Engineering Senior Seminar
- ME 452 – Introduction to Automation and Control System Design
- ME 460 – Applied Finite Elements

- ME 463 – Low Speed Aerodynamics
- ME 473 – Compressible Flow
- ME 484 – Biomechanics
- ME 487 – Mechatronics

COURSE INFORMATION	**CE 301 Mechanics of Materials** 3 credits-required Spring/2006
INSTRUCTOR:	J. McNamara
ASSISTANTS:	N/A
OFFICE HOURS:	2:00pm – 3:00 pm, M W
CATALOG DESCRIPTION:	Stress, strain, and elasticity of materials
PREREQUISITES:	CE 233 or ME236
TEXT:	Mechanics of Materials by Beer, Johnston, & DeWolf 4^{th} Edition
CLASS SCHEDULE:	9:30am – 10:20am MWF
GRADES:	
COURSE OBJECTIVES:	• Provide a strong technical foundation to our graduates for engineering analysis and problem-solving in the area of solid mechanics and mechanics of materials in civil engineering practice • Prepare students for licensure and professional careers in a fundamental area of civil engineering
TOPICS COVERED:	• Introduction to the Concept of Stress • Stress & Strain – Axial Loading • Stresses and Deformations Due to Torsion • Stresses and Deformations Due to Pure Bending • Analysis and Design of Beams for Bending • Shearing Stresses in Beams and Thin-Walled Members • Transformation of Stresses & Strain • Principal Stresses Under a Given Loading • Deflection of Beams • Introduction to Column Buckling Theory
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems. Program Objective C – to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information and to work collaboratively
RELATIONSHIP TO PROGRAM OUTCOMES	a - Apply knowledge of mathematics, science, and engineering in solving mechanics of materials problems [a] e - Apply critical thinking skills to identify, formulate, and solve mechanics of materials problems common in civil engineering [e]
CONTRIBUTION TO PROFESSIONAL COMPONENT:	• PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	• ME 4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems.
POLICIES:	N/A
AUTHOR/DATE:	J. McNamara 5/9/06

COURSE INFORMATION	**CH E 361 Engineering Materials** 3 credits-required Spring/2006
INSTRUCTOR:	Stuart H. Munson-McGee
ASSISTANTS:	N/A
OFFICE HOURS:	N/A
CATALOG DESCRIPTION:	Bonding and crystal structure of simple materials. Electrical and mechanical properties of materials. Phase diagrams and heat treatment. Corrosion and environmental effects. Application of concepts to metal alloys, ceramics, polymers, and composites. Selection of materials for engineering design
PREREQUISITES:	CHEM 111 or CHEM 114 or equivalent
TEXT:	W. D. Callister, Jr., "Materials Science and Engineering: An Introduction," 6th edition, John Wiley and Sons, NY, NY
CLASS SCHEDULE:	10:30-11:20am MWF
GRADES:	N/A
COURSE OBJECTIVES:	To provide engineering students a fundamental understanding of materials and the interrelationship between processing, structure, properties, and performance. Specifically, the student who successfully completes this course will be able to: • Describe the structure of atoms and the bonding between atoms • Describe quantitatively and qualitatively the structure of FCC and BCC crystals • Determine the mechanical properties of a material from its stress-strain diagram • Determine 1-dimensional steady state and transient diffusion profiles • Conduct simplified failure analysis • Determine the equilibrium phase structures in binary alloys • Determine the structure of a material resulting from isothermal transformations • Calculate the potential of an electrochemical as it applies to corrosion behavior • Describe techniques to prevent corrosion in metals
TOPICS COVERED:	• Atomic Structure & Interatomic Bonding • The Structure of Crystalline Solids • Imperfections in Solids • Diffusion • Mechanical Properties • Dislocation & Strengthening Mechanisms • Failure • Corrosion • Phase Diagrams • Phase Transformations • Thermal Processing • Ceramics, Polymers, & Composites

COURSE INFORMATION	**CH E 361 Engineering Materials** 3 credits-required Spring/2006
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems. Program Objective C – to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information and to work collaboratively
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering e – ability to identify, formulate and solve engineering problems c – Ability to design a system, component, or process to meet desired needs
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME 4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems.
POLICIES:	
AUTHOR/DATE:	S. Munson-McGee 1/12/06

COURSE INFORMATION	**CHEM 111 General Chemistry I & Lab** 4 credits-required Spring/2006
INSTRUCTOR:	Deanna Dunlavy *Office:* CB104B *Phone:* 646-4823 *E-mail:*dunlavy@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	10:30 – 11:30 MTuWThF and by appointment
CATALOG DESCRIPTION:	Descriptive and theoretical Chemistry.
PREREQUISITES:	• A C or better in MATH 115 or placement in a higher level math class • One of the following: o a B or better in a second semester high school chemistry course o a C or better in CHEM 100 o enhanced ACT score of at least 22
TEXT:	**TEXTBOOK:** Chemistry, A Molecular Science, by Dennis Wertz, 2nd Custom Edition, Pearson Custom Publishing, New Jersey, 2006. **LAB MATERIALS:** • CHEM 111-112 lab textbook, published by Outernet Publishing Co. • Laboratory Notebook (Hayden, McNeil Pub.) • Goggles, as described below on the last page
CLASS SCHEDULE:	8:55am – 10:10am TuTh
GRADES:	Three hour exams and final exam (15% each) 60% Quizzes and assignments 20% Lab experiments 20%
COURSE OBJECTIVES:	At the end of this course, it is expected that the student will be able to: • Demonstrate knowledge of basic chemical principles, including the following areas: structure of the atom and nature of electrons, periodicity of atomic properties, ionic vs covalent bonds and the compounds containing them, molecular structure and bonding, gas laws, types of solids, liquid properties, phase changes, reaction energetics and kinetics, extent of reaction, solutions, electrochemistry and redox reactions, acid/base reactions. • See the applicability of chemistry to common occurrences in daily life. • Analyze a problem and determine the appropriate mathematical manipulation required to solve it. • Tie together macroscopic phenomena with microscopic understanding

COURSE INFORMATION	**CHEM 111 General Chemistry I & Lab** 4 credits-required Spring/2006
TOPICS COVERED:	• Early Experiments • Quantum Theory • Atomic Structure and Properties • Ionic Bond • The Covalent Bond • Molecular Structure and Bonding • States of Matter and Changes in State • Solid Materials • Reaction Energetics • Solutions • Electrochemistry • Acid-base chemistry
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems. D -- to teach students to use modern experimental and data analysis techniques
RELATIONSHIP TO PROGRAM OUTCOMES	a - ability to apply knowledge of math, science, and engineering b -- ability to design and conduct experiments/analyze and interpret data e – ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME1 -- knowledge of chemistry and calculus-based physics with depth in at least one
POLICIES:	N/A
AUTHOR/DATE:	D. Dunlavy **1/12/06**

COURSE INFORMATION	**CHEM 112 General Chemistry II & Lab** 4 credits-required Spring/2006
INSTRUCTOR:	William Quintana Office: CB 100 Phone: 646-2410 Email: wquintan@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	M – F 10:20 - 11:20 AM and by appointment
CATALOG DESCRIPTION:	Descriptive and theoretical chemistry (2nd Course)
PREREQUISITES:	• Grade of D or better on CHEM 111. • Having approved Math 180 and Math 185. Students that had a poor performance in CHEM 111 must consider repeating course prior to attempting CHEM 112. As a general rule, an average of one l grade is dropped in going from CHEM 111 to CHEM 112. To avoid a poor performance in CHEM 112, study habits must be substantially improved.
TEXT:	**TEXTBOOK:** Chemistry, A Quantitative Science, 2nd Custom Edition, by Dennis W. Wertz, published by Pearson/Prentice Hall. **LAB MATERIAL**: • CHEM 111 –112 General Chemistry Lab Textbook, 4th Edition, Outernet Publishing. • Laboratory Notebook (Hayden, McNeil Publishing) • Goggles, as described in the laboratory rules
CLASS SCHEDULE:	11:30 AM – 12:30 PM MWF
GRADES:	Three hour exams and final exam (15% each) 60% Quizzes and assignments 20% Lab experiments 20%
COURSE OBJECTIVES:	Upon completion of this course, the student will be able to: • Demonstrate knowledge of basic chemical principles in each of the following areas: Stoichiometry, Solutions, Thermodynamics, Chemical Equilibrium, Acid – Base Chemistry, Electrochemistry, Chemical Kinetics, Nuclear Chemistry (time permitting) • Understand the application of chemistry to daily life. • Learn to analyze a problem and determine the proper mathe operation needed to solve a problem. • Understand the relationship between macroscopic phenomen microscopic understanding

COURSE INFORMATION	**CHEM 112 General Chemistry II & Lab** 4 credits-required Spring/2006
TOPICS COVERED:	• Chapter 1, Stoichiometry • Chapter 2, Solutions • Chapter 3, First Law of Thermodynamics • Chapter 4, Thermodynamics and Equilibria • Chapter 5, Chemical Equilibrium • Chapter 6, Acids and Bases • Chapter 7, Mixtures and Acids and Bases • Chapter 8, Equilibria containing Metal Ions • Chapter 9, Electrochemistry • Chapter 10, Chemical Kinetics • Chapter 11, Nuclear Chemistry • Comprehensive Final Exam, 1:00 – 3:00 PM
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems. D -- to teach students to use modern experimental and data analysis techniques
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering b -- ability to design and conduct experiments/analyze and interpret data e – ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME1 -- knowledge of chemistry and calculus-based physics with depth in at least one
POLICIES:	N/A
AUTHOR/DATE:	W. Quintana 1/12/06

COURSE INFORMATION	**COMMM 265G Principles of Human Communication** 3 credits-required Spring/2006
INSTRUCTOR:	Staff
ASSISTANTS:	N/A
OFFICE HOURS:	N/A
CATALOG DESCRIPTION:	Study and practice of interpersonal, small group, and presentation skills essential to effective social, business, and professional interaction
PREREQUISITES:	None
TEXT:	Devito, Joseph A., *Human Communication*, Allyn & Bacon/Longman, 2005 Rothwell, J. Dan, *In the Company of Others: An Introduction to Communication*, New York, McGraw-Hill, 2004
CLASS SCHEDULE:	This 3-credit course meets for 150 minutes per week.
GRADES:	N/A
COURSE OBJECTIVES:	• Develop and improve the students' critical thinking skills • Develop and improve students' ability to integrate and synthesize information • Develop and improve students' ability to present cogent arguments during an oral/verbal presentation

TOPICS COVERED:	• **Informative Speaking:** The purpose of this assignment is to inform your audience by clarifying a concept or process, demonstrating a process, or in general, widening your audience's knowledge base
	• **Persuasive Speaking:** To bring about a change in your audience's attitudes and/or action; to align your audience's attitudes and/or actions with your desired attitudes/actions
	• **Relational Analysis**
	    • Attraction
	    • Development
	    • Maintenance
	    • Conflict

RELATIONSHIP TO PROGRAM OBJECTIVES:	C -- to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information and to work collaboratively
RELATIONSHIP TO PROGRAM OUTCOMES	g -- ability to communicate effectively
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC4 – general education component
RELATIONSHIP TO ABET SPECIFIC CRITERIA	
POLICIES:	N/A
AUTHOR/DATE:	Staff 1/12/06

COURSE INFORMATION	**EE 201 Networks I** 3 credits-required Spring/2006
INSTRUCTOR:	Ram Prasad T&B222 Phone: 646-3623 Email: rprasad@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	10:00 am - 11:30 am MW
CATALOG DESCRIPTION:	Electric component descriptions and equations. Kirchoff's voltage and current laws, formulation and solution of network equations using time domain concepts
PREREQUISITES:	Minimum 2.0 GPA. Co-requisite: Math 192. For non-majors only
TEXT:	***Fundamentals of Electric Analysis***, Clayton Paul
CLASS SCHEDULE:	11:45 am - 1:00 pm, TuTh
GRADES:	*Exams* - 80%; *Homework* - 20%
COURSE OBJECTIVES:	Provide non-EE majors the fundamental knowledge and skills needed to solve DC and AC electrical circuits with R L C components. Students will understand how electric networks perform, what their performance measures are, and how to calculate the performance characteristics. Students will understand how to develop electrical analogs of mechanical, chemical, and other processes and systems. The course also provides the knowledge and skills required of non-EE majors in order to pass the electrical circuits portion of the engineers in training (EIT) exam
TOPICS COVERED:	**Chapter 1 – Basic Definitions and Laws** An overview of circuit analysis Voltage and current Ideal circuit elements Power and energy Voltage and current sources Ohm's Law Kirchoff's Laws **Chapter 2 – Basic Circuit Elements and Analysis Techniques** Resistors in series Resistors in parallel Voltage divider Current divider Measuring V and I Wheatstone bridge **Chapter 3 – Additional Circuit Analysis Techniques** Terminology Node-Voltage (N-V) method Special cases of N-V method Mesh-current (M-C) method Special cases of M-C N-V versus M-C **Chapter 4 – The Operational Amplifier** Concept and Uses Circuit Analysis with Operational Amplifiers

COURSE INFORMATION	**EE 201 Networks I** 3 credits-required Spring/2006
	Chapter 5 – Energy Storage Elements Inductors in series and parallel Capacitors in series and parallel **Chapter 6 - Sinusoidal Excitation of Circuits** Sinusoidal sources Sinusoidal response The Phasor Passive elements in the frequency domain Kirchoff's laws in the frequency domain Series, parallel simplifications Source transformations and Thevenin-Norton equivalents Node-voltage method Mesh-current method Instantaneous power Average and reactive power The RMS value and power calculations Complex power **Chapter 7 – The General Time-Domain Response of Circuits** Natural response of an RLC circuits Step response of RLC circuits General solutions for step and natural responses Natural response of an RL circuit Natural response of an RC circuit Step response of RL and RC circuits General solutions for step and natural Responses
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES	a - ability to apply knowledge of math, science, and engineering e – ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	• ME 4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems.
POLICIES:	N/A
AUTHOR/DATE:	R. Prasad 1/12/06

COURSE INFORMATION	**ENGL 111G Rhetoric and Composition** 4 credits-required Spring/2006
INSTRUCTOR:	Staff
ASSISTANTS:	N/A
OFFICE HOURS:	N/A
CATALOG DESCRIPTION:	Skills and methods used in writing university-level essays
PREREQUISITES:	ACT standard English score of 16 or higher during regular semester (20 or above during summer) or successful completion of a developmental writing course or equivalent
TEXT:	Faigley, Lester, and Selzer, Jack, *Good Reasons: Designing and Writing Effective Arguments*, 3/E, 3rd Edition, Boston, Allyn & Bacon/Longman, 2006
CLASS SCHEDULE:	This 4-credit course meets for 210 minutes per week and includes at least one block of 110 minutes.
GRADES:	N/A
COURSE OBJECTIVES:	• Become familiar with the composing process and learn to adjust it to accomplish various writing tasks • Develop analytical reading and critical thinking • Develop expository and argumentative writing skills • Develop research skills • Use collaborative learning in various contexts
TOPICS COVERED:	The course includes 5 essay assignments • Essay 1: A Critique of Self • Essay 2: Writing in a Major • Essay 3: Documented White Paper • Essay 4: Editorial • Essay 5: Reflective Self-Assessment The portfolio assignment requires studentsto revise these essays and submit them at the end of the semester. In addition, students are required to take the Common Essay exam at the end of the semester.
RELATIONSHIP TO PROGRAM OBJECTIVES:	C -- to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information and to work collaboratively
RELATIONSHIP TO PROGRAM OUTCOMES	g -- ability to communicate effectively
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC4 – general education component
RELATIONSHIP TO ABET SPECIFIC CRITERIA	
POLICIES:	N/A
AUTHOR/DATE:	Staff 1/12/06

COURSE INFORMATION	**ENGL 218G Technical and Scientific Communication** 3 credits-required Spring/2006
INSTRUCTOR:	Staff
ASSISTANTS:	N/A
OFFICE HOURS:	N/A
CATALOG DESCRIPTION:	Effective writing for courses and careers in the sciences, engineering, and agriculture. Strategies for understanding and presenting technical information for various purposes to various audiences.
PREREQUISITES:	ENGL 111G
TEXT:	Johnson-Sheehan, Richard, *Technical Communication Today*, Boston, Longman, 2005
CLASS SCHEDULE:	This 3-credit course meets for 150 minutes per week.
GRADES:	N/A
COURSE OBJECTIVES:	• Identify and define audience and purpose • Learn about ethics and professionalism in the workplace • Employ technology in the writing process • Plan, draft, and revise oral and written communication • Learn about professional and user-friendly style in technical communication • Work effectively as team members in writing situations • Identify basic elements of design for technical communication • Learn to work under time constraints and deadline situations
TOPICS COVERED:	• Introduction memo • Technical communications in my field • Computer usage • Collaborative technical project • Project proposal memo • Annotated bibliography • Project presentation • Written report • Transmittal memo • Group evaluation memo
RELATIONSHIP TO PROGRAM OBJECTIVES:	C -- to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information and to work collaboratively
RELATIONSHIP TO PROGRAM OUTCOMES	g -- ability to communicate effectively
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC4 – general education component
RELATIONSHIP TO ABET SPECIFIC CRITERIA	
POLICIES:	N/A
AUTHOR/DATE:	Staff 1/12/06

COURSE INFORMATION	**MATH 191 Calculus and Analytic Geometry I** 3 credits-required Spring/2006
INSTRUCTOR:	Susana Salamanca-Riba SH 260 Phone: 646-2305 Email: mailto:ssalaman@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	2:30pm - 3:30pm TuTh in SH 260 2:30pm - 3:30pm W in SH118
CATALOG DESCRIPTION:	Algebraic, logarithmic, exponential and trigonometric functions, theory and computation of derivatives, approximation, graphing and modeling. May include an introduction to integration
PREREQUISITES:	Grade of C or better in Math 180 and 185
TEXT:	*Calculus: Concepts and Contexts, 3rd Edition*, James Stewart, Brooks/Cole
CLASS SCHEDULE:	10:20am -11:35 am, TuTh
GRADES:	Homework 10% Reading/Homework Quizzes and Long Assignments 20% Midterms (3X15%) 45% Final Exam 25%
COURSE OBJECTIVES:	The first of three calculus courses taken by engineers.
TOPICS COVERED:	• Functions and models • Limits and derivatives • Differentiation rules • Applications of differentiation • Introduction to integration
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations
POLICIES:	N/A
AUTHOR/DATE:	S. Salamanca-Riba 1/12/06

COURSE INFORMATION	**MATH 192 Calculus and Analytical Geometry II** 3 credits-required Spring/2006
INSTRUCTOR:	Susana Salamanca-Riba SH 260 Phone: 646-2305 Email: mailto:ssalaman@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	2:30pm - 3:30pm TuTh in SH 260 2:30pm - 3:30pm W in SH118
CATALOG DESCRIPTION:	Riemann sums, the definite integral, antiderivatives, fundamental theorems, use of integral tables, numerical integration, modeling, improper integrals, differential equations, series, Taylor polynomials,.
PREREQUISITES:	Grade of C or better in Math 191
TEXT:	*Calculus: Concepts and Contexts, 3rd Edition*, James Stewart, Brooks/Cole
CLASS SCHEDULE:	10:20am -11:35 am, TuTh
GRADES:	Homework 10% Reading/Homework Quizzes and Long Assignments 20% Midterms (3X15%) 45% Final Exam 25%
COURSE OBJECTIVES:	The second of three calculus courses taken by engineers
TOPICS COVERED:	• Integrals • Applications of integration • Differential equations • Infinite sequences and series
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations
POLICIES:	
AUTHOR/DATE:	S. Salamanca-Riba 1/12/06

COURSE INFORMATION	**MATH 291 Calculus and Analytic Geometry III** 3 credits-required Spring/2006
INSTRUCTOR:	Ernie Barany Office: SH257 Phone: 646-2526 Email: ebarany@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	12:00pm – 1:00pm MW; 1:00pm – 2:00pm TuTh
CATALOG DESCRIPTION:	Vector algebra, directional derivatives, approximation, max-min problems, multiple integrals, applications, cylindrical and spherical coordinates, change of variables.
PREREQUISITES:	Grade of C or better in MATH 192
TEXT:	*Calculus: Concepts and Contexts, 3rd Edition*, James Stewart, Brooks/Cole
CLASS SCHEDULE:	11:45am – 1:00pm TuTh
GRADES:	Reading/Homework Quizzes and Long Assignments 25% Midterms (3) 50% Final Exam 25%
COURSE OBJECTIVES:	Introduction to multi-variable calculus and analytic geometry. Virtually all of the first two semesters of this calculus series has dealt with functions of one variable. Since we live in space that has (at least) three dimensions, it is important for applications that our understanding of calculus be extended to more than one variable. To facilitate the extension, we will first learn a bit about the mathematical description of two and three dimensional space. We will need the idea of *vector*s in two and three dimensions, and the idea of *parameterize*d *path*s that will allow us to develop a mathematical description of motion in space. Armed with this knowledge, we will then consider functions on multi-dimensional space and define how we might do calculus with them (for example differentiate and integrate them).
TOPICS COVERED:	• Vectors and geometry of space • Vector functions • Partial derivatives • Multiple integrals
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations
POLICIES:	N/A
AUTHOR/DATE:	E. Barany 1/12/06

COURSE INFORMATION	**MATH 392 Ordinary Differential Equations** 3 credits-required Spring/2006
INSTRUCTOR:	Guram Bezhanishvili Office: WH 203 Phone: 646-2837 **Email:** gbezhani@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	12:25PM – 1:25PM MWF
CATALOG DESCRIPTION:	Introduction to differential equations and dynamical systems with emphasis on modeling and applications. Basic analytic, qualitative and numerical methods. Equilibria and bifurcations. Linear systems with matrix methods, real and complex solutions.
PREREQUISITES:	C or better in Math 192
TEXT:	*Differential Equations,* 2nd Edition, R. Blanchard, R.L. Devaney, G.R. Hall, Brooks/Cole
CLASS SCHEDULE:	11:30am -- 12:20pm MWF
GRADES:	Homework 20% Tests 50% (2 tests, 25% each) Cumulative Final Exam 30%
COURSE OBJECTIVES:	The goals are to present the basic concepts of ordinary differential equations, and their applications. We emphasize analytical, numerical, and qualitative aspects of ordinary equations.
TOPICS COVERED:	We cover portions of the first five chapters of the text. For the most part, these will be covered in the order they appear. Additional material will be covered as time permits. • First-order differential equations • First-order systems • Linear systems • Forcing and resonance • Nonlinear systems • (Laplace transforms) • (Numerical methods) • (Discrete dynamical systems)
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations
POLICIES:	N/A
AUTHOR/DATE:	G. Bezhanishvili 1/12/06

COURSE INFORMATION	**PHYS 215 Engineering Physics I** 3 credits-required Spring/2006
INSTRUCTOR:	Thomas Hearn
ASSISTANTS:	N/A
OFFICE HOURS:	N/A
CATALOG DESCRIPTION:	Calculus based course of kinematics, work and energy, particle dynamics, conservation principles, simple harmonic motion.
PREREQUISITES:	Math 191 or equivalent calculus course
TEXT:	Randall Knight, *Physics for Scientists and Engineers*, Pearson Addison Wesley, 1st Edition.
CLASS SCHEDULE:	Three 50 minute classes or two 75 minute classes per week; two hour final exam during exam week.
GRADES:	N/A
COURSE OBJECTIVES:	Students should be able to apply kinematic equations to describe motion, apply Newton's laws to describe forces and their effects on motion, apply energy and momentum concepts and their conservation properties, and define the basic properties of oscillations and waves.
TOPICS COVERED:	• Measurement and units; • Kinematic relationships between position, velocity and acceleration; • Newton's Laws; • forces; • friction; • potential and kinetic energy; • conservation of energy; • momentum and conservation of momentum; • rotational velocity and acceleration; • torque; • rotational energy and momentum; • gravity and orbits; • oscillations and simple harmonic motion.
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering e – ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME1 -- knowledge of chemistry and calculus-based physics with depth in at least one
POLICIES:	N/A
AUTHOR/DATE:	T. Hearn and S. Pate 1/12/06

COURSE INFORMATION	**PHYS 216 Engineering Physics II** 3 credits-required Spring/2006
INSTRUCTOR:	Jacob Urquidi
ASSISTANTS:	N/A
OFFICE HOURS:	N/A
CATALOG DESCRIPTION:	Calculus-level treatment of topics in electricity, magnetism, and optics.
PREREQUISITES:	MATH 192 and PHYS 215
TEXT:	Randall Knight, *Physics for Scientists and Engineers*, Pearson Addison Wesley, 1st Edition.
CLASS SCHEDULE:	Three 50 minute classes or two 75 minute classes per week; two hour final exam during exam week.
GRADES:	N/A
COURSE OBJECTIVES:	Students should become proficient in the topics on electricity, magnetism, and optics presented as well as connecting the concepts presented and their use in engineering applications.
TOPICS COVERED:	• The Electric Field; • Electric Potential; • Electrostatic Energy and Capacitance; • Electric Current and Direct Current Circuits; • The Magnetic Field; • Magnetic Induction; • Alternating Current Circuits; • Maxwell's Equations; • Properties of Light; • Optical Images
RELATIONSHIP TO PROGRAM OBJECTIVES:	B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering e – ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME1 -- knowledge of chemistry and calculus-based physics with depth in at least one
POLICIES:	N/A
AUTHOR/DATE:	J. Urquidi and Dr. Stephen Pate 1/12/06

COURSE INFORMATION	**ME 102 ME Orientation Sections 1 & 2** Required – 1 credit Spring 2006
INSTRUCTOR	David Seigel Office: JH 13 Phone: 312-2759 Email: dseigel@nmsu.edu
ASSISTANTS	Eric Winstead
OFFICE HOURS:	By appointment only. To schedule an appointment email or call the instructor.
CATALOG DESCRIPTION:	Students are introduced to the world of mechanical engineering. Emphasis is placed on tours of ME labs and NMSU facilities that illustrate possible career paths for mechanical engineers. Students are introduced to the faculty of the department, student organizations, and support services available at NMSU. The role of good communication skills, using modern technology, team building, and intellectual property are reviewed. Students are advised in planning the balance of their academic program.
PREREQUISITES	No Prerequisites.
TEXT:	There is no text book for this class. All material will be given out in class.
CLASS SCHEDULE:	Tuesday (Section 1) / Thursday (Section 2) 11:45-1:00 p.m. JH 209
GRADES:	Class Attendance 25 % Homework/Quizzes 20 % Projects 35 % Participation 20 %
EXTRA CREDIT:	• Each ASME meeting you attend will earn you 1% extra credit on your final grade. • An additional 5% extra credit may be earned by participating in the ASME student design competition.
COURSE OBJECTIVES:	• Introduce students to the Mechanical Engineering discipline within the College of Engineering.(i) • Introduce students to tools offered by the university that will help them in their academic career. • Students will gain an appreciation of what Mechanical Engineering is about including specific areas of specialty associated with the field.(f) • To provide students with a working knowledge of written and oral forms of communication used by engineers.(g) • Introduce students to the faculty in the Mechanical Engineering department and the Engineering Deans office. • Introduce students to the Mechanical Engineering student organizations and upper level students. • Introduce students to the importance of working in groups and teams and give them experience with the design process.
TOPICS COVERED:	• Mechanical Engineering Laboratory Tours • Technical Communication • Working in Teams • Design Competition Activities • Ethics • Academic Program • Using Web CT and other NMSU online programs

COURSE INFORMATION	**ME 102 ME Orientation Sections 1 & 2** Required – 1 credit Spring 2006
RELATIONSHIP TO PROGRAM OBJECTIVES:	• Program Objective A – to prepare students for successful careers and lifelong learning • Program Objective C – To develop skills pertinent to the design process, including students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively. • Program Objective E – To instill in our students an understanding of their professional and ethical responsibilities..
RELATIONSHIP TO PRPOGRAM OUTCOMES	f- understanding of professional and ethical responsibilities g - ability to communicate effectively i - recognition of need for, and ability to, engage in lifelong learning
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC1 – major design experience PC3 – 1 ½ years of engineering topics
RELATIONSHIP TO ABET SPECIFIC CRITERIA	
POLICIES:	• Class attendance will be taken at the beginning of every class. It is the student's responsibility to show up to class on time and sign the attendance sheet. (*Failure to sign the attendance sheet will result in an absent grade for that day*) • Students with three consecutive unexcused absences will be dropped from the course. • Homework assignments will be collected at the beginning of class. **Late homework** assignments will be accepted one up to one week. A **50% penalty** will be given to all late homework. • Student participation in group assignments will be evaluated by group members. Failure to meet at times specified by the group or participate in group activities will result in a reduction of the student's course grade by one letter grade.
AUTHOR/DATE:	D. Seigel 1/18/06

COURSE INFORMATION	**ME 159 Graphical Communication and Design** Required – 2 credits Spring 2
INSTRUCTOR:	Ronald J. Pederson Office: JH117 Phone: 646-3501 Email: rpederso@nmsu.edu
ASSISTANTS:	To Be Announced
OFFICE HOURS:	Posted in ME Office
CATALOG DESCRIPTION:	Sketching and orthographic projection. Detail and assembly drawings, dimensioning, tolerance specification, and design projects.
PREREQUISITES:	Basic algebra and trigonometry
TEXT:	*Computer Aided Design with Unigraphics NX3*, H. Felix Lee and David W. Fulton, Kendall/Hunt Publishing, 2005. This is a **WebCT course** – Go to http://my.nmsu.edu and use NMSU Bookmarks WebCT ***OR*** use http://salsa.nmsu.edu directly in the browser
CLASS SCHEDULE:	Lecture: 1:30-2:20, Lab: 2:30 - 5:20 Tu or W Lab Hours Outside of Class for Doing Homework: 8:00am – 5:00pm, Monday → Friday in Jett Hall 21 (Downstairs) 5:00pm – 11:00pm, Sunday → Thursday in Jett Hall 604 (Upstairs)
GRADES:	Quizzes 30% Exam 20% Lab Drawings/Homework/Project 50%
COURSE OBJECTIVES:	• The student will become familiar with 3-D, featured based, parametric solids modeling as a design tool in mechanical engineering. (k) • The student will become familiar with the practices and procedures used to produce and read engineering working drawings. (k) • The student will become familiar with computers from an historical, software, and hardware perspective as they are used in mechanical engineering. • The student will become familiar with the general principles of computer aided design and drafting (CADD), and be reasonably proficient in the use of one modern CADD software package – Unigraphics NX3 from UGS Corporation. (k) • The student will work in a team environment to produce a set of engineering drawings for a small engineering assembly. (c)
TOPICS COVERED:	Using Unigraphics NX3: • Feature-based solids modeling – creation of basic and intermediate features • NX3 as a design tool - building design intent into models • Assembly modeling • Creating engineering drawings of parts and assemblies Practices and Procedures Used to Produce Engineering Drawings: • Creating 2D orthographic drawings of 3D objects – standard views, required number, placement, etc. • Required drawing dimensions – identify features, decide how many dimensions, etc. • Good dimensioning practices – where paced in drawing? How should they look? • Reading engineering drawings – using 2D orthographic views and dimensions to infer 3D shape
RELATIONSHIP TO PROGRAM	A – to prepare students for successful careers and lifelong learning C – to develop skills pertinent to the design process, including the students’

COURSE INFORMATION	**ME 159 Graphical Communication and Design** Required – 2 credits Spring 2
OBJECTIVES:	ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively.
RELATIONSHIP TO PROGRAM OUTCOMES:	c – ability to design a system, component, or process k – ability to use techniques, skills and modern engineering tools for engineering practice.
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC1 – major design experience PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME4 – ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.
POLICIES:	• Lab Drawings will be checked in class or handed in at the end of the laboratory sessions as noted in the Course Outline. Homework is due at the beginning of the next class lecture (1:30 PM). Lab drawings or Homework may be turned in LATE until 9:00 PM the following day with a 20% grade penalty. No Drawings or Homework will be accepted after that time. • Temporary storage space up to 50MB will be supplied for the semester in the two ME computer labs - JH 604 and JH 21 – free of charge. This space is usable for all of your courses – but it can fill up fast – keep it cleaned up by deleting unnecessary files or copying files to permanent storage. Permanent storage is the responsibility of the student; you can copy files that you want to keep to a USB drive, a CD-RW, or to floppy disks (JH 604 only). • Paper for printing up to 100 sheets in the semester will be supplied free of charge. Printing beyond that amount will be charged at the rate of 5¢/page (see secretary in JH 117). • **ALL** absences must be “excused”, otherwise a **0** will be recorded for that Lecture/Lab Drawing. Talk/Email the instructor as soon as you know that you will miss the class. Because of limited space/machines, any make-up work must be coordinated with the instructor.
AUTHOR/DATE:	R. Pederson Spring/2(

COURSE INFORMATION	**ME 166 Introduction to Mechanical Engineering** Required – 2 credits Spring/200
INSTRUCTOR:	Dr. Nadir Yilmaz Office: JH 613 Email:
ASSISTANTS:	TBA
OFFICE HOURS:	10:30 AM – 12:30 PM, MW
CATALOG DESCRIPTION:	Introduction to mechanical engineering and the software tools used for communication and computation in engineering.
PREREQUISITES:	None; Co-requisite: Math 191
TEXTBOOK:	*Introduction to Mechanical Engineering* by Robert Rizza
CLASS SCHEDULE:	8:30 – 9:20 AM, MW, JH 604
GRADING:	Homework assignments: 35% Exam 1 : 20% Exam 2 : 20% Final Exam: 25%
COURSE OBJECTIVES:	• Enhance potential for academic success (attitude, behavior, goals and organization). • Become comfortable with the college's computing resources including e-mail, the Internet, Word, Excel, and MathCAD. (k) • Learn how to approach engineering problems with appropriate tools. (k) • Build professional awareness (disciplines, industries, job types)- learn what to tell people when they ask: "What is ME and what does an ME do?" (f)
TOPICS COVERED:	• Mechanical Engineer Role. • Tools (Internet, Word, Excel, Power Point, and MathCAD). • Dimensions, Units, Conversions, etc. • Error Analysis. • Statics and Dynamics. • Solid Mechanics. • Fluids. • Thermal Sciences.
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems. Program Objective E – to instill in our students an understanding of their professional and ethical responsibilities
RELATIONSHIP TO PROGRAM OUTCOMES:	a – ability to apply knowledge of math, science, and engineering d – ability to function on multi-disciplinary teams e – ability to identify, formulate, and solve engineering problems f – understanding of professional and ethical responsibility i – recognition of need for, and ability to engage in lifelong learning j – knowledge of contemporary issues k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)

COURSE INFORMATION	**ME 166 Introduction to Mechanical Engineering** Required – 2 credits Spring/200(
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME4 – the ability to work professionally in both thermal and mechanical systems including the design and realization of such systems
POLICIES:	• Homework assignments must be turned in at the beginning of the class period when they are due. No late homework assignments will be accepted. • Students cannot make up missed tests. • Examination during the semester will be administered during the regular class period (50 minutes) and will be problem solving and short essay type. • All examinations will be closed book, closed notes and closed neighbor. You will be allowed to use calculators, and a 5 X 7 note card with any information you would like to put. However, homework or any kind of problem solutions should not be written on the note card. • The final examination will be comprehensive but will stress material not covered by previous examinations. • Any form of cheating on any examination will result severe penalties (e.g., F in the course or expulsion from the university.
AUTHOR/DATE:	N. Yilmaz 1/23/2(

COURSE INFORMATION	**ME 236 Engineering Mechanics-I** 3 credits-required Spring/2006
INSTRUCTOR:	Igor Sevostianov Office: JH 628 Phone: 646-3322 Email: igor@me.nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	We 10:30-11:30 or by appointment
CATALOG DESCRIPTION:	Force systems, resultants, equilibrium, distributed forces, area moments, friction, and kinematics of particles.
PREREQUISITES:	MATH 192 Corequisite: PHYS 215
TEXT:	*Engineering Mechanics, Statics* R.C. Hibbeler., 10-th ed Prentice Hall
CLASS SCHEDULE:	Lecture 9:30 – 10:20, Mo, We, Fr JH 209
GRADES:	Homeworks and Quizzes 15%; Test #1 15%; Test #2 20%; Test #3 20%; Final Exam 30%
COURSE OBJECTIVES:	**After completing this course, a student should be able to:** • Determine resultants of concurrent force systems using both force triangle and component methods (a). • Apply equilibrium conditions to force systems (a). • Construct free body diagrams of particles, rigid bodies, and structures, and identify all external forces and moments acting on them (k). • Use principles of equilibrium to determine forces and moments acting on individual members of trusses, and other structures (k). • Apply concepts of friction to a variety of problems including ramps, sliding vs. tipping, wedges, and belts (e). • Determine the centroid and moment of inertia of cross-sectional areas, including structural shapes (a).
TOPICS COVERED:	• Vectors • Particle equilibrium • Equivalent force systems • Rigid body equilibrium • Structural analysis • Centroids, distributed load systems, fluid pressure • Area and mass moments of inertia • Friction • Internal forces • Principle of wirtual work
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers when solving problems. Program Objective C – to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information and to work collaboratively
RELATIONSHIP TO PROGRAM OUTCOMES	a - ability to apply knowledge of math, science, and engineering e – ability to identify, formulate and solve engineering problems j – ability to use techniques, skills and modern engineering tools for

COURSE INFORMATION	**ME 236 Engineering Mechanics-I** 3 credits-required Spring/2006
	engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	• ME 4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems.
POLICIES:	• Overall grade for HW will be based on all assignments excluding the one with the worst grade. • Every student has the right to skip one HW assignment. However, having used this right, one cannot exclude the worst HW
AUTHOR/DATE:	Igor Sevostianov 1/18/2006

COURSE INFORMATION	**ME 237 Engineering Mechanics I** Required – 3 credits Spring/2006
INSTRUCTOR:	J. Genin Office: JH 110 Phone: 646-3809 Email: jgenin@nmsu.edu
ASSISTANTS:	TBA
OFFICE HOURS:	M,W,F 9:30-11:00 or by appointment
CATALOG DESCRIPTION:	Kinetics of particles, kinematics and kinetics of rigid bodies, systems of particles, energy and momentum principles, and kinetics of rigid bodies in three dimensions
PREREQUISITES:	ME 236, Math 192; Co requisite: Math 291
TEXT:	*Dynamics*, by Bedford and Fowler, 3rd edition, Prentice Hall
CLASS SCHEDULE:	Lecture 12:30 – 1:20 pm, MWF, JH 203
GRADES:	Homework: 15% Final Exam: 20% Test1: 10% Test2: 15% Test3: 20% Test4: 20%
COURSE OBJECTIVES:	• Understanding of Static and Dynamic Equilibrium • Proficiency in developing Mathematical Models (FBD's) • Understanding of the Kinematics and Kinetics of Particles • Understanding of Energy and Momentum Principles wrt Particles • Understanding of the Kinematics and Kinetics for Planar Motion of Rigid Bodies • Understanding of Energy and Momentum Principles for Planar Motion of Rigid Bodies • Understanding of the Kinematics and Kinetics for Three Dimensional Motion of Rigid Bodies • The ability to use knowledge acquired in above to formulate, solve and interpret solutions of engineering problems.
TOPICS COVERED:	• Vector Algebra and Static Equilibrium • Kinematics and Kinetics, Energy and Momentum principles for Particles Rigid Bodies in Planar Motion Rigid Bodies in Three Dimensional Motion • Moments and Products of Inertia • Relative Motion and Moving Reference Frame
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems. Program Objective C – to develop skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, and to synthesize information, and to work
RELATIONSHIP TO PROGRAM OUTCOMES	a - ability to apply knowledge of math, science and engineering c - ability to design a system, component or process e – ability to identify, formulate and solve engineering problems i – recognition of the need for, and ability to, engage in lifelong learning

COURSE INFORMATION	**ME 237 Engineering Mechanics I** Required – 3 credits Spring/2006
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 - 1 ½ years of engineering topics
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 - the ability to apply advanced mathematics through multivariate calculus and differential equations
POLICIES:	• Homework assignments must include: 1. problem description, 2. mathematical model(s), 3. formulation of solution, 4. presentation of mathematical procedures used, 5. results, and where appropriate, 6. analysis of results. • Late homework assignments will not be accepted. • Collaboration in the form of discussion of formulation of solutions or results is encouraged, however, each individual must work independently to create the required solutions to homework assignments. • Grades will be assigned on an absolute scale
AUTHOR/DATE:	J. Genin 1/11/06

COURSE INFORMATION	**ME 240 Thermodynamics -** Required – 3 credits Spring 2006
INSTRUCTOR:	Professor Harry Hardee Office: JH 113 Phone: 646-6608 Email: hardee@zianet.com
ASSISTANTS:	None
OFFICE HOURS:	TuTh (except lecture hours) or by appointment
CATALOG DESCRIPTION:	First and Second Laws of Thermodynamics, irreversibility and availability, applications to pure substances and ideal gases.
PREREQUISITES:	PHYS 215
TEXT:	*Thermodynamics, An Engineering Approach, 4th Edition,* Yunus Cengel and Michael Boles, McGraw-Hill
CLASS SCHEDULE:	Tue/Thur 8:55 a.m. – 10:10 a.m. -- Jett Hall 209
GRADES:	Homework and Daily quizes: 40% Exams: 40% Final Exam: 20%
COURSE OBJECTIVES:	Students will learn to formulate and solve typical thermodynamic problems that arise in Mechanical Engineering (e) Students will become familiar with thermodynamic devices and processes that occur in practical Mechanical Engineering applications. (e)
TOPICS COVERED:	Basic Concepts of Thermodynamics Properties of Pure Substances Energy Transfer by Heat, Work, and Mass The First Law of Thermodynamics The Second Law of Thermodynamics Entropy Exergy Vapor and Combined Power Cycles
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – To prepare students for successful careers and lifelong learning. Program Objective B – To educate students thoroughly in thermodynamic principles and methods of analysis for solving thermodynamic problems.
RELATIONSHIP TO PROGRAM OUTCOMES	a – ability to apply knowledge of math, science, and engineering e – ability to identify, formulate, and solve engineering problems g - ability to communicate effectively k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME4 – the ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems

COURSE INFORMATION	**ME 240 Thermodynamics -** Required – 3 credits Spring 2006
POLICIES:	Homework assignments should include: 1. problem statement, 2. problem assumptions (if appropriate), 3. problem solution, 4 comments or discussion of results (if appropriate). **LATE HOMEWORK WILL NOT BE ACCEPTED!** Collaboration in the form of discussion of formulation of solutions or results is encouraged, <u>however, each individual must work independently to create the final homework solution.</u> Grades will be approximately based on a normalized distribution curve (i.e. relative to computed class average). Attendance will be randomly checked and will be factored into the final course grade. Missed assignments or in-class quizzes are not excused and result in lost credit. Reasonable excuses are considered for missed class exams. <u>All make-up exams are scheduled and given during the last week of the semester</u>. Failure to attend the scheduled final exam will result in a course grade of I or F. (Note that the final exam is currently scheduled for Tuesday, May 3). During lecture, please turn off all cell phone ringers and pager buzzers so that the class is not disturbed by these devices.
AUTHOR/DATE:	H. Hardee 1/1/05

COURSE INFORMATION	**ME 260 Mechanical Engineering Problem Solving** Required – 3 credits Spring 2006
INSTRUCTOR:	Oleg Prokopiev Office: JH104 Phone: 646-7749 email: gabegarc@nmsu.edu
ASSISTANTS:	NA
OFFICE HOURS:	10:00 a.m.-12:00 p.m. TTh 9:00 a.m.-11:00 a.m. MWF or by appointment
CATALOG DESCRIPTION:	Evolution and application of computers and computer hardware/software. Development of problem-solving techniques, and their implementation and execution on the computer. (Satisfies general education computer science requirement.)
PREREQUISITES:	Math 185
TEXT:	*MATLAB Programming for Engineers, 3rd Ed., S. J. Chapman, Thomson, 2004*
CLASS SCHEDULE:	TU TH 08:55 - 10:10 A.M. JH 604
GRADES:	Homework: 20% Lab Work and Quizzes: 10% 4 Exams: 15% each, total 60% Two Projects: 5% each, total 10%
COURSE OBJECTIVES:	• Students will become familiar with Engineering Problem Solving and programming using MATLAB and MATHCAD software packages. • Students will learn how to develop solutions to problems by the divide and conquer strategy. (a) • Students will learn how to formulate algorithms and write programs to solve problems. (e)
TOPICS COVERED:	• Engineering Problem Solving • MATLAB Environment • MATHCAD Environment • MATLAB Functions • Linear Algebra and Matrices • Solutions to Systems of Linear Equations • Interpolation and Curve Fitting • Ordinary Differential Equations • Symbolic Mathematics using MATHCAD • Integration and Differentiation using MATHCAD • Special Topics
RELATIONSHIP TO PROGRAM OBJECTIVES:	A – to prepare students for successful careers and lifelong learning. B – to educate students thoroughly in engineering science and methods of analysis, including mathematical and computational methods appropriate for engineers to use when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES:	a – ability to apply knowledge of math, science, and engineering e – ability to identify, formulate, and solve engineering problems g – ability to communicate effectively k – ability to use techniques, skills and modern engineering tools for engineering practice

COURSE INFORMATION	**ME 260 Mechanical Engineering Problem Solving** Required – 3 credits Spring 2006
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME3 – familiarity with statistics and linear algebra
POLICIES:	• All computer programs must be written in MATLAB or MATHCAD as instructed and well commented. • All computer program programs are to be emailed by 5:00 p.m. the day they are due. • No late homework will be accepted. • Collaboration in the form of discussion of formulation of solutions or results is encouraged, however, each individual must work independently to create the solution and computer programs. • Attendance will be checked each class period. Students who miss two consecutive class periods or continually miss class periods will be dropped from the course.
AUTHOR/DATE:	G. Garcia 01/11/06

COURSE INFORMATION	**ME 326 Mechanical Design –** Required – 3 credits Spring/2006
INSTRUCTOR:	Edgar Conley Office: JH 519 Phone: 646-5698 Email: econley@nmsu.edu
ASSISTANTS:	James Sullivan
OFFICE HOURS:	MWF 8:30 – 9:30 am, and by appointment
CATALOG DESCRIPTION:	Design methodology and practice for mechanical engineers
PREREQUISITES:	ME 237, CE 301
TEXT:	None; notes and study materials provided
CLASS SCHEDULE:	Class: MW 11:30 – 12:20 Lab: MWF 12:30 – 1:20
GRADES:	Class participation: 10% Homework: 20% Design Projects: 50% Final Exam – open 'book' and notes: 20%
COURSE OBJECTIVES:	• Major design experience (c) • Team working • Professional and Ethical Responsibilities (f) • Conduct experiments and analyze data (b)
TOPICS COVERED:	• Design Methods • Case studies • Professional practice • Safety • Product liability
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems. Program Objective C – to develop skills pertinent to the design process, including the student's ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work
RELATIONSHIP TO PROGRAM OUTCOMES	b – ability to design and conduct experiments/analyze and interpret data c – ability to design a system, component, or process d – ability to function on multi-disciplinary teams f - understanding of professional and ethical responsibility e – ability to identify, formulate, and solve engineering problems h – broad education needed to understand impact in a global and societal context
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC1 – major design experience PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME3 – familiarity with statistics and linear algebra ME4 – the ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems

COURSE INFORMATION	ME 326 Mechanical Design – Required – 3 credits Spring/2006
POLICIES:	• No make up exam • Late homework will be accepted up to one week tardy; a grade reduction factor of ½ will apply. • Grades are based on the above schedule. If, at course end, your grade is midway between ranges, then it will be bumped up to the next higher level provided the following condition is met: all homework is completed and submitted on time.
AUTHOR/DATE:	E. Conley 1/12/06

COURSE INFORMATION	**ME 328 Engineering Analysis I –** Required – 3 credits Spring 2006
INSTRUCTOR:	Professor Harry Hardee Office: JH 113 Phone: 646-6608 Email: hhardee@nmsu.edu
ASSISTANTS:	
OFFICE HOURS:	Tu/Thur (except lecture hours) or by appointment
CATALOG DESCRIPTION:	Mathematical methods for exact and approximate solutions of engineering problems.
PREREQUISITES:	Math 392
TEXT:	*Advanced Engineering Mathematics, 8th Edition,* Erwin Kreyszig, John Wiley & Sons
CLASS SCHEDULE:	Tue/Thur -- 1:10 – 2:25 p.m. -- Jett Hall 203
GRADES:	Homework and Daily Quizes 40% , Exams 40%, Final Exam 20%
COURSE OBJECTIVES:	• Students will learn to formulate and solve typical analytical problems that arise in Mechanical Engineering (e) • Students will become familiar with special mathematical functions that arise in the solution of Mechanical Engineering problems (a)
TOPICS COVERED:	• Ordinary Differential Equations • Bessel and Legendre Functions • Fourier Series • Partial Differential Equations • Special Mathematical Functions • Laplace Transform Methods • Fourier Transform Methods • Integral Equations • Linear Algebra • Approximate Methods of Analysis
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – To prepare students for successful careers and lifelong learning. Program Objective B – To educate students thoroughly in methods of analysis, including mathematical and computational methods appropriate for engineers to use when solving problems. Program Objective D – To teach students to use modern experimental and data analysis techniques.
RELATIONSHIP TO PROGRAM OUTCOMES	a- ability to apply knowledge of math, science and engineering e – ability to identify, formulate, and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME3 – familiarity with statistics and linear algebra

COURSE INFORMATION	ME 328 Engineering Analysis I – Required – 3 credits Spring 2006
POLICIES:	**HOMEWORK ASSIGNMENTS MUST BE SUBMITTED IN A NEAT AND CLEAR FORMAT**. **LATE HOMEWORK WILL NOT BE ACCEPTED!** Collaboration in the form of discussion of formulation of solutions or results is encouraged, however, each individual must work independently to create the final homework solution. Grades will be based on a distribution relative to a computed class average. Attendance will be randomly checked and will be factored into the final course grade. Missed assignments or in-class quizzes are not excused and result in lost credit. Reasonable excuses are considered for missed exams. All make-up exams are scheduled and given during the last week of the semester. Failure to attend the scheduled final exam will result in a course grade of I or F. (Note that the final exam is currently scheduled for Thursday, December 9). During lecture, please turn off all cell phone ringers and pager buzzers so that these devices do not disturb the class.
AUTHOR/DATE:	H. Hardee 1/12/06

COURSE INFORMATION	**ME 329 Engineering Analysis II** Required – 3 credits Spring 2006
INSTRUCTOR:	Ian H. Leslie Office: JH112 Phone: 646-2335 Email: ileslie@nmsu.edu
ASSISTANTS:	none
OFFICE HOURS:	See posting on office door.
CATALOG DESCRIPTION:	Numerical methods for roots of linear and nonlinear equations, numerical integration, and solution of ordinary differential equations with emphasis on software design and engineering applications.
PREREQUISITES:	Math 392 and ME 260
TEXT:	*Applied Numerical Methods with Matlab, by* Steven C. Chapra
CLASS SCHEDULE:	TuTh 1:10 – 2:25 PM
GRADES:	Homework and Projects 70% , Quizzes 30%
COURSE OBJECTIVES:	• Students will learn a variety of numerical methods that are useful in both basic and advanced engineering calculations. (a, e) • Students will develop an appreciation for the hazards and limitations of numerical solutions, including accuracy, stability, and computer limitations of memory and speed. (e, k) • Students will learn the basics of Matlab. (k)
TOPICS COVERED:	• Roots of Equations • Linear systems of equations • Non Linear systems of equations • Interpolation and Curve fitting • Numerical differentiation and integration • Solution of Ordinary differential equations • Solution of Partial differential equations
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – To prepare students for successful careers and lifelong learning. Program Objective B – To educate students thoroughly in methods of analysis, including mathematical and computational methods appropriate for engineers to use when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES:	a – ability to apply knowledge of math, science, and engineering e – ability to identify, formulate, and solve engineering problems k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME3 – familiarity with statistics and linear algebra
POLICIES:	• Homework assignments must be turned in on time for full credit. • Homework will be accepted up to one day late with a 30% penalty. • Students must do their own work on each assignment, with the exception of seeking help from the instructor. Students may, however, get help on Matlab syntax and usage from anyone. • Grades may be curved but the instructor makes **no** commitment to do so.
AUTHOR/DATE:	I. H. Leslie 2/22/2006

COURSE INFORMATION	**ME331 Intermediate Strength of Materials** Elective – 3 credits Spring/2005
INSTRUCTOR:	DR. VINCENT CHOO Office: JH516 Phone: 6-2225 Email: vchoo@nmsu.edu
ASSISTANTS:	
OFFICE HOURS:	Via email
CATALOG DESCRIPTION:	Covers stress and strain, theories of failure, curved flexural members, flat plates, pressure vessels, buckling, and composites
PREREQUISITES:	CE 301, Math 392
TEXT:	Advanced Strength and Applied Stress Analysis, 2nd Edition, by Richard G. Budynas
CLASS SCHEDULE:	8:30-9:20A.M., MWF, **PLACE**: JH 204
GRADES:	Homework: 20% Quizzes: 20% Test 1: 20%, Test 2: 20%, Final Exam: 20%
COURSE OBJECTIVES:	This course is designed to develop the student's ability to solve strength of materials problems
TOPICS COVERED:	• Stress • Strain • Stress Transformation • Stress-Strain relation • Equilibrium Equation • Equation of Motion • Compatibility Condition • Place Elastic Problems • Airy Stress Function • Stress Concentration • Fracture Mechanics • Strength Theories
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B - to educate students thoroughly in methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems;
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering e -- ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems.
POLICIES:	Attend all lectures
AUTHOR/DATE:	Vincent Choo 12/1/2008

COURSE INFORMATION	**ME 332 Vibrations** Elective – 3 credits Spring 2006
INSTRUCTOR:	Professor Genin Office: JH 110 Phone: 646-3809 Email: jgenin@nmsu.edu
ASSISTANTS:	NA
OFFICE HOURS:	1:30 - 2:30 p.m. M,T,W,Th,F or by appointment
CATALOG DESCRIPTION:	Vibration of single and n-degree of freedom systems considering free, forced, and damped motion. Lagrange's equations. Dynamic stability. Controls. Matrix iteration.
PREREQUISITES:	ME 237
TEXT:	Vibrations, Thomson and class notes
CLASS SCHEDULE:	08:30-9:30 MWF Jett Hall 103
GRADES:	Homework 40%, Tests 60%
COURSE OBJECTIVES:	To be able to model vibrations problems using (a) free body diagrams, (b) Lagranges equations. To be able to linearize the equations of motion. To develop solutions to linear vibration systems using applied mathematics. (e) To interpret the results of a linear analysis.
TOPICS COVERED:	Free Vibrations Harmonic Motion Undamped and Damped Systems Energy Methods Harmonic Excitation Forced Vibration Impulse Arbitrary Input Periodic Input Multiple-Degree-of-Freedom Systems Distributed-Parameter Systems Vibration Testing and Experimental Modal Analysis
RELATIONSHIP TO PROGRAM OBJECTIVES:	Objective A - To prepare students for successful careers and lifelong learning. Objective B - To educate students in methods of analysis, including the mathematical and computational methods appropriate for engineers to employ in problem solving. Objective C - To develop skills pertinent to the design process, including the student's ability to formulate problems, to think creatively, to communicate effectively, and to synthesize information and to work collaboratively.
RELATIONSHIP TO PROGRAM OUTCOMES	c – ability to design a system, component or process Vibrations is essential knowledge in the design of mechanical systems, be they toasters or airplanes.

COURSE INFORMATION	**ME 332 Vibrations** Elective – 3 credits Spring 2006
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years of engineering topics It is an essential skill which builds upon the student's dynamics, elasticity and materials background.
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME3 – familiarity with statistics and linear algebra (This is not a required undergraduate course in all curricular. However it should be made available to those who wish it.)
POLICIES:	Homework assignments must include: 1. problem description, 2. mathematical model(s), 3. formulation of solution, 4.presentation of mathematical procedures used, 5. results, and where appropriate, 6. analysis of results. Late homework assignments will not be accepted. Collaboration in the form of discussion of formulation of solutions or results is encouraged. However, each individual must work independently to create the required solutions to homework assignments. Grades will be assigned on an absolute scale.
AUTHOR/DATE:	Genin 1-15-06

COURSE INFORMATION	**ME 333 Intermediate Dynamics** Elective – 3 credits Spring 2006
INSTRUCTOR:	J. Genin Office: JH 110 Phone: 646-3809 Email: jgenin@nmsu.edu
ASSISTANTS:	
OFFICE HOURS:	MWF 1:00 – 2:00, or by appointment
CATALOG DESCRIPTION:	Three dimensional kinematics and kinetics, orbal motion, Lagrange's equations, dynamic stability, and controls.
PREREQUISITES:	ME 237 or consent of instructor
TEXT:	Website—http://me.nmsu.edu/~jgenin
CLASS SCHEDULE:	MWF 8:30 – 9:20
GRADES:	Homework: 40% 3 tests: 60%
COURSE OBJECTIVES:	• Understanding of Kinematics of Rigid Bodies • Understanding of Dynamic Equilibrium of Rigid Bodies • Proficiency in developing Mathematical Models using a) free body diagrams, b) Lagrange's equations (c) • Ability to use knowledge acquired above to formulate, solve and interpret solutions to engineering problems (e)
TOPICS COVERED:	• Kinematics and Kinetics of Particles and Planar Rigid Bodies using moving reference frames, featuring Cartesian Coordinates, Path Variables, Cylindrical Coordinates • Kinematics of three dimensional bodies • Kinetic descriptions considering: Equations of Motion, Work-Energy, • Linear Impulse-Momentum, Angular Impulse-Momentum • Mass Moments and Products of Inertia • Langrange's Equations • Dynamic Stability • Nonholonomic Systems • Vibrations, Single degree of freedom Free, Forced, Damped • Vibrations, Multi-degrees of freedom Free, Forced, Damped
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems. Program Objective C: to develop skills pertinent to the design process, including the student's ability to formulate problems, to think creatively, to communicate effectively, and to work synthesize information
RELATIONSHIP TO PROGRAM OUTCOMES	a- ability to apply knowledge of math, science and engineering c – ability to design a system, component or process e – ability to identify, formulate and solve engineering problems i – recognition of the need for, and ability to, engage in lifelong learning
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 1 ½ years of engineering topics
RELATIONSHIP TO ABET	ME2 – the ability to apply advanced mathematics through multivariate

COURSE INFORMATION	**ME 333 Intermediate Dynamics** Elective – 3 credits Spring 2006
SPECIFIC CRITERIA	calculus and differential equations
POLICIES:	• Homework assignments are due at the beginning of class. • Late homework assignments will not be accepted. • Students cannot make up missed tests.
AUTHOR/DATE:	J. Genin 1/12/04

COURSE INFORMATION	**ME 338 Fluid Mechanics** Required – 3 credits Spring/2006
INSTRUCTOR:	J. Allen Office: JH 614 Phone: 646-6546 Email: jallen@nmsu.edu
ASSISTANTS:	
OFFICE HOURS:	M, W 2:30 – 4:00 p.m.
CATALOG DESCRIPTION:	Properties of fluids. Fluid statics and fluid dynamics. Applications of the conservation equations – continuity, energy, and momentum – to fluid systems.
PREREQUISITES:	ME 237; Co requisite: CE 301, ME 328
TEXT:	*Fundamentals of Fluid Dynamics*, B.R. Munson, D.F. Young and T.H. Okiishi, Wiley, 5th edition, 2002
CLASS SCHEDULE:	Lecture 10:30 – 11:20 am, MWF, JH 209
GRADES:	Homework:34%; Quizzes: 33%; Final: 33%
COURSE OBJECTIVES:	Develop a basic proficiency in 1. Ability to analyze hydrostatic loading problems (a,e). 2. Applications of mass, momentum and energy conservation laws to fluid mechanics problems (a,e). 3. Applications of dimensional analysis and dynamic similitude (b,e). 4. Development of understanding of empirical formulations for internal and external flows (c,e).
TOPICS COVERED:	Fluid Statics Bernoulli's Equation & Fluid Dynamics Integral Approach and Control Volumes Dimensional Analysis Internal Flow – Pipe Flows External Flows
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective B – to educate students thoroughly in methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems. Program Objective C – to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work
RELATIONSHIP TO PROGRAM OUTCOMES	a – ability to apply knowledge of math, science, and engineering b -- ability to design and conduct experiments/analyze and interpret data c – ability to design a system, component or process e – ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science PC3 – 1 ½ years of engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME1 – knowledge of chemistry and calculus-based physics with depth in at least one ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME4 – ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.

COURSE INFORMATION	ME 338 Fluid Mechanics Required – 3 credits Spring/2006
POLICIES:	Final grades will be determined using the following grading scale: A=85-100, B=70-84, C=60-69, D=50-59, F=<50. Graded material will include homework, two exams, and a comprehensive final. Absence from graded classroom activities will result in a grade of zero on that exam, unless student informs instructor before the exam and produces a valid document of absence
AUTHOR/DATE:	J. Allen 1/12/06

COURSE INFORMATION	ME 340 Applied Thermodynamics Required – 3 credits Spring/2006
INSTRUCTOR:	A. B. Donaldson Office: JH 612 Phone: 646-6545 Email: bdonalds@nmsu.edu
ASSISTANT	Oleg Prokopiev Office: JH 106 Email: prokop@nmsu.edu
OFFICE HOURS:	MW 10:30-11:30, or arrangement or opportunity.
CATALOG DESCRIPTION:	Thermodynamic cycles, Maxwell relations, Gibbs and Helmholtz functions, mixtures, psychrometrics, chemical reactions, chemical equilibrium. Design of thermodynamic systems
PREREQUISITES:	ME 240
TEXT:	Thermodynamics: An Engineering Approach, 4 th ed, Yunus A. Cengel and Michael A.. Boles, McGraw-Hill, 2002
CLASS SCHEDULE:	11:45-1:00 TuTh
GRADES:	Homework 10% Quizzes 30% Two Hour Exams 30% Final 30%
COURSE OBJECTIVES:	To solidify the theoretical principles of thermodynamics and expose students to various engineering applications of those principles (e)
TOPICS COVERED:	Heat Engines, Vapor and Combined Power Cycles, Refrigeration Cycles, Thermodynamic Property Relations, Gas Mixtures, Gas-Vapor Mixtures and Air-Conditioning, Chemical Reactions, Chemical and Phase Equilibrium, Thermodynamics of High-Speed Gas Flow
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems.
REALTIONSHIOP TO PROGRAM OUTCOMES	a – ability to apply knowledge of math, science, and engineering e – ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years of engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations

COURSE INFORMATION	ME 340 Applied Thermodynamics Required – 3 credits Spring/2006
POLICIES:	• Homework will be due at the beginning of lecture on Tuesday. Homework will not be solved during lecture time. After due date, appropriate pages from the solution manual will be posted behind glass upstairs in the West wing of Jett Hall or placed in a notebook in the front office. Scheduled or unscheduled quizzes may be given on any lecture day, generally during the last 15 minutes of the class. The quiz may reflect the lecture just given or reflect homework previously assigned. Missed quizzes cannot be made-up. Instead, if the student has an official excuse for non-attendance on a quiz day, the composite grade for that student will be determined without that grade component. • Two one hour exams will be given with a weighting of 15% each and a final will be given with a weighting of 30%. • Final grading will be based on a modified curve. The class grade mean is expected to fall between B and C. In other words, for a final grade of B, the student needs to have a composite score above the class mean. In general, a grade of A will be assigned for composite scores at least one standard deviation above the class mean. From symmetry, ranges for C and D grades will similarly be determined. The specific break point between letter grades will be decided by a combination of: 1) the magnitude of differences between adjacent composite scores, and 2) the distribution of the class within each letter grade group. It is the prerogative of the instructor to make adjustments to these distributions depending upon the overall satisfaction with the performance of the class.
AUTHOR/DATE:	A. B. Donaldson 1/16/06

COURSE INFORMATION	**ME 341 Heat Transfer** Required – 3 credits Spring 2006
INSTRUCTOR:	Ian H. Leslie Office: JH 112 Phone: 646-2335 Email: ileslie@nmsu.edu
ASSISTANTS:	Ravi Purandare
OFFICE HOURS:	See posting on office door.
CATALOG DESCRIPTION:	Fundamentals of conduction, convection, and radiation. Design of heat transfer systems.
PREREQUISITES:	Thermodynamics (ME240) & Engineering Analysis (ME328)
TEXT:	*Fundamentals of Heat and Mass Transfer, 5th Ed.*, Incropera & DeWitt, John Wiley
CLASS SCHEDULE:	Lectures are Tu Th 8:55 – 10:10, Room 103 EC2
GRADES:	Homework 20%, 4 Exams worth 20% each, Last exam is comprehensive.
COURSE OBJECTIVES:	• Student will become familiar with the basic concepts of conduction, convection and radiation heat transfer. (a) • Student will learn how to apply the First Law to a variety of heat transfer problems.(a, e, k) • Student will develop the ability to simplify problems and assess the validity of the simplfying assumptions that were made. (e)
TOPICS COVERED:	• Application of the Fiirst Law in heat transfer. • Fourier's Law of conduction. • Analytical solution of 1-D conduction problems. • Numerical solution of multidimensional conduction problems (steady-state and transient). • Fundamentals of convection. • Solution of external convection problems (steady-state). • Solution of internal flow problems (steady-state). • Basic heat exchanger theory and problem solution. • Basic electromagnetic radiation theory. • Black and gray-body radiation exchange heat transfer.
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective B - to educate students thoroughly in methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems.
RELATIONSHIP TO PROGRAM OUTCOMES:	a – ability to apply knowledge of math, science, and engineering e – ability to identify, formulate, and solve engineering problems k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME2 **–** the ability to apply advanced mathematics through multivariate calculus and differential equations ME4 - the ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems

COURSE INFORMATION	ME 341 Heat Transfer Required – 3 credits Spring 2006
POLICIES:	• Late homework will not be accepted without prior approval. • It is the responsibility of the student to check the course web site regularly. Since NMSU provides access to the internet it is not necessary to own a computer. • The student is expected to attend every class meeting. • There are no makeup exams without specific prior approval. • There is no extra work during, or after, the semester ends in order to bring up a grade. • Cheating may be prosecuted, and will have consequences. • The instructor reserves the right to alter the class schedule. Absence from class is not an excuse since notices of change will be posted on the course web site. • The instructor, above all else, wishes for every student to do well in the course.
AUTHOR/DATE:	Ian H. Leslie 2/22/2006

COURSE INFORMATION	**ME 345 Experimental Methods I** Required – 3 credits Spring 20(
INSTRUCTOR	E. Conley 646-5698 econley@nmsu.edu JH 519
ASSISSTANTS:	Kaz Maeda JH 508 646-6525 621-7293 kamaeda@nmsu.edu
	Brandon Armendariz JH 603 385-3649 braarmen@nmsu.edu
	Frank Fierro JH176 646-3194 496-2563 ffierro@nmsu.edu
OFFICE HOURS:	MWF 8:30-9:30 and by appointment
CATALOG DESCRIPTION:	Emphasis on experimental techniques, basic instrumentation, data acquisition and analysis, and written presentation of results. Includes experiments in dynamics and deformable body mechanics.
PREREQUITES:	MATH 392, ME 237, and ME 240. co-requisite: CE 301
TEXTBOOK:	*Writing Style and Standards in Undergraduate Reports*, Jeter and Donnell, College Publishing, Glen Allen, VA, ISBN: 0-9679121-7-2
SCHEDULE	Lecture: 9:30-10:20 MW, JH 205; Laboratory by section, JH 602
GRADING:	Final grades will be determined using the standard scale: A = 100-90, B = 89-80, C = 79-70, D = 69-60, F < 60. **Lab Reports are due two days after your lab meeting by 5pm in ME office. Assignments will be accepted up to one week tardy; a grade reduction factor of 1/2 will apply, unless you are provided with an excused absence.** Other than cases of emergency, excused absences must be arranged in advance. Grades are based on the above schedule. If, at course end, your grade is midway between ranges, then it will be bumped up to the next higher level provided the following condition is met: *all homework is completed and submitted on time*.
	Weighting: homework, LabVIEW™ assignments and in-class quizzes 30%; lab reports 30%; lab quizzes 20%; oral presentation 10%; class participation 10%
COURSE OBJECTIVES:	• Develop familiarity with experimental methods and basic instrumentation used in the practice of Mechanical Engineering. (b) • Become familiar with methods of data acquisition, statistical data analysis, and their presentation in both written and oral formats. (b) (g) (k) • Gain experience and skill in writing technical reports. (g)
TOPICS:	Experimental Methods and Techniques: • Measurement systems, in particular LabVIEW™, instrument characteristics, instrument selection. • Instrumentation and techniques used to measure pressure, temperature, electrical resistance, strain, force, and, indirectly, material properties. Analysis of Experimental Data: • Statistical analysis to obtain uncertainty of data and results. • Statistical analysis for curve fitting. Reporting Methods: • Presentation of tabular and graphical data and results. • Technical report writing. • Oral presentations.

COURSE INFORMATION	**ME 345 Experimental Methods I** Required – 3 credits Spring 20(
REALTIONSHIP TO PROGRAM OBJECTIVES:	D -- to teach students to use modern experimental and data analysis techniques
RELATIONSHIP TO PROGRAM OUTCOMES:	a – ability to apply knowledge of math, science, and engineering b – ability to design and conduct experiments/analyze and interpret data e – ability to identify, formulate, and solve engineering problems g – ability to communicate effectively k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME2 – ability to apply advanced mathematics through multivariate calculus and differential equations ME3 – familiarity with statistics and linear algegra.
AUTHOR/DATE	E. Conley

COURSE INFORMATION	ME 425 Design of Machine Elements 3 credits – Required Spring/2006
INSTRUCTOR	Phillip R. Smith Office: JH 629 Phone: 646-2118 Email: phsmith@nmsu.edu
ASSISTANT:	N/A
OFFICE HOURS:	8:00-9:00 MTuWTh or by appointment
TEXT:	*Fundamentals of Machine Component Design* R.C. Juvinall and K.M. Marshek, 4th ed. Wiley
CLASS SCHEDULE:	Lecture 10:20-11:35, Tu. Th. JH 204
GRADES:	Homework: 16.7%; Quizzes: 16.7%; Three 1hr. 15min. Exams: 50%; Design Project: 16.7% All exam scores are normalized.
COURSE OBJECTIVES	**Upon completion of the course, a student should be able to:** • Perform load analyses on machine element parts and assemblies (a). • Perform stress and strain analyses on machine elements and determine element deflections and stability (a,e,k). • Utilize standard failure theories and fatigue analysis to develop safety factors and reliability for machine elements (f,i,k). • Select materials for particular machine elements and machine element assemblies (e,i). • Design machine elements and machine element assemblies (c,k). • Work effectively as part of a design team (c,g).
TOPICS COVERED:	• Load analysis • Materials • Stresses and strains • Deflections and stability • Standard failure theories and fatigue analysis • Threaded fasteners and power screws • Springs, • Bearings, gears, and shafts
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B – to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems Program Objective C – to develop the skills pertinent to the design process, including the student's ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively Program Objective E – to instill in our students an understanding of their professional and ethical responsibilities
RELATIONSHIP TO PROGRAM OUTCOMES:	a – ability to apply knowledge of math, science and engineering c – ability to design a system, component, or process e – ability to identify, formulate, and solve engineering problems k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL	PC3 1 1/2 years of engineering topics (engineering science and design)

COURSE INFORMATION	**ME 425 Design of Machine Elements** 3 credits – Required Spring/2006
COMPONENT:	
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME4 – ability to work professionally in both the thermal and mechanical systems areas including design and realization of such systems
HOMEWORKS POLICIES:	• All homework is due the period following its assignment. • Homework can be up to one week late, but all late homework grades will be reduced by 50%.
AUTHOR/DATE:	Phillip R. Smith 4/19/06

COURSE INFORMATION	**ME 426/427 Design Project Laboratory I/II** Required – 6 credits Spring/2006
INSTRUCTOR:	Young H. Park Office: JH 615 Phone: 646-3092 Email: ypark@nmsu.edu
ASSISTANTS:	To be announced
OFFICE HOURS:	8:00 – 9:00 am, MTuWThF and by appointment
CATALOG DESCRIPTION:	Students address a design problem in which innovation and attention to detail are emphasized. Solution of the problem entails applications of mechanics and/or the thermal sciences.
PREREQUISITES:	ME 326, ME341, ME 338, ME 425(co-requisite)
TEXT:	
CLASS SCHEDULE:	3:30 – 6:20 pm, MW, JH 283
GRADES:	Class Participation: 20% Meeting Participation: 10% Class Assignments: 10% Design Project: 60%
COURSE OBJECTIVES:	• Have experience functioning as mechanical engineer within an engineering design and development group. (d) • Complete a real-life design task – transform a client's needs into a tangible, tractable project definition, and see the project through to completion. (c) • Understand and use a formal engineering design method, with emphasis on building concurrent engineering procedures into the basic design method. (c) • Become proficient in preparing and reviewing formal technical data package related to an engineering design including written progress reports, oral presentations, and final design package and report (g)
TOPICS COVERED:	• Participation in a project team • Use of technical tools from past engineering courses • Strengthening of teaming skills • Learning how to apply engineering fundamentals to the design
RELATIONSHIP TO PROGRAM OBJECTIVES:	A – to prepare students for successful careers and lifelong learning C – to develop skills pertinent to the design process, including the students' ability to formulate problems, ti think creatively, to communicate effectively, to synthesize information, and to work collaboratively.
RELATIONSHIP TO PROGRAM OUTCOMES:	c -- ability to design a system, component, or process d -- ability to function on multi-disciplinary teams g -- ability to communicate effectively
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC1 – major design experience PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME4 – ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems
POLICIES: **AUTHOR/DATE**	Y.H. Park 1/12/06

COURSE INFORMATION	**ME 443 Internal Combustion Engines** Elective – 3 credits Spring 2006
INSTRUCTOR:	R.D. Hill Office: JH415 Phone: 646-6533 Email: dhill@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	TBA
CATALOG DESCRIPTION:	Cycles, characteristics, and principles of combustion for air breathing engines. Course taught on an as-needed basis
PREREQUISITES:	ME 340
TEXT:	<u>Engineering Fundamentals of the I.C. Engine</u>, W.W. Pulkrabek, Prentice Hall 1997 <u>Internal Combustion Engines, F. Ferguson</u>, John Wiley, 2nd ed. 2001 <u>Internal Combustion Engine Fundamentals</u>, J. Heyward, McGraw Hill 1998 <u>Internal Combustion Engines</u>, E. Obert, Harper & Row 1973 <u>The Internal Combustion Engine: Theory & Practice</u>, C. Taylor, MIT Press 1985
CLASS SCHEDULE:	10:30am – 11:20am MWF
GRADES:	6 quizzes: 50 points each Final exam is comprehensive for the course. One has three options to choose from BEFORE the final exam: 1. Use quiz score as final grade, and not take the final exam 2. Use final exam to replace one quiz score 3. Use final exam as entire grade score Scale below will determine course grade. Because of the 3 available choices, NO MAKE UP exams will be given. Homework Assignments: There are about 6 homework assignments, which will be graded, handed back, and marked as *turned in* (a requirement for course credit). Scale: 270-300 = A 240-269 = B 210-239 = C 180-209 = D 0-179 = F
COURSE OBJECTIVES:	• Identify piston engine types and consider the relationship of the mechanical parts of the engine • Understand various factors used to compare engine performance • Identify and consider the properties of some hydrocarbon fuels used in IC engines • Consideration of the standard Otto cycle for spark ignition engines • Consideration of the standard diesel cycle for compression ignition engines • Understand the basic device for fuel metering and speed control • Consideration of methods of increasing inlet pressur

COURSE INFORMATION	**ME 443 Internal Combustion Engines** Elective – 3 credits Spring 2006
TOPICS COVERED:	• Engines Types, Kinematics • Performance Factors • Fuels and Flame Temperature • Otto Cycle • Diesel Cycle • Carburetion • Fuel Injection • Supercharging
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning
RELATIONSHIP TO PROGRAM OUTCOMES	a – ability to apply knowledge of math, science, and engineering c – ability to design a system, component, or process e – ability to identify, formulate, and solve engineering problems k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – ability to apply advanced mathematics through multivariate calculus and differential equations ME4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems
AUTHOR/DATE:	R.D. Hill 1/12/06

COURSE INFORMATION	**ME 445 Experimental Methods II** Required – 3 credits Spring 2006
INSTRUCTOR:	A.B. Donaldson Office: JH 612 Phone: 646-6545 Email: bdonalds@nmsu.edu
ASSISTANTS:	
OFFICE HOURS:	M, W 10:30 – 11:30
CATALOG DESCRIPTION:	Emphasis on experimental techniques, instrumentation and data acquisition in fluid mechanics, heat transfer, and thermodynamics. Laboratory results will be presented in written and verbal formats.
PREREQUISITES:	ME 338, 340, 341, 345
TEXT:	ME 445 Course Notes from Campus Printing Office; Experimental Methods for Engineers 7th edition, Holman, J.P., McCraw Hill, Inc. 2001 (optional). In addition, textbooks utilized in the theory courses for thermodynamics, fluid mechanics, and heat transfer will be utilized as references.
CLASS SCHEDULE:	Lecture: M,W 9:30 – 10:20. Lab (one per week from the following: 12:30 - 3:20, M, W; 3:00 – 5:20, Tu
GRADES:	Formal reports and prelabs (5x10) 50% Final report, including proposal and oral presentation (20+5+5) 30% Scheduled quizzes (3) and unscheduled classroom exercises (5x4) 20%
COURSE OBJECTIVES:	Physical demonstration of phenomenologies in fluid mechanics, heat transfer and thermodynamics Provide students with opportunities to predict outcomes of experiments based on theoretical models and verify predictions by measurement (b,e) Utilize various measurement and data acquisition tools Analyze and present data (b) Participate as a team member of a functional group Practice communication skills in both written and oral format (g)
TOPICS COVERED:	• Lift and drag on an airfoil as a function of angle of attack, flow measurement by Pitot, venturi, and hot wire anemometer, velocity profiles and velocity averaging. • Pressure drop for liquid flow in straight pipe and fittings, comparison of flow meters, calibration of transducers, uncertainty analysis of orifice measurement. • Bridgewire break time modeling from heat transfer and thermodynamics, measurement of temperature, multi-variable linear analysis to determine heat loss parameters from manufacturer's steady-state data, statistical analysis of results. • Pressure vessel blowdown modeling and measurement, writing applications for LabVIEW® based computer data acquisition. • Energy, mass balance and economic analysis for operating power turbine and heating/cooling for campus co-generation facility. Group directed experiment that will be proposed, planned and executed by group. Should include clear objectives, a theoretical model, data acquisition consistent with equipment which is available, and comparison to literature results. Concurrence of course instructor and TA on topic, methods and scope is required.
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – To prepare students for successful careers and lifelong learning. Program Objective D – to teach students to use modern experimental and data analysis techniques
RELATIONSHIP TO PROGRAM OUTCOMES	a – ability to apply knowledge of math, science, and engineering b – ability to design and conduct experiments/analyze and interpret data e – ability to identify, formulate, and solve engineering problems g – ability to communicate effectively

COURSE INFORMATION	ME 445 Experimental Methods II Required – 3 credits Spring 2006
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC23 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems
POLICIES:	• Four of the experiments will be conducted on a two week cycle. The first week will be spent in analyzing the assigned problem and predicting outcome. This prediction will be submitted to the TA at the end of that session as a prelab, to document predictions over range of variables. Prelabs will also contain other requested information that will ultimately be included in the formal report. The second week will be devoted to experimentation and data collection. A report will then be written and submitted at the start of the subsequent lab meeting. This report will discuss the theory and compare predictions to measurements and comment on quality of the comparison. Another laboratory will be devoted to touring the NMSU campus power and heating/cooling facility and collecting operating data. This data will then be used to analyze the efficiency of fuel utilization and the performance of various devices, e.g., turbine engine, refrigeration units, boilers, cooling towers, etc. The final topic will be a group selected experiment to make measurements to verify a hypothesis or determine a physical outcome, presumably related to fluid mechanics, heat transfer or thermodynamics. The group will be responsible for writing a proposal including the objective(s), the theory that is to be utilized, the equipment required, the scope of the measurements, and the methodology. Once this proposal has been reviewed and approved by the course instructor and TA, the team will set about to assemble or fabricate the apparatus, make the measurement(s) and compare results to predictions or literature sources. This final report will be in both oral and written format. • This course seeks to prepare engineers for collaborative interaction with colleagues on a professional level. Teams will be formed based on individual selection and each member is expected to participate in group activities related to pre-laboratory exercises, conduct of experiments and the reporting of results. After each report, the team can, by majority vote, elect to disband and reform in an altered configuration. Individuals who have been ejected from the group will prepare individual pre-lab predictions and subsequent reports, based on commonly collected and shared data. It is strongly advised that each group member contribute to the report preparation effort in order to avoid expulsion from the group. It is also advised that for each experiment, a group leader should be selected who will assign individual responsibilities and see to the final compilation and consistent format of the report and to its submission in a timely manner.

COURSE INFORMATION	**ME 445 Experimental Methods II** Required – 3 credits Spring 2006
	• For comparison purposes, reports will be scored by rank rather than a letter or numerical grade, from the highest quality to the lowest quality. The reports will be ranked based on each of two components: technical presentation and grammatical presentation where each component carries the same weight. As a general guide for the letter or numerical grade corresponding to the order rank, the highest rank can be tentatively assigned a 95, and the lowest rank can be tentatively assigned a 75. Quizzes will be scored on a curve with class average carrying a tentative score of 85.
AUTHOR/DATE:	A. B. Donaldson 1/12/06

COURSE INFORMATION	**ME 449 Senior Seminar** 3 Credits – Required Spring 2006
INSTRUCTOR	E. Conley JH 519 646-5698 econley@nmsu.edu
OFFICE HOURS	MWF 8:30 – 9:30
CATALOG DESCRIPTION	Senior seminar covering topics relevant to graduating mechanical engineering seniors (job placement, interviewing techniques, resume preparation
PREREQUISITES	Senior standing
TEXT	None
SCHEDULE	Friday 11:30 – 12:20
GRADES	• Homework 30% • Participation 70% (required attendance) • Homework is due at the beginning of class unless otherwise indicated. Late homework will be accepted up to one week late – a grade reduction factor of ½ will apply. • Standard grading system: A 100-90; B 89-80; C 79–70, etc.
COURSE OBJECTIVES	• Prepare for the job search and or graduate school. (i) • Establish the bounds of professional conduct in the workplace. (f) • Prepare for financial obligations and opportunities. (j)
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A - Prepare students for a successful professional career, and for lifelong learning. Program Objective E – to instill in our students an understanding of their professional and ethical responsibilities
RELATIONSHIP TO PROGRAM OUTCOMES	f – understanding of professional and ethical responsibility g – ability to communicate effectively i – recognition of the need for, and ability to engage in lifelong learning j – knowledge of contemporary issues
CONTRIBUTION TO PROFESSIONAL COMPONENT	NA
RELATIONSHIP TO ABET SPECIFIC CRITERIA	NA
AUTHOR/DATE:	E.C. Conley 1/12/06

COURSE INFORMATION	**ME 452 Introduction to Automation & Control Systems Design** Elective – 3 credits Spring/2006
INSTRUCTOR:	Dr. Ou Ma Office: JH 515 Phone: 646-6534 Email: oma@nmsu.edu
ASSISTANTS:	TBD
OFFICE HOURS:	TBD
CATALOG DESCRIPTION:	Control system design and implementation. Emphasis on practical applications of traditional control algorithms to mechanical engineering application in thermofluid systems and mechanical systems. Design of feedback analog and digital control systems. Introduction to robots and automation. Lab assignments include programming industrial robotic and automation systems.
PREREQUISITES:	ME 328 and EE 201, consent of instructor
TEXTBOOK:	TBD
CLASS SCHEDULE:	2-hour lecture + 3-hour lab practice
GRADING:	Homework assignments: 20% Project: 40% Midterm (closed-book): 20% Final (open-book, open-notes): 20%
COURSE OBJECTIVES:	• Provide a broad overview of the modeling and analysis of classical feedback control systems with a focus on practical issues important to mechanical engineers. • Provide students a training of the basic skills required for design,
TOPICS COVERED:	• Review of dynamic systems in different disciplines • Modeling and simulations of dynamic systems in mechanical engineering • PID controls and analysis • Control systems design and implementation • Control of industrial robots and automation systems
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B - To educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems Program Objective D - to teach students to use modern experimental and data analysis techniques
RELATIONSHIP TO PROGRAM OUTCOMES	a – ability to apply knowledge of math, science, and engineering c – ability to design a system, component, or process e – ability to identify, formulate, and solve engineering problems k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT	PC3 – 1 ½ years engineering topics (engineering science and design)

COURSE INFORMATION	**ME 452 Introduction to Automation & Control Systems Design** Elective – 3 credits Spring/2006
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME4 – the ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.
AUTHOR/DATE:	O. Ma

COURSE INFORMATION	**ME 460 Applied Finite Elements** Elective – 3 Credits Spring 2006
INSTRUCTOR:	Professor Garcia Office: JH104 Phone: 646-7749 Email: gabegarc@nmsu.edu
ASSISTANTS:	NA
OFFICE HOURS:	9:00 a.m - 1:00 p.m. Tu & Th 1:30 – 3:30 M W F or by appointment
CATALOG DESCRIPTION:	Introduction to the practical aspects of structural finite element modeling. Course focuses on providing a working knowledge of how to effectively incorporate finite element techniques into the design process.
PREREQUISITES:	Senior standing
TEXT:	*NONE*
CLASS SCHEDULE:	12:30 - 01:20 pm MWF JH 604
GRADES:	Homework 30% , Three exams 20% each, and 1 Project 10%
COURSE OBJECTIVES:	• The student will become familiar with the procedures to solve mechanical engineering related problems using commercially available finite element packages. (k) • The student will become familiar with the practices and procedures to perform sensitivity studies, optimization, and to generate graphical visualization for thermal and structural finite analysis.
TOPICS COVERED:	• Finite Element Theory • Finite Element Meshing • Truss Elements • Beam Elements • Shell Elements • Continuum (solid) Elements • Finite Element Stress Analysis • Finite Element Thermal Analysis • Modal Analysis • Dynamic and transient heat problems • Optimization
RELATIONSHIP TO PROGRAM OBJECTIVES:	A – to prepare students for successful careers and lifelong learning B - to educate students thoroughly in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems C - to develop skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively
RELATIONSHIP TO PROGRAM OUTCOMES:	a – ability to apply knowledge of math, science, and engineering c – ability to design a system, component, or process k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC1 – major design experience PC3 – 1 ½ years engineering topics (engineering science and design)

COURSE INFORMATION	**ME 460 Applied Finite Elements** Elective – 3 Credits Spring 2006
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME4 – the ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems
POLICIES:	• Students will be required to complete homework assignments using HyperWorks, Nastran, and NX. • Homework assignments will be turned in electronically. Assignments must be downloaded by 5:00 p.m. the day they are due. If homework is not turned in at this time, it is considered late. • Late homework assignments will be given a numerical grade of zero.
AUTHOR/DATE:	G. Garcia 1/18/06

COURSE INFORMATION	**ME 461 Polymers, Composites and their Mechanical Behavior** 3 credits-elective Spring/2006
INSTRUCTOR:	Vincent Choo Office: JH516 Phone: 6-2225 vchoo@nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	2:30pm – 3:30pm, MWF
CATALOG DESCRIPTION:	Principles of polymerization, polymer properties and polymer characterization, the fabrication and physical properties of polymer-based composite materials. Synthesis and characterization of polymers and polymeric composites.
PREREQUISITES:	CHEM 112 and MATH 191
TEXT:	Notes
CLASS SCHEDULE:	3 50-minute lectures per week
GRADES:	Test 1 25% Test 2 25% Test 3 25% Course Project 25%
COURSE OBJECTIVES:	To Introduce the advanced undergraduate engineering student to: • Constituent materials used in commercial polymer matrix composites (PMC) (a, e) • Processing technologies for PMC (a, e) • Mechanical properties of PMC (a, e) • Testing and evaluation of PMC (b, k)
TOPICS COVERED:	• Reinforcements: carbon fibers, glass fibers, organic fibers, and other fibers • Filters and additives • Chemistry of polyesters and epoxies • Chemistry of other polymers • Processing technologies: injection molding • Processing technologies: resin transfer molding • Processing technologies: compression molding • Processing technologies: hand lay-up an lamination • Processing technologies: autoclave curing • Micromechanics of lamina • Macromechanics of lamina • Macromechanics of laminate • Lamination theory • Ultrasonic non-destructive evaluation of composites
RELATIONSHIP TO PROGRAM OBJECTIVES:	C -- to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information and to work collaboratively D -- to teach students to use modern experimental and data analysis techniques
RELATIONSHIP TO PROGRAM OUTCOMES	a -- ability to apply knowledge of math, science, and engineering b -- ability to design and conduct experiments/analyze and interpret data e -- ability to identify, formulate and solve engineering problems k – ability to use techniques, skills and modern engineering tools for engineering practice

COURSE INFORMATION	**ME 461 Polymers, Composites and their Mechanical Behavior** 3 credits-elective Spring/2006
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 1 ½ years engineering topics (engineering science and design)
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME4 – ability to work professionally in both thermal and mechanical systems areas including design and realization of such systems.
POLICIES:	N/A
AUTHOR/DATE:	V Choo 1/12/06

COURSE INFORMATION	**ME 463 Low Speed Aerodynamics** Elective – 3 credits Spring 2006
INSTRUCTOR:	James Allen Office: JH 614 Phone: 646-6546 Email: jallen@nmsu.edu
ASSISTANTS:	
OFFICE HOURS:	M,W 2.30-4.00pm
CATALOG DESCRIPTION:	Introduction to incompressible aerodynamics using potential flow and boundary layer theories.
PREREQUISITES:	ME 329, 338
TEXT:	*Fundamentals of Aerodynamics* 3rd edition, J. D. Anderson Jr., McGraw-Hill, Inc., 2001.
CLASS SCHEDULE:	M,W,F 10:30 – 11:20
GRADES:	Final 30% Homework 40% Quiz 15% Design project 15%
COURSE OBJECTIVES:	Develop a basic proficiency in • Ability to analyze inviscid two dimensional flow (a,e). • Applications of laws of fluid mechanics to problems involving lifting bodies in external flows (a,e). • Development of ability to predict airfoil behavior of airfoil using computational analysis (Matlab) (c,e,k). • 3. Development of skills to fabricate and test models (b,c,e)
TOPICS COVERED:	• Vectors, kinematics and dynamics of fluid motion • 2D Eulers equations of motion • 2D Potential Flow Governing Equations • Elementary superposition sources, sinks, vortex • Source panel method • Cylinder with circulation • Thin-Airfoil Theory • Lifting-Line Theory • Vortex panel method • Finite wings- Biot Savart law • Lifting line theory-elliptical lift distribution • Airfoil design and testing
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective B – to educate students thoroughly in methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems. Program Objective C – to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively.
RELATIONSHIP TO PROGRAM OUTCOMES	a – ability to apply knowledge of math, science, and engineering b - ability to design and conduct experiments/analyze and interpret data c – ability to design a system, component or process e – ability to identify, formulate and solve engineering problems k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science PC3 – 1 ½ years of engineering topics (engineering science and design) PC1- Major design experience

COURSE INFORMATION	**ME 463 Low Speed Aerodynamics** Elective – 3 credits Spring 2006
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME4 – ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.
POLICIES:	Homework assignments must be turned in on time for full credit.
AUTHOR/DATE	**James Allen**

COURSE INFORMATION	**ME 473 Compressible Flow** Elective – 3 credits Spring 2005
INSTRUCTOR:	James Allen Office: JH 614 Phone: 646-6546 Email: jallen@nmsu.edu
ASSISTANTS:	
OFFICE HOURS:	M,W, F. 10.30-11.20am
CATALOG DESCRIPTION:	Development and application of the principles of compressible flow. Emphasis on one-dimensional flows.
PREREQUISITES:	ME 338, 340
TEXT:	*Modern Compressible Flow, 3rd* edition, J. D. Anderson Jr.
CLASS SCHEDULE:	M,W,F 10:30 – 11:20
GRADES:	Homework: 40% Final 30% Quiz 15% Research project 15%
COURSE OBJECTIVES:	Focus will be on introduction to compressible flow with an emphasis: • Understanding principles of supersonic flow (a,e) • Characterization of shock waves (a,e) • Effects of friction (a,e,c) • External flows around flying bodies (a,e,c) • Design of supersonic wind tunnel (a,b)
TOPICS COVERED:	• 1-D isentropic flow calculations • Normal shock calculations • Oblique shock wave calculations • Prandtl-Meyer flow • Thin airfoil theory • Adiabatic Flow with friction • Optical techniques • Method of characteristics • Practical exercise – wind tunnel construction
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective B – to educate students thoroughly in methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems. Program Objective C – to develop the skills pertinent to the design process, including the students' ability to formulate problems, to think creatively, to communicate effectively, to synthesize information, and to work collaboratively.
RELATIONSHIP TO PROGRAM OUTCOMES	a – ability to apply knowledge of math, science, and engineering b - ability to design and conduct experiments/analyze and interpret data c – ability to design a system, component or process e – ability to identify, formulate and solve engineering problems
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC2 – 1 year math and basic science PC3 – 1 ½ years of engineering topics (engineering science and design) PC1- Major design experience
RELATIONSHIP TO ABET SPECIFIC CRITERIA	ME2 – the ability to apply advanced mathematics through multivariate calculus and differential equations ME4 – ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.
AUTHOR/DATE	James Allen 1/12/06

COURSE INFORMATION	**ME 484 Biomechanics** Elective – 3 Credits Spring/2005
INSTRUCTOR:	Igor Sevostianov Office: JH 628 Phone: 646-3322 Email: igor@me.nmsu.edu
ASSISTANTS:	N/A
OFFICE HOURS:	8:30 – 10:30 pm, Wednesday and by appointments
CATALOG DESCRIPTION:	Comprehensive coverage of mechanical properties of living tissues and fluids, and the relationship between structure and function in living tissues and organs. Students understand the importance of the application of engineering tools in the study of biological tissue mechanics. Specific topics include structure, function, mechanical properties of biological tissues, and mechanics of human movement.
PREREQUISITES:	ME 237, ME 329 and PHYS 216
TEXT:	*Biomechanics. Mechanical properties of living tissues*, Fung,, 2nd ed, Springer.
CLASS SCHEDULE:	Lecture 13:10 – 14:25 am, TuTh, JH 204
GRADES:	2 Midterm exams: 25% each Homework and quizzes: 20% Final Project: 30%
COURSE OBJECTIVES:	ME 484 develops the ability to apply the engineering tools in the study of biological tissue mechanics.
TOPICS COVERED:	ME 484 surveys structure, functions and mechanical properties of the living tissues and mechanics of human movement. Specific topics include: • The meaning of the constitutive equations • Mechanics of cells and cell membranes • Mechanical properties of blood vessels • Structure and properties of skeletal, hart and smooth muscles • Structure and properties of bone • Dynamics of human movement
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning
RELATIONSHIP TO PROGRAM OUTCOMES	
CONTRIBUTION TO PROFESSIONAL COMPONENT:	
RELATIONSHIP TO ABET SPECIFIC CRITERIA	

COURSE INFORMATION	**ME 484 Biomechanics** Elective – 3 Credits Spring/2005
HOMEWORKS POLICIES:	• HW's are due by 5 pm (the time ME office closes) of the day indicated. 30% will be deducted for HW's submitted within the next two business days. No HW's are accepted after that. • Overall grade for HW will be based on all assignments excluding the one with the worst grade. • Every student has the right to skip one HW assignment. However, having used this right, one cannot exclude the worst HW
AUTHOR/DATE:	Igor Sevostianov 1/10/2005

COURSE INFORMATION	**ME 487 Mechatronics** Elective – 3 credits Fall/2005
INSTRUCTOR:	Dr. Ou Ma Office: JH 515 Phone: 646-6534 Email:
ASSISTANTS:	TBD
OFFICE HOURS:	TBD
CATALOG DESCRIPTION:	Introduction to the analysis and design of computer controlled electromechanical systems, including data acquisition and conversion, force and motion sensors, actuators, mechanisms, feedback control, and robotic devices. Students required to work in teams to construct and test simple robotic systems.
PREREQUISITES:	ME 234 or 237, ME 345 and EE 201 or equivalent
COREQUISITES:	ME 425 and 445
TEXTBOOK:	[1] *Introduction to Mechatronics and Measurement Systems*, D. Alciatore & M. Bistand, McGraw Hill, 2nd Edition, 2003 [2] *Mechatronics, an Integrated Approach, de Silva, CRC 2004* (reference) [3] *Additional reference materials will be handed out in the class*
CLASS SCHEDULE:	Lectures: MWF 1:30 - 2:20, JH 203
GRADING:	Homework assignments: 20% Project: 30% Midterm: 20% Final: 30%
COURSE OBJECTIVES:	• Provide a broad overview of cross-disciplinary topics in electro-mechanical with a focus on the issues important to mechanical engineers. (a) (b) • Provide students a training of the basic skills required for modeling, analysis, and design of electro-mechanical systems. (b) (e) (k)
TOPICS COVERED:	• Sensors • Actuators • Signal processing and operational amplifiers • Computer interfacing • Mixed dynamic systems • Feedback control (for position and speed controls) • Overview of robotics
RELATIONSHIP TO PROGRAM OBJECTIVES:	Program Objective A – to prepare students for successful careers and lifelong learning Program Objective B - to educate students in engineering science and methods of analysis, including the mathematical and computational methods appropriate for engineers to use when solving problems Program Objective C - to teach students to use modern experimental and data analysis techniques

COURSE INFORMATION	**ME 487 Mechatronics** Elective – 3 credits Fall/2005
RELATIONSHIP TO PROGRAM OUTCOMES:	a -- ability to apply knowledge of math, science, and engineering b -- ability to design and conduct experiments/analyze and interpret data e -- ability to identify, formulate and solve engineering problems g -- ability to communicate effectively k – ability to use techniques, skills and modern engineering tools for engineering practice
CONTRIBUTION TO PROFESSIONAL COMPONENT:	PC3 – 11/2 years of engineering topics
RELATIONSHIP TO ABET SPECIFIC CRITERIA:	ME2 – ability to apply advanced mathematics through multivariate calculus and differential equations ME4 – ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems
POLICIES:	N/A
AUTHOR/DATE:	O. Ma 1/12/06

Mechanical Engineering Faculty Resumes

The resumes for Mechanical Engineering faculty in the ABET requested format are provided in this section of Appendix I. Resumes for the following faculty are provided:

- James J. Allen
- Thomas D. Burton
- Vincent K. Choo
- Edgar G. Conley
- A.B. (Burl) Donaldson
- Gabe V. Garcia
- Joseph Genin
- Hary C. Hardee
- R. Dean Hill
- Richard G. Hills
- Ian H. Leslie
- Ou Ma
- Young Ho Park
- Ronald J. Pederson
- Igor Sevostianov
- Banavara N. Shashikanth

JAMES J. ALLEN Assistant Professor		
Education	Ph.D. 1996 1990	Mechanical and Manufacturing Engineering, University of Melbourne, Australia Honors Degree (H2A), Mechanical and Manufacturing Engineering, University of Melbourne, Australia
NMSU	2004-present	**New Mexico State University** Assistant Professor, Mechanical Engineering Department
Professional Experience	2000-2004 2000-2004 2002-2003 1999-2002 1998-1999 1998 1998	**Ocean Power Technologies, Trenton New Jersey** Senior hydrodynamicist and engineering consultant **Ocean Power Technologies, Trenton New Jersey** Senior hydrodynamicist and engineering consultant **University of Poitiers** Visiting Research Scientist **Princeton University** Research Scientist, Gas Dynamics Laboratory Department of Mechanical and Aerospace Engineering **Georgia Institute of Technology** Postdoctoral Research Fellow Department of Mechanical Engineering **Monash University** Postdoctoral Research **University of Melbourne** Contract lecturer, Faculty of Engineering
Teaching/Research Interests	Fluid Mechanics	
Consulting		
State(s) in which registered		
Principal publications of the past 5 years	<u>Journal Articles</u> Allen, J. J. and Naitoh, T., "Production of Optimal Vortex Rings." *Accepted Physics of Fluids,* 2005. Allen, J. J. and Smits, A.J., "Energy Harvesting Eel," *Journal of Fluids and Structures*, **15**, pp. 629-640, 2001. <u>Conference Papers</u> Bocanegra-Evans, H. and Allen, J.J., "Study of Asymmetric Wakes Using a Soap-Film," accepted *Physics of Fluids Gallery of Flow visualization*, APS-DFD meeting Seattle November 21-23, 2004. Allen, J.J. , Shockling, M.S. and Smits, A.J., "Effects of Surface Roughness on high Reynolds Number Turbulent Pipe Flow," *APS-DFD Meeting* Seattle, WA, November 21-23 2004. Buchholz, J.H.J., Jimenez, J.M., Allen, J.J. and Smits, A.J., "Hydrodynamics of Thrust Production in a Fish-Like Flapping Membrane," *13th International Symposium on Unmanned Untethered Submersible Technology (UUST,)* New England Center, Durham, New Hampshire, August 24 - 27, 2003. Naitoh, T. and Allen, J. J. Spanwise, "Instability of a Junction Vortex," *10th International Symposium on Flow Visualization*, Kyoto, August 26 - 29, 2002. Jimenez, J. M., Allen, J. J. and Smits, A. J., "Preliminary Velocity Measurements in the Wake of a Submarine Model," *4th International Symposium on Particle Image Velocimetry*, Gottingen,	

	Germany, September 17-19, 2001.
Scientific & Professional societies	
Honors and Awards	1997 – Fulbright Postdoctoral Award 1991-1996 Australian Postgraduate Award
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

THOMAS D. BURTON Professor		
Education	PhD – 1976 MS – 1972 BS – 1969	Mechanical Engineering and Applied Mechanics, University of Pennsylvania Mechanical Engineering and Applied Mechanics, University of Pennsylvania Engineering, California Institute of Technology
NMSU	2005 -	New Mexico State University Head, Department of Mechanical Engineering
Professional Experience	 2004– 2005 1995-2004 1997- present 1994-1996 1991-1992 1988-1995 1982-1988 1977-1982 1984-1985 1979 1969-1977	**Texas Tech University** Professor of Mechanical Engineering Chair, Department of Mechanical Engineering **Los Alamos National Laboratories** Consultant **Batelle Pacific Northwest Laboratory** Affiliated Staff Scientist **Washington State University** Acting Department Head Professor Associate Professor Assistant Professor **Virginia Tech** Visiting Professor (sabbatical leave) **Boeing Military Airplane Company** Consulting Analyst **General Electric Company, Missile and Space Division** Engineer
Teaching/Research Interests	Dynamics and Vibrations	
Consulting/Patents, etc.	Los Alamos National Laboratories Boeing Military Airplane Company	
State(s) in which registered		
Principal publications of the past 5 years	Journal Articles Burton, TD, "Numerical Calculation of Nonlinear Normal Modes in Structural Systems," *Nonlinear Dynamics*, in press; accepted for publication, January, 2006. P Meekangvan, AA Barhorst, TD Burton, S Chatterjee, and L Schovanec, "Nonlinear Dynamical Model and Response of Avian Cranial Kinesis," *J. Theoretical Biology*, **240**, 32-47 (2006). Journal Papers in Review J Kim and TD Burton, "Reduction of Structural Dynamics Models with Nonlinear Damping," *J. Vibration and Control*, original submission June, 2005; in revision. TD Burton, "Evidence of Nonlinear Resonance in a Randomly Excited Complex Structure," *Nonlinear Dynamics*, submitted August, 2005	

	<u>Conference Proceedings</u> J. Kim and T. D. Burton, "Reduction of Nonlinear Structural Models Having Non-Smooth Nonlinearities, Proc. IMAC XX, pp. 324-330, Los Angeles, CA (2002). J. Kim and T. D. Burton, "Reduction of Structural Dynamics Models Having Nonlinear Damping," ASME 2003 DETC, 19th Biennial Conf. On Vibration and Noise, September 2-6, Chicago, IL (2003).
Scientific & Professional societies	
Honors and Awards	2004 Tau Beta Pi Award, Outstanding Instructor in TTU College of Engineering 2003, 1999, 1996 Outstanding Undergraduate Teacher, ME Dept., Texas Tech University 1995, 1994, 1991, 1986, 1980, 1978, Outstanding Undergraduate Teacher, ME Dept., Washington State University 1991 Outstanding Undergraduate Instructor, College of Engineering, Washington State University 1982 DOW ASEE Outstanding Young Faculty, Northwest Region
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	1994-present Editorial Board, *Journal of Vibration and Control* 2001 – present Guest Editor, Special Issues of *Nonlinear Dynamics* in honor of DT Mook) Accelerated Strategic Computing Initiative (ASCI) Milestone Review Panels, Sandia National Labs: Hostile Environments (2000 – present); Normal Environments (2001 – present); Abnormal Environments (2002 – present). 2004-present ASCI Milestone Review Panel for structural response (Chair), Los Alamos National Lab 2003 National Director at Large, Pi Tau Sigma (ME Honorary), (2003) National President, Pi Tau Sigma (2004 -) Co-organizer, National Pi Tau Sigma Convention, Lubbock, TX, February, 2004.

VINCENT K. CHOO

Associate Professor

Education	Ph.D. 1982 B.Sc. 1977.	Composite Materials, Liverpool University, U.K. Mechanical Engineering, Nottingham University, U.K.
NMSU	1992 - present 1985-1992	**New Mexico State University** Associate Professor, Mechanical Engineering Department Assistant Professor, Mechanical Engineering
Professional Experience	1983-1984 1982	**University of Washington** Visiting Assistant Professor, Mechanical Engineering Department **Imperial College**, London Postdoctoral Research Assistant
Teaching/Research Interests	Experimental Solid Mechanics, Wind Energy	
Consulting	Turbo-Care, subdivision of Westinghouse Abitibi Crescent Consultants, Ltd. Sund Defibrator AB Boeing Flow Industries	
State(s) in which registered	NA	
Principal publications of the past 5 years	<u>Journal Articles</u> Benzie, C., Facciano, A., and Choo, V.K., 2002, "Composite Guidance Section Fuselage Trade Study and Prototype Overwrap Evaluation for a Supersonic, Air Breathing Threat Interceptor," *SAMPE Journal*, March/April 2002. <u>Conference Papers</u> Choo, V.K. "Characterization of Composite Materials in the Design of Integral Missile Antenna/Fuselage Assemblies." *2002 Materials and Processes Technology Network/Mechanical and Structures Technology Network Symposium*, El Segundo, CA, September 2002.	
Scientific & Professional societies		
Honors and Awards		
Institutional and professional service in the past 5 years		
Professional development activities in the past 5 years		

EDGAR G. CONLEY

Associate Professor

Education	Ph.D. 1986 M.S. 1979 B.S. 1971	Engineering Mechanics, Michigan State University Mechanical Engineering, Michigan State University Mechanical Engineering, Michigan State University
NMSU	1993-present 1988-1993	**New Mexico State University** Associate Professor, Mechanical Engineering Department Assistant Professor, Mechanical Engineering Department
Professional Experience	1986-1988	**University of Alaska, Fairbanks** Assistant Professor, Mechanical Engineering Department
Teaching/Research Interests	Mechanical design, optics, wind energy, experimental solid mechanics	
Consulting/Patents, etc.	Tumbleweed and Light Trash Collecting Machine	
State(s) in which registered	Michigan	
Principal publications of the past 5 years	Journal Articles Conley, E. and Tafoya, J.,"Poor Man's Detonator Circuit," submitted *IEEE Transactions*, July 2004. Conley, E., Dougherty M.D, P.J., Vickaryous M.D.,and Hickerson, K., "Comparison of Two Temporary Femoral External Fixator Constructs for use in Military Field Hospitals," *Clinical Orthopaedics and Related Research*, **111**, p176, June 2003. Conference Papers Conley, E., "Measuring True Strain - An Application of the Logarithm," *American Society for Engineering Education, for ASEE Annual Conference, Session 4655*, Salt Lake City, Utah, June 2004. Conley, E. and Riley, L., "Partnering for an Innovative Freshman Design Experience: The Case of Mechanical and Industrial Engineering," *Science, Engineering, and Technology Annual Conference,* NMSU, Las Cruces, NM, January 2001. Conley, E., Stevens M.D., W., and Carbajal, L, "Use of Laser Speckle Photography in Biomechanical Analysis of a Goat Spinal Fusion," *American Academy of Orthopaedic Surgeons Annual Meeting*., Orlando, FL, March 2000.	
Scientific & Professional societies	American Society for Engineering Education American Society of Mechanical Engineers	
Honors and Awards	2005 Mechanical Engineering Academy Professor of the Year 2000 Mechanical Engineering Academy Professor of the Year 1989 Outstanding Journal Paper for 1989 awarded by the Computers in Education Division of the American Society for Engineering Education	
Institutional and professional service in the past 5 years		
Professional development activities in the past 5 years		

A.B. (BURL) DONALDSON

College Professor

Education	Sc.D. 1969 M.S. 1965 B.S. 1963	Mechanical Engineering, New Mexico State University Chemical Engineering, University of Utah Chemical Engineering, New Mexico State University
NMSU	1998-present	**New Mexico State University** College Professor, Mechanical Engineering Department
Professional Experience Academic	1995-1998	**New Mexico Highlands University** Visiting Professor of Engineering
	1990-1993	**Qatar University** Visiting Professor and Chemical Engineering Dept. Head
	1972-1975	**Sandia National Laboratories** Instructor of Continuing Education
	1969-1972	**New Mexico State University** Adjunct Professor, Mechnical Engineering Department
Industrial	1965-1968	Instructor
	1981-1989	**Enhanced Energy Systems, Inc.** Director of Design and Development Director of Field Operations
	1969-1981	**Sandia National Laboratories** Heat Transfer Group Electrochemical Components Group Deep Steam Project
Teaching/Research Interests	Thermodynamics and applications, heat transfer, fluid mechanics including gas dynamics, and combustion	
Consulting	Vapor Corporation TXT, Houston United World College Ace Oil, USA Various insurance companies and law offices (expert witness on causes of explosion and/or fire	
Patents, etc.	"Wetstacking Avoidance in Internal Combustion Engines" (2005) "System and Method for Desalination of Brackish Water from an Underground Water Supply" with J. Genin and M. Lavery (2003) Downhole Steam Injector Downhole Steam Generator with Preheating/Cooling Features Direct Contact Low Emissions Steam Generating System and Method Utilizing a Compact Multi-Fuel Burner Steam Generator having a High Pressure Combustor with Controlled Thermal and Mechanical Stresses and Utilizing Pyrophoric Ignition	
State(s) in which registered	New Mexico	
Principal publications of the past 5 years	<u>Conference Papers</u> Donaldson, A.B. and Yilmaz, N., "Numerical Simulation of Chemical Processes in a Compression Ignition Engine Operating on Simple Alcohols," *2005 Cairo International Conference on Energy and the Environment*, Cairo, Egypt, March 20-23, 2005. Donaldson, A.B. , Johns, A. and Yilmaz, N., "Aspects of Operating a Compression Ignition Engine on Simple Alcohols," *2005 Cairo International Conference on Energy and the Environment*, Cairo, Egypt, March 20-23, 2005.	

	Donaldson, A.B., "Integrating Various Mathematical Tools with a Senior Mechanical Engineering Laboratory Experiment," *Annual ASEE Conference*, Salt Lake City, Utah, June 22-25, 2004 Donaldson, A.B. and Varela, B., "Evaluation of Thermal Properties of Geopolymeric Materials of the Na-PSS and Na-PSDS Families," *2003 North American Thermal Analysis Society Meeting*, Albuquerque, NM, September, 2003. Donaldson, A.B. and Shouman, A.R., "Thermodynamic Analysis of the Flammability Limits of Fuel, Oxygen and Inert Mixtures," *2003 North American Thermal Analysis Society Meeting*, Albuquerque, NM, September 2003. Donaldson, A.B. and Shouman, A.R., "Correlation of the Flammability Limits of Hydrocarbons with the Equivalence Ratio," *2003 North American Thermal Analysis Society Meeting*, Albuquerque, NM, September 2003. Donaldson, A.B. and Varela, B., "Evaluation of the Curing Kinetics for a Geopolymer using Differential Scanning Calorimetry," *2003 North American Thermal Analysis Society Meeting*, Albuquerque, NM, September 2003. Donaldson, A.B. and Shouman, A.R., "Thermodynamic Analysis of the Flammability Limits of Fuel, Oxygen and Inert Mixtures," *NATAS 2003 Meeting*, Albuquerque, NM, September 2003. Donaldson, A.B. and Varela, B., "Evaluation Of Thermal Properties Of Geopolymeric Materials of The Na-PSS And Na-PSDS Families," *NATAS 2003 Meeting*, Albuquerque, NM, Sept. 23-25, 2003. Donaldson, A.B. and Shouman, A.R., "Correlation of the Flammability Limits of Hydrocarbons with the Equivalence Ratio," *NATAS 2003 Meeting*, Albuquerque, NM, Sept. 23-25, 2003. Donaldson, A.B. and Varela, B., "Evaluation of the Curing Kinetics for a Geopolymer using Differential Scanning Calorimetry," *NATAS 2003 ,Meeting* Albuquerque, NM, Sept. 23-25, 2003. Donaldson, A.B. and Romero, L., "Observations on Diesel Engine/Generator Performance at Part Load," *Engine Expo 2001*, Stuttgart, Germany, June 19-21, 2001.
Scientific & Professional societies	Professional Engineer (ME & Chemical) – New Mexico Combustion Institute
Honors and Awards	
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

GABE GARCIA

Associate Professor

Education	Ph.D. 1996 M.S. 1991 B.S. 1988	Civil Engineering, Texas A & M University Mechanical Engineering, New Mexico State University Mechanical Engineering, New Mexico State University
NMSU	2002-present	**New Mexico State University** Associate Professor, Mechanical Engineering Department
	2003-present	Graduate Program Director
	1996-2002	Assistant Professor, Mechanical Engineering Department
	1990-1992	**New Mexico State University** Research/Teaching Assistant
Professional Experience	1994-1996	**Texas A & M University** Research Assistant/Teaching Assistant
	1993	**Allied Signals, Inc**. Structures Component Design Group
	1988-1990	**EG & G Idaho, Inc**. Associate Scientist
Teaching/Research Interests	Research: focus-vibration based non-destructive damage detection and localization	
Consulting/Patents, etc.	Methods of Measuring a Liquid Pool Volume Method of Non-contacting Ultrasonic Process Monitoring	
State(s) in which registered		
Principal publications of the past 5 years	Journal Articles Jayawardana, S., Garcia, G.V., Nakotte, N., Clausen, B., Bourke, M., "Finite Element Modeling of Anisotropic Properties of Cu-Ag Metal Matrix Composites", *IEEE Transactions on Applied Superconductivity,* Vol. 10 (1), 2000. **Conference Presentations** L. A. Riley, B. Nassersharif, G. Garcia and J. Schaub, "An Automated Testing and Classification System For Identifying Defects in Nuclear Steam Generator Tubes Using a Learning Vector Quantization Neural Architecture," *Proceedings of the 2003 Advanced Simulation Technologies Conference,* Society for Computer Simulation International, Orlando, Florida, April 2003. Gabe V. Garcia, Robert McMurry, and Joe Garde, "Damage Detection Analysis of the Swiss Z24 Bridge Using Damage Index Method," *Smart Structures and Materials*, Los Angeles, California, February 2002. Gabe V. Garcia, Robert McMurry, and Joe Garde, "Damage Detection of a Bridge Structure Using Ambient Test Data," *20th International Modal Analysis Conference*, San Diego, California, March 2002. Nassersharif, B, Caffey, T. W. H., Garcia, G.V., Smith, P. R., Jedlicka, R. P., and Hensel, E. C., "An In-Tube Radar for Detecting Defects in Thin-Walled Metal Tubes," *16th International Conference on Structural Mechanics in Reactor Technology (SMiRT 16),* August 2001. Maeda1, K., Chang, S., Nakotte, H., Garcia, G., Barley, S., Richardson, J., Han, K., Embury, J.D., Clausen, B., and Bourke M., "Cyclic Loading and Residual Strains in Cu-25%Ag Composites," *2001 TMS Annual Meeting*, New Orleans, Louisiana, February, 2001	
Scientific & Professional societies	Tau Beta Pi Pi Tau Sigma American Society for Optical Engineering	

	Society for Experimental Mechanics American Society of Mechanical Engineers
Honors and Awards	2000 NSF Young Investigator Award 1998 Outstanding Professor NMSU Chicano Programs
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

JOSEPH GENIN

Professor

Education	Ph.D. 1963 M.S. B.S.	Engineering Mechanics, University of Minnesota Structural Engineering, University of Arizona Civil Engineering, The City College of New York
NMSU	1981 - present	**New Mexico State University** Professor, Mechanical Engineering Department
	1985-1994	Director of the Optics and Material Sciences Laboratory Professor, Mechanical Engineering Department
	1981-1985	Dean of the College of Engineering Professor, Mechanical Engineering Department
Professional Experience	1975-1981	**Purdue University** Head of Engineering Mechanics Division Professor, Mechanical Engineering Department
	1971-1976	Director of Advanced Transportation Center
	1968-1973	Professor of Aeronautics, Astronautics, and Engineering Sciences
	1964-1967	Associate Professor of Aeronautics, Astronautics, and Engineering Sciences
	1963-1964	**General Dynamics Corporation,** Fort Worth, Texas Senior Structures Engineer
	1959-1963	**University of Minnesota** Instructor of Aeronautics and Engineering Mechanics
	1956-1960	**Joseph Genin, Consulting Engineers** Structural design and analysis
	1956-1958	**University of Arizona** Instructor of Civil Engineering
	1954-1956	**U.S. Army Corps of Engineers** (while in the U.S. Army) Miscellaneous design and field projects related to military structures
	1954	**Ammann and Whitney,** New York, New York Structural Engineer
Teaching/Research Interests	Aeroelasticity, bioengineering, dynamic stability, dynamics	
Consulting/Patents, etc.	Efficient Production Technologies, Inc. ATOMS, Inc. Corner Stone Enterprises Los Alamos National Laboratory State of New Mexico International Harvestor Co. Marcel Dekker Publishing Co. Association of American Railroads Talbert Industries Lockheed Propulsion Company Allison Division of General Motors Zentralblatt Furr Mathematik McGraw-Hill Publishing Co. Holt, Rinehart and Winston Publishing Co. Midwest Applied Science Corporation Argonne National Laboratory	

State(s) in which registered	Minnesota
Principal publications of the past 5 years	Journal Articles Genin, J. and Genin, G.M., "Sensor Placement for Angular Velocity Determination," Forthcoming – *ASME Journal of Dynamics, Measurements and Control*. Genin, J., Prokopiev, O., Sevostianov, I., Munson-McGee, S., and Woodward., C., "Microstructure and Elastic Properties of Sintered Hydroxyapatite," *International Journal of Fracture*, **130**, 2004, pp. 3-10. Also, *Proceedings of (and presented at) the 41st Annual Meeting of the Society of Engineering Sciences Technical Meeting*, Lincoln, Nebraska, October 10, 2004. Genin, J. and Darabseh, T.T., "Dynamic Stability of Viscoelastic Columns Loaded by a Follower Force," *Journal of Mechanical Engineering Science*, **218**, No. 10, October 2004, pp. 1091-1101. Genin, J., and Wu, X., "Force Stream Function Method," *Journal of Stress Analysis*, **38**, No. 2, March 2003, pp. 181-185. Genin, J., and Xu, W., "Plate Subjected to an Out-of-Plane Follower Force," *Journal of Mechanical Engineering Science*, **216**, No. 9, September 2002, pp. 913-921. Genin, J., and Xu, W., "Elastostatic Inverse Formulation," *ZAMP, Journal of Applied Mathematics and Physics*, **53**. No. 1, January 2002, pp. 90-102. Genin, J., "Static Follower Problem Revisited," *Journal of Mechanical Engineering Science*, **215**, No. C9, December 2001, pp. 1139-1142.
Scientific & Professional societies	Professional Engineer – State of Minnesota American Society for Engineering Education American Society of Mechanical Engineers National Society of Professional Engineers (1981-1986) American Institute of Aeronautics and Astronautics (1964-1967)
Honors and Awards	2001 Mechanical Engineering Academy Professor of the Year 2000 Who's Who Among America's Teachers 1998 Who's Who Among America's Teachers 1990 Elected to grade of "Fellow" by the American Society of Engineers 1985 Honored as 'Colonel, Aide-de-Camp" by Governor of New Mexico 1969 "Best Teacher" by Purdue Chapter of Sigma Gamma Tau 1968 "One of Ten Best Purdue Engineering Teachers" 1967 "One of Ten Best Purdue Engineering Teachers"
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

HARRY C. HARDEE

Professor

Education	Ph.D. 1966 USAEC 1962 M.S. 1961 B.S. 1959	Mechanical Engineering, University of Texas (Austin) Special Fellowhip in Nuclear Studies, MIT Mechanical Engineering, University of Texas (Austin) Mechanical Engineering, University of Texas (Austin)
NMSU	1991-present 1966-1966	**New Mexico State University** Professor, Mechanical Engineering Department Assistant Professor, Mechanical Engineering Department
Professional Experience	 1990-1991 1982-1990 1979-1982 1974-1979 1967-1974 1963-1964 1964-1966	**Sandia National Laboratories** Supervisor of Geoinstrumentation Divison Supervisor of Geophysics Division Supervisor of Geothermal Research Division Supervisor of Heat Transfer Division Technical Staff Staff Member **University of Texas** Instructor, Mechanical Engineering Department
Teaching/Research Interests	Interconnection Technology	
Consulting/Patents, etc.	Sandia National Laboratories BI, Inc. Technical Materials, Inc. TRW Handy & Harman Allen-Bradley Lucent Technologies, NASA Connector Lubricant Technology Corning-Gilbert 13 U.S. and foreign patents awarded – most recent: Electrical Contact Lubricant Composition for Inhibiting Fretting Failure Multi-Head, Interruptible-Sequence, Fretting Machine for Testing Pin/Socket Electrical Contacts	
State(s) in which registered	Texas, New Mexico	
Principal publications of the past 5 years	Hardee, H. C. (2002) “Multi-Heat, Interruptible-Sequence, Fretting Machine for Testing Pin/Socket Electrical Contacts,” U.S. Patent No. 60/414,518. Hardee, H.C., and Neil R. Aukland (2001). “Electrical Contact Lubricant Composition For Inhibiting Fretting Failure,” U.S. Patent No. 6,271,186. <u>Conference Papers</u> Gabel, B., H. C. Hardee and J. Hanlon (2002). “Ambient Humidity Effect on Fretting Performance of Gold Plated MDM Connectors,” *Proceedings of the 35th International Institute of Connectors and Interconnection Technology Symposium (IICIT*), October, 2002, 31-37. Gabel, N., H. C. Hardee and P. Lees (2001). “Comparison Of Coefficient Of Friction	

	And Contact Resistance During Sliding Wear On Clad Gold-Nickel Surfaces," *Proceedings of the 47th IEEE Holm Conference on Electrical Contacts*, 633-636.
Scientific & Professional Societies	
Honors and Awards	2002 Mechanical Engineering Academy Professor of the Year 1991 Sandia National Lab "Award for Excellence" in Instrumentation Development 1990 Special Invitation Award by the Japanese Government 1962 USAEC Special Fellowship in Nuclear Science and Engineering
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

R. DEAN HILL

College Professor

Education	Ph.D. 1962 M.S. 1959 B.S. 1957	Chemistry, Michigan State University Chemistry, New Mexico State University Chemistry, University of Utah
NMSU	1982 - present 1960-1968	**New Mexico State University** College Professor, Mechanical Engineering Department Assistant Professor, Chemistry Department
Professional Experience	1968-1980	**Rose-Hulman Institute of Technology** Professor, Chemistry Department
Teaching/Research Interests	Internal Combustion Engines	
Consulting/Patents, etc.	NASA National Hot Rod Association	
State(s) in which registered		
Principal publications of the past 5 years		
Scientific & Professional societies	Sigma Xi	
Honors and Awards	Outstanding Teacher Award, Rose-Hulman Institute of Technology 1999-Lifetime Achievement Award for Excellence in Education	
Institutional and professional service in the past 5 years		
Professional development activities in the past 5 years		

RICHARD GUY HILLS

Professor

Education	Ph.D. 1979 M.S. 1974 B.S. 1972	Mechanical Engineering, New Mexico State University Mechanical Engineering, Purdue University Mechanical Engineering, New Mexico State University
NMSU	2004-present	**New Mexico State University** Professor, Mechanical Engineering Department
	2003-2004	Interim Vice Provost for Research
	2000-2003	Associate Dean/Director of the Engineering Research Center
	1997-2000	Professor, Mechanical Engineering Department
	1994-1997	Acting Department head and Department Head, Mechanical Engineering Department
	1981-1994	Assistant Professor, Associate Professor, and Professor, Mechanical Engineering Department
	1975-1980	Graduate Teaching Assistant
Professional Experience	1980-1981	**Sandia National Laboratories** Technical staff, Geophysical remote sensing, geophysical heat transfer
	1974-1975	**Aerojet Nuclear Co.** Research Scientist, Nuclear reactor safety and containment
	1972-1974	**Purdue University** Graduate Research Assistant
Teaching/Research Interests	Research-Validation of stochastic and deterministic models, inverse theory and optimization, modeling and simulation, CAD Teaching – Numerical analysis, analysis, CAD	
Consulting/Patents, etc.	Downhole Periodic Seismic Generator (with H. Hardee and R. Striker) Advanced Downhole Periodic Seismic Generator (with H. Hardee and R. Striker)	
State(s) in which registered		
Principal publications of the past 5 years	Hills, R. G., (2005), "Model Validation: Model Parameter and Measurement Uncertainty," submitted to the *Journal of Heat Transfer* for review. Hills, R. G. and K. Dowding, (2005), "Statistical Validation of Engineering and Scientific Models: Bounds, Calibration, and Extrapolation," SAND2005-1826, *Sandia National Laboratories*, Albuquerque. Dowding, K. J., R. G. Hills, I. Leslie, M. Pilch, B. M. Rutherford, and M. L. Hobbs (2004), "Case Study for Model Validation: Assessing a Model for Thermal Decomposition of Polyurethane Foam," SAND2004-3632, *Sandia National Laboratories*, Albuquerque, October. Hills, R. G., I. H. Leslie, and K. Dowding, (2004), "Statistical Validation of Engineering and Scientific Models: Application to the Abnormal Environment," SAND2004-1029, *Sandia National Laboratories*, Albuquerque, March. Hills, R. G., and I. H. Leslie (2003), "Statistical Validation of Engineering and Scientific Models: Validation Experiments to Application," SAND2003-0706, *Sandia National Laboratories*, Albuquerque. Hills, R. G. and T. G. Trucano (2002), "Statistical Validation of Engineering and Scientific Models: A Maximum Likelihood Based Metric," SAND2001-1783, *Sandia National Laboratories*, Albuquerque. Trucano, T. G., R. G. Easterling, K. J. Dowding, T. L. Paez, A. Urbina, V. J. Romero, B. M. Rutherford, and R. G. Hills, (2001), Description of Sandia Validation Metrics Project," SAND2001-1339, Sandia National Laboratories, Albuquerque. Hills, R. G. and T. G. Trucano (2001), "Statistical Validation of Engineering and Scientific Models with Application to CTH," SAND2001-0312, Sandia National Laboratories,	

	Albuquerque. <u>Conference Papers</u> Hills, R. G. and I. H. Leslie, (2003), "The Use of Uncertainty Analysis in Model Validation," 2003 ASME International Mechanical Engineering Congress & Exposition, Proceedings of IMECE'03, IMECE2003-41678, Washington, D.C, November. Hills, R. G. and I. Leslie (2002), "Model Validation: A Subsystem to Systems Level Approach", Presented at the International Test and Evaluation Modeling & Simulation Workshop, Las Cruces, Dec. 9-12. Hills, R. G. and I. Leslie (2002), "Model Validation Methodology: From Validation Experiments to Systems Level Application," Proceedings of the VV&A Foundations 2002 Workshop, John Hopkins University, Applied Physics Lab, Oct. 22-24
Scientific & Professional societies	American Society of Mechanical Engineers American Geophysical Union Society of Automotive Engineers Sigma Xi
Honors and Awards	1997 Most Valuable Professor, NMSU, ASME/Pi Tau Sigma student chapters 1985 NMSU Bromilow Award for Research 1984 Dow Award for Outstanding Young Educator (Gulf-Southwest section) 1982 Dynamic Diveshaft Award, presented by NMSU ASME students for most "helpful" professor
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

IAN H. LESLIE
Professor

Education	Ph.D. 1984 M.S. 1977 B.S. 1976	Mechanical Engineering, Stanford University Mechanical Engineering, University of Michigan at Ann Arbor Mechanical Engineering, University of California at Berkley
NMSU	1984 -present	**New Mexico State University** Associate/Assistant Professor, Mechanical Engineering Department
Professional Experience		
Teaching/Research Interests	Combustion, hazardous liquid waste destruction, pool fire behavior	
Consulting/Patents, etc.	Livingston Associates Star Labs	
State(s) in which registered		
Principal publications of the past 5 years	R. Hills and I. Leslie, 'Statistical Validation of Engineering and Scientific Models: Validation Experiments to Application,' Sandia Report SAND2003-0706, March,2003. R. Hills, I. Leslie and K. Dowding, Final report to Sandia National Laboratories, 'Statistical Validation of Engineering and Scientific Models: Application to Abnormal Environment,' September, 2002. R. Hills, I. Leslie and T. Trucano, Final report to Sandia National Laboratories, 'Statistical Validation of Engineering and Scientific Models: Validation Experiments to Application,' October, 2001. Conference Papers I. Leslie and G. Garcia, "Improving Student Performance in Programming Courses Through Unlimited Access to Computer and Software Resources," *2005 ASEE annual Conference*, June 2005, Portland, OR. I. Leslie and G. Garcia, "High Level Programming Packages in Undergraduate Mechanical Engineering," Paper presented at the *2004 ASEE Annual Conference*, June 2004, Salt Lake City, UT. R. Hills and I. Leslie, 'The Role of Uncertainty Analysis in Model Validation,' *Proceedings of IMECE'03*, Washington, D.C., November 16-21, 2003. R. Hills and I. Leslie, 'Model Validation Methodology,' *Proceedings for National Defense Industrial Association VV&A Foundations 2002*, Johns Hopkins Univ., October, 2002	
Scientific & Professional societies	American Society for Engineering Education American Society of Mechanical Engineers Combustion Institute	
Honors and Awards		
Institutional and professional service in the past 5 years		
Professional development activities in the past 5 years		

OU MA

Associate Professor

Education	Ph.D. 1991 M.S. 1987 B.Sc. 1982	Mechanical Engineering, McGill University Mechanical Engineering, McGill University Mechanical Engineering, Zhejiang University, China
NMSU	2002-present	**New Mexico State University** Associate Professor, Mechanical Engineering Department
Professional Experience	1996-2002	**MacDonald Dettwiler Associates** Senior R&D Technical Leader and Project Engineer
	1991-1996	**Spar Aerospace Ltd.** Control and Analysis Engineer
	1982-1985	**Zhejiang University** Faculty Member, Mechanical Engineering Department
Teaching/Research Interests	Robotics, Mechatronics, Controls, Dynamics	
Consulting/Patents, etc.		
State(s) in which registered	Ontario, Canada	

Principal publications of the past 5 years

Journal Articles

Weber M., Patel K., Ma O., and Sharf I., “Identification of Contact Dynamics Model Parameters from Constrained Robotic Operations,” accepted by *ASME Journal of Dyn. Syst., Meas., and Control,* 2005.

Ma, O., Wang J., Misra S., and Liu M., “On the Validation of SPDM Task Verification Facility,” *Journal of Robotic Systems*, Vol.21, No.5, 2004, pp.219-235.

Conference Papers

Ma O. and Diao X., “Dynamics Analysis of a Cable-Driven Parallel Manipulator for Hardware-in-the-Loop Dynamic Simulation,” invited paper for *the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM 2005)*, 24- 28 July, 2005, Monterey, California.

Ma O., "Model Order Reduction for Contact Dynamics Simulations of Flexible Multibody Systems," to be presented at the 46th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, Paper # 2005-2262, April 18-21, 2005, Austin, Texas.

M. Zhang and O. Ma, “Dynamic Modeling and Analysis of Oligo DNA Microarray Spotting,” *IEEE 2005 American Control Conference*, Portland, Oregon, June 8-10, 2005.

Ma O., "Model Order Reduction for Contact Dynamics Simulations of Manipulator systems," *Proc. of IEEE Int. Conf. on Robotics and Auto.*, April 27-30, 2004, New Orleans, LA, pp.1814-1819.

E. Dupris, M. Doyon, E. Martin, P. Allard, J.C. Piedboeuf, and O. Ma, “Autonomous Operations for Space Robots,” Proc., 55th *International Astronautical Congress*, Vancouver, Oct.4-8, 2004, Paper #IAC-04-IAA.U.5.03.

Ma, O., Wang J., Misra S., and Liu M., “On the Validation of SPDM Task Verification Facility,” *Proc. of the 7th International Symposium on Artificial Intelligence, Robotics and Automation in Space*, Nara, Japan, May 19-23, 2003.

Ma O., Crabtree D., Jones H., Yang G., Martin E., Carr R., and Piedboeuf J.C., “Development and Applications of A Simulink-Based Satellite Docking Simulator with Generic Contact Dynamics Capabilities,” *Proc. of the 2002 IAF World Space Congress*, Oct.10-19, 2002, Houston, USA.

Weber M., Ma O., and Sharf I., “Identification of Contact Dynamics Model Parameters from Constrained Robotic Operations,” *ASME Design Eng. Tech. Conf. and Computers in Eng Conf.,* Sept.29-Oct.2, 2002, Montreal, DETC2002/MECH-34357.

Carretero J.A., Nahon M., and Ma O., “Using Genetic Algorithms with Niche Formation to Solve

	the Minimum Distance Problem amongst Concave Objects," *ASME Design Eng. Tech. Conf. and Computers in Eng Conf.,* Sept.29-Oct.2, 2002, Montreal, DETC2002-DAC34105. J. A. Carretero, M. A. Nahon and O. Ma, "Solving distance problems with concave bodies using Simulated Annealing," *Proc of the 2001 IROS Conference*, Maui, Hawaii, US, October 29-November 3, 2001, pp. 1507-1512. Carr R., Ma O., Yang G., Jones H., Bolger J. Martin E., Piedboeuf J.C., and Crabtree D., "A Simulink-Based Satellite Docking Simulator with Generic Contact Dynamics Capabilities," *The 6th Int. Symp. on Artificial Intelligence, Robotics, and Automation in Space*, Montreal, Canada, June 18-22, 2001
Scientific & Professional societies	Registered Professional Engineer (PEO), Ontario, Canada American Institute of Aeronautics and Astronautics (AIAA) American Society of Mechanical Engineers (ASME) Institute of Electrical and Electronics Engineers (IEEE)
Honors and Awards	
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

YOUNG HO PARK

Assistant Professor

Education	Ph.D. 1994 M.S. 1988 B.S. 1986	Mechanical Engineering, University of Iowa Mechanical Design & Production Engineering, Seoul National University Mechanical Engineering, Seoul National University
NMSU	2000-present	**New Mexico State University** Assistant Professor, Mechanical Engineering Department
Professional Experience	1999-2000	**University of Iowa** Adjunct Assistant Professor
	1996-2000	**Center for Computer-Aided Design, University of Iowa** Research Scientist
	1994-1996	**Ford Motor Company** Research Engineer
	1991-1994	**Center for Computer-Aided Design, University of Iowa** Research Scientist
Teaching/Research Interests	Computational mechanics, statistical modeling and analysis, finite element and meshfree methods for nonlinear mechanics, computational fracture mechanics, fatigue life prediction, structural reliability analysis	
Consulting/Patents, etc.		
State(s) in which registered		
Principal publications of the past 5 years	<u>Journal Articles</u> Young Ho Park and Jun Tang, "Optimal Replacement Decision of Mechanical Components for Fatigue Failure," *International Journal of Fatigue,* 2005 (submitted). Young H. Park, "Rigid Plastic Meshfree Analysis for Metal Forming Simulation." *Journal of Computers and Structures*, 2004 (under review) Young Ho Park and Jun Tang, "An Efficient Methodology for Fatigue Reliability Analysis for Mechanical Components," *ASME Journal of Pressure Vessel Technology*, 2004 (under review). Byeng D. Youn, Kyung K. Choi, and Young H. Park, "Hybrid Analysis Method For Reliability-Based Design Optimization," *ASME Journal of Mechanical Design*, 125, 221-232, 2003. Chen, G., Rahman, S., and Y. H. Park, "Shape Sensitivity Analysis of Linear-Elastic Cracked Structures," *Journal of Pressure Vessel Technology – Transactions of the ASME*, Vol. 124, No. 5, 2002. pp. 476-482. N.H. Kim, Y.H. Park, and K.K. Choi, "An Optimization of Hyper-Elastic Structure with Multibody Contact Using Continuum-Based Shape Design Sensitivity Analysis," *Structural Optimization*, Vol. 21, No.3, 2001, pp. 196-208. Guofeng Chen, Sharif Rahman, and Young Ho Park, "Shape Sensitivity and Reliability Analyses of Linear-Elastic Cracked Structures," *International Journal of Fracture*, Vol. 112, 2001, pp. 223-246. Kyung K. Choi, Jian Tu, and Young H. Park, "Extension of Design Potential Concept for Reliability-Based Design Optimization to Non-Smooth and Extreme Cases," *Structural and Multidisciplinary Optimization*, Vol. 22, No. 5, pp. 335-350, 2001. Guofeng Chen, Sharif Rahman, and Young Ho Park, "Shape Sensitivity Analysis in Mixed-Mode Fracture Mechanics," *Computational Mechanics*, Vol. 27, 2001, pp. 282-291. Jian Tu, Kyung K. Choi, and Young H. Park, "Design Potential Method for Robust System Parameter Design," *AIAA Journal*, 2001, Vol. 39, No.4, pp.667-677. <u>Conference Papers</u> Jun Tang, Edwin Hardee, and Young Ho Park, "Fatigue Reliability Based Optimal Replacement Decision Based on Frst Order Reliability Method," *Proceedings of 2005, ASME Pressure Vessels*	

	and Piping Conference, Denver, Colorado, July 17-21, 2005. Young Ho Park, "Numerical Study of Metal Forming Simulation Using Elasto-Plastic and Rigid-Plastic Meshfree Analysis," *Proceedings of 2005, ASME Pressure Vessels and Piping Conference*, Denver, Colorado, July 17-21, 2005. Y.H. Park and W. Morgan, "Effective Elastic Moduli of Cracked Solid and application to Functionally Graded Material," *Proceedings of 2004, ASME Pressure Vessels and Piping Conference*, San Diego, California, July 25-29, 2004. Jun Tang and Young Ho Park, "Fatigue Reliability Based Optimal Replacement Decision of Mechanical Components, " *Proceedings of 2004, ASME Pressure Vessels and Piping Conference*, San Diego, California, July 25-29, 2004. Patricia Wojahn, Linda Ann Riley, and Young Ho Park, "Teaming Engineers and Technical COmmunicatiors in Interdisciplinary Classrooms: Working With and Against Compartmentalized Knowledge," *IEEE International Professional Communication Conference (IPCC)*, Minneapolis, Minnesota , September 29-October 2, 2004 Young H. Park and Wesley Morgan, "Study of Effective Elastic Moduli of Cracked Solid," *Proceedings of 2003, ASME Pressure Vessels and Piping Conference*, Cleveland, Ohio, July 20-24, 2003. Young H. Park, "Rigid-Plastic Meshfree Method for Metal Forming Simulation," *Proceedings of 2003, ASME Pressure Vessels and Piping Conference*, Cleveland, Ohio, July 20-24, 2003. Jun Tang and Young Ho Park, "An Efficient Methodology for Fatigue Reliability Analysis of Mechanical Components Based on the Stress-Life Prediction Approach," *Proceedings of 2003, ASME Pressure Vessels and Piping Conference*, Cleveland, Ohio, July 20-24, 2003. Linda Ann Riley, Patti Wojahn, and Young Ho Park, "Multidisciplinary Courses: Facilitating Win-Win Opportunities Across Departments and Colleges," *Science, Engineering & Technology Education Conference*, January 3, 2003, Las Cruces, New Mexico State University Young Ho Park, Linda Ann Riley, Patti Wojahn, "Senior Design Classes: Teaming Engineers with Technical Documentation Specialists to Enhance Students' Learning Experiences," *Science, Engineering & Technology Education Conference*, January 4, 2002, Las Cruces, New Mexico State University. Jun Tang and Young Ho Park, "A Methodology for Fatigue Reliability Analysis of Mechanical Components Using First Order Reliability Method," *Proceedings of 2002, ASME Pressure Vessels and Piping Conference*, Vancouver, Canada, August 4-8, 2002. Young H. Park, "Material Processing Simulation Using a Meshfree Method," *Proceedings of 2002, ASME Pressure Vessels and Piping Conference*, Vancouver, Canada, August 4-8, 2002. Jun Tang and Young H. Park, "Fatigue Reliability Analysis of Mechanical Components Using First-Order Reliability Method," *Proceedings of 2001, ASME Pressure Vessels and Piping Conference*, Atlanta, GA, July 22-26, 2001. Young H. Park and Hong J. Yim, "Efficient Probabilistic Constraint Evaluation of Reliability-Based Design Optimization Using Meshfree Method," *Proceedings of 2001, ASME Pressure Vessels and Piping Conference*, Atlanta, GA, July 22-26, 2001. Young H. Park, "Stable Evaluation of Probabilistic Constraint of Reliability-Based Design Optimization for Large Deformation Problem," *ASME 2001 DETC Design Engineering Technical Conferences*, Pittsburgh, Pennsylvania, September 9-12, 2001. G. Chen, S. Rahman, Y.H. Park, "Continuum Shape Sensitivity Analysis in Mixed-Mode Fracture Mechanics," *Sixth U.S. National Congress on Computational Mechanics*, Dearborn, Michigan, August 1-4, 2001 (Abstract only).
Scientific & Professional societies	American Society of Mechanical Engineers American Institute of Aeronautics and Astronautics Korean-American Scientist and Engineers Association Association of Korean-American Professionals in Automotive Industries
Honors and Awards	2004 Mechanical Engineering Academy Professor of the Year 2003 Outstanding Teacher, NMSU ASME/Pi Tau Sigma Student chapters 2003 Mechanical Engineering Innovative Teaching Award, NMSU 2002 Who's Who in Engineering Education

	2001 Cited in Strathmore's Who's Who 2001 Outstanding Teacher, NMSU ASME/Pi Tau Sigma Student chapter
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

RONALD PEDERSON

Associate Professor

Education	Ph.D. 1976 M.S. 1969 B.S. 1967	Mechanical Engineering, University of Minnesota Aeronautical Engineering, University of Arizona Mechanical Engineering, South Dakota State University
NMSU	1984-present 2003 - 2005 1997 1994-present	**New Mexico State University** Associate Professor, Mechanical Engineering Department Interim Department Head, Mechanical Engineering Department Acting Department Head, Mechanical Engineering Department Associate Department Head, Mechanical Engineering Department
Professional Experience	1977-1984 1976-1977	**Texas Tech University** Assistant Professor, Mechanical Engineering Department **Iowa State University** Visiting Assistant Professor, Mechanical Engineering Department
Teaching/Research Interests	Computer Assisted Design and Manufacturing	
Consulting/Patents, etc.		
State(s) in which registered	Texas #51970	
Principal publications of the past 5 years		
Scientific & Professional societies	American Society for Engineering Education American Society of Mechanical Engineers	
Honors and Awards	2003 Mechanical Engineering Academy Professor of the Year 1994 – Donald C. Roush Award for Teaching Excellence, NMSU-ME 1992 - Member, Tau Beta Pi 1985 – Most Helpful Professor Award, Dept. of Mechanical Engineering, NMSU 1984 – Outstanding Professor Award, Dept. of Mechanical Engineering, Texas Tech University 1982 - Outstanding Professor Award, Dept. of Mechanical Engineering, Texas Tech University Member, Pi Tau Sigma	
Institutional and professional service in the past 5 years		
Professional development activities in the past 5 years		

IGOR SEVOSTIANOV

Assistant Professor

Education	Ph.D. 1993 B.S./M.S. 1988	Solid Mechanics, St. Petersburg State University (Russia) Solid Mechanics, St. Petersburg State University (Russia)
NMSU	2001-present	**New Mexico State University** Assistant Professor, Mechanical Engineering Department
Professional Experience	1998-2001 1991-2001 1997-1998 1993-1997 1993-1996	**Tufts University** Senior Research Assistant, Mechanical Engineering Department **Suffolk University** Adjunct Faculty, Department of Mathematics and Computer Science **University of Natal, Durban, South Africa** Senior Research Assistant **St Petersburg State University, Russia** Assistant Professor, Department of Theory of Elasticity **Max-Planck Institute, Dresden, Germany** Visiting Scientist
Teaching/Research Interests	Micromechanics : general, applied, experimental and computational	
Consulting/Patents, etc.	General Electric Corporation ALSTOM Power, Inc. Max-Planck Institute for Materials Research	
State(s) in which registered		
Principal publications of the past 5 years	<u>Journal Articles</u> **Sevostianov, I.**, Yilmaz, N., Kushch, V. and Levin, V., "Effective elastic properties of matrix composites with transversely-isotropic phases," *International Journal of Solids and Structures* **42**, 2005, 455-476. Kachanov, M. and **Sevostianov, I., "**On quantitative characterization of microstructures and effective properties." *International Journal of Solids and Structures* **42**, 2005, 309-336. Prokopiev, O., **Sevostianov, I.**, Genin, J., Manson McGee, S., Woodward, C. Microstructure and elastic properties of sintered hydroxyapatite. *International Journal of Fracture*, **130**, 2004, L3-L10. **Sevostianov, I.**, Kachanov, M., Ruud, J., Lorraine, P., Dubois, M. Quantitative characterization of microstructures of plasma-sprayed coatings and their conductive and elastic properties. *Materials Science and Engineering-A,* **386**, 2004, 164-174. **Sevostianov, I.** and Kachanov, M. Connection between elastic and conductive properties of microstructures with Hertzian contacts. *Proceedings of the Royal Society of London: Mathematical, Physical & Engineering Sciences* **A-460**, 2004, 1529-1534. **Sevostianov, I.,** Agnihotri, G., and Flores Garay, J. On the connection between 3-D microstructure of an inhomogeneous material and its 2-D images. *International Journal of Fracture* **126**, 2004, 65-72. Kushch, V. and **Sevostianov I.** Effective elastic moduli tensor of particulate composite with transversely isotropic phases. *International Journal of Solids and Structures* **41**, 2004, 885-906. **Sevostianov, I.** Explicit relations between elastic and conductive properties of a material containing annular cracks. *Philosophical Transactions of the Royal Society of London: Mathematical, Physical and Engineering Sciences*, **361**, 2003, 987-999. **Sevostianov, I.,** Verijenko, V., and Verijenko, B. Evaluation of microstructure and properties deterioration in short fiber reinforced thermoplastics subjected to hydrothermal aging. *Composite Structures* **62**, 2003, 411-417. **Sevostianov, I.** and Kachanov, M. Correlations between elastic moduli and thermal	

	conductivities of anisotropic short fiber reinforced thermoplastics: theory and experimental verification. *Materials Science and Engineering*, **A-360**, 2003, 339-344. **Sevostianov, I.**, Sookay, N.K., von Klemperer, C.J. and Verijenko, V.E. Environmental degradation using functionally graded material approach *Composite Structures* , **62**, 2003, 419-423. **Sevostianov, I.** and Kachanov, M. Explicit cross-property correlations for anisotropic two-phase composite materials. *Journal of the Mechanics and Physics of Solids*, **50**, 2002, 253-282. Karapetian, E., Kachanov, M. and **Sevostianov, I.** The principle of correspondence between elastic and piezoelectric problems. *Archive for Applied Mechanics* 2002, **72**, 564-587. **Sevostianov, I.** Correlation between mechanical and conductive properties of porous/microcracked metals. *International Journal of Theoretical and Applied Mechanics* 2002, **28-29**, 289-324. Zohdi, T., Kachanov, M. and **Sevostianov, I.** A microscale numerical analysis of a plastic flow in a porous material. *International Journal of Plasticity*, **18**, 2002, 1649-1659. **Sevostianov, I.**, Bogarapu, M. and Tabakov, P. Correlation between elastic and electric properties for cyclically loaded metals. *International Journal of Fracture*, **115**, 2002, L15-L20. **Sevostianov, I.**, Verijenko, V.E. and Kachanov, M. Cross-property correlations for short fiber reinforced composites with damage and their experimental verification. *Composites, part B*, **33**, 2002, 205-213. **Sevostianov, I.,** Kováčik, J. and Simančík, F. Cross-property correlation for metal foams: theory and experiment. *International Journal of Fracture*, **114**, 2002, L23-L28. **Sevostianov, I.,** Kachanov, M. and Ruud, J. On the elastic properties of PVD coatings in relation to their microstructure. *ASME Journal of Engineering Science and Technology*, **124**, 2002, 246-249. **Sevostianov, I.** and Kachanov, M. On the compliances of irregularly shaped cracks. *International Journal of Fracture*, **114**, 2002, 245-257.. **Sevostianov, I.**, Levin, V. and Kachanov, M. On the modeling and design of piezocomposites with prescribed properties. *Archive for Applied Mechanics* 2001, **71**, 733-747. **Sevostianov, I.**, Gorbatikh, L. and Kachanov, M. Recovery of information on the microstructure of porous/microcracked materials from the effective elastic/conductive properties. *Materials Science and Engineering A*, **318**, 2001, 1-14. **Sevostianov, I.** and Kachanov, M. Elastic compliance of an annular crack, *International Journal of Fracture*, **110**, 2001, L51-L54. **Sevostianov, I.** and Kachanov, M. On the yield condition for anisotropic porous materials. *Materials Science and Engineering A*, **313**, 2001, 1-15. **Sevostianov, I.** and Vakulenko, A. Inclusion with non-linear properties in elastic medium, *International Journal of Fracture,***107**, 2001, pp. L9-L14. Kachanov, M., **Sevostianov, I.** and Shafiro, B. Explicit cross-property correlations for porous materials with anisotropic microstructures, *Journal of the Mechanics and Physics of Solids*, **49**, 2001, 1-25. **Sevostianov, I.** and Kachanov, M. Plasma sprayed ceramic coatings: anisotropic elastic and conductive properties in relation to the microstructure. Cross-property correlations. *Materials Science and Engineering*, **297**, 2001, 235-243.
Scientific & Professional societies	American Society of Mechanical Engineers American Association for the Advancement of Science
Honors and Awards	
Institutional and professional service in the past 5 years	
Professional development activities in the past 5 years	

BANAVARA N. SHASHIKANTH

Assistant Professor

Education	Ph.D. 1998 M.E. 1991 B.Tech 1989	Aerospace Engineering, University of Southern California Aerospace Engineering, Indian Institute of Science Aerospace Engineering, Indian Institute of Technology
NMSU	2001-present	**New Mexico State University** Assistant Professor, Mechanical Engineering Department
Professional Experience	1998-2000 1993-1998 1991-1993	**California Institute of Technology** Postdoctoral Scholar, Department of Control and Dynamical Systems **University of Southern California** Teaching and Research Assistant **National Aerospace Laboratories, India** Research Scientist, Experimental Aerodynamics Division
Teaching/Research Interests	Computational and theoretical fluid mechanics	
Consulting/Patents, etc.		
State(s) in which registered		
Principal publications of the past 5 years	Journal Articles Shashikanth, B. N., “Poisson brackets for the dynamically interacting system of a 2D rigid cylinder and N point vortices: the case of arbitrary smooth cylinder shapes,” *Regular and Chaotic Dynamics*, Vol.10(1), pp. 1-14, 2005. Shashikanth, B. N. and Marsden, J. E., “Leapfrogging Vortex Rings: Hamiltonian structure, geometric phases and discrete reduction,” *Fluid Dynamics Research,* Vol.33 (4), pp 333-356, 2003. Shashikanth, B. N., Marsden, J. E., Burdick, J.W. and Kelly, S.D., “The Hamiltonian Structure of a 2-D rigid cylinder interacting dynamically with N point vortices,” *Physics of Fluids*, vol.14 (3), pp. 1214—1227, 2002. Shashikanth, B. N. and Newton, P.K., “Geometric phases for co-rotating elliptical vortex patches,” *Journal of Mathematical Physics*, vol.41 (12), pp.8148-8162, 2000.	
Scientific & Professional societies	American Society of Mechanical Engineers Society for Industrial and Applied Mathematics American Mathematical Society	
Honors and Awards		
Institutional and professional service in the past 5 years		
Professional development activities in the past 5 years		