2012-13 Partial Grades Assessments – Criterion A - Math/Science skills

Course	Sample mathematics concept used	Work samples
530.102 Freshman Experiences in ME	Algebra, vectors, calculus, linear regression, minimization, eulers method, integration and differentiation, interpolation	H2, H3, H4, H5, H6, H8, H9, H10
530.103 Introduction to Mechanics	Algebra, vectors, calculus	H1-H4
530.104 Introduction to Mechanics II	Calculus, vector analysis	Every homework assignment and all exams address calculus and vector analysis
530.215 Mechanics Based Design	Linear algebra, differential equations, multivariate calculus.	All written work
530.231 Thermodynamics	Multivariate calculus	Derivations of conservation laws in class notes
530.241 Electronics and Instrumentation	Differential equations, linear independence, base conversion, Boolean algebra; these are all issues evaluated in the lab reports.	All lab reports
530.327 Introduction to Fluid Mechanics	Multivariate calculus, differential equations.	From Fall 08: Exam 2, Final Exam, Quiz 4, 8, HW 4, 5, 7, 8, 9, 10
530.329 Introduction to Fluid Mechanics Lab	Discrete Integration	Lab 3
530.334 Heat Transfer	Integration and differentiation, linear ordinary differential equations, vector analysis, multivariate calculus, linear algebra, similarity methods	H2-H12
530.343 Design and Analysis of Dynamic Systems	Multivariate calculus, differential equations, linear algebra, Laplace transform.	All Problem Sets
530.446 Experimental Methods in Biomechanics	Linear regression, error analysis, interpolation, calculus, Algebra, Trigonometry	L1-L5

Course	Sample science concept used	Work samples
530.102 Freshman Experiences in ME	Newton's laws, friction, springs, power, energy, work, elasticity	H2, H6, H8
530.103 Introduction to Mechanics	Newton's laws, friction, springs, power, energy, work, elasticity, harmonic motion	H5-H12
530.104 Introduction to Mechanics II	Newton's laws, rotational motion, gravitation and Kepler's laws, continuum mechanics, thermodynamics, waves	All written work
530.215 Mechanics Based Design	Statics, mechanics, dynamics.	H2, H3, H5
530.216 Mechanics Based Design Lab	Newton's laws, friction, power, energy, work	All laboratory assignments
530.231 Thermodynamics	Energy conservation – 1st Law of Thermodynamics. States and properties of materials. Second Law of Thermodynamics, entropy, efficiency. Control volume and control mass – Lagrangian and Eulerian reference frames.	Class notes, HW 1, HW 2, HW 7
530.232 Thermodynamics Lab	Laws of thermodynamics, chemical processes of combustion	All laboratory assignments
530.241 Electronics and Instrumentation	Charge, current, voltage, power, energy.	Spring 2009 Lab, Quiz, and Final Exam
530.327 Introduction to Fluid Mechanics	Newton laws, angular momentum, energy conservation.	All written work
530.329 Introduction to Fluid Mechanics Lab	Bernoulli's equation, lift and draw, flow in pipes	All laboratory assignments
530.334 Heat Transfer	Conservation of energy. Fluid mechanics. Dimensional analysis	H1-H12

2012-13 Partial Grades Assessments – Criterion A - Math/Science skills

530.335 Heat Transfer Lab	Convection, radiation, conduction, conservation relations	All laboratory assignments
530.343 Design and Analysis of Dynamic Systems	Dynamics, Newton laws, Energy, Lagrange's Equation, Electromagnetism.	All Problem Sets
530.403 Engineering Project (Senior Design, Fall)	Statics and strength of a mechanism; hydrodynamic force estimation.	Team ANT report 5, appendix with moment calculation; Team FLU report 4 appendix 4.
530.446 Experimental Methods in Biomechanics	Newton's laws, energy, work, elasticity, ohm's law, hall effect, electromagnetism, Viscoelasticity, End-effects	L1-L5
530.352 Materials Selection	Chemistry of materials, atomic bonding and structures, crystal structures, mechanical and electrical and optical properties of materials	All problem sets

	Math and Science performance assessment for	**F** **0**	**D** **1.00**	**C-** **1.67**	**C** **2.00**	**C+** **2.33**	**B-** **2.67**	**B** **3.00**	**B+** **3.33**	**A-** **3.67**	**A** **4.00**	**A+** **4.33**	**Mean**
STEVE BELKOFF	530.102, Spring	0	0	0	4	1	3	6	12	15	18	0	3.45
JOHN THOMAS	530.103, Fall	1	0	1	4	6	8	6	10	7	17	0	2.99
JOHN THOMAS	530.104, Spring	0	1	3	7	0	7	5	3	7	20	0	3.20
STEVEN MARRA	530.215, Spring	0	0	2	3	5	11	8	9	10	5	4	3.13
STEVEN MARRA	530.216, Spring	0	0	0	0	0	0	0	0	0	59	0	4.00
JOE KATZ	530.231, Fall	4	5	3	5	2	3	7	5	9	14	12	3.06
STEVEN MARRA	530.232, Fall	0	0	0	0	0	2	4	5	14	40	0	3.77
SEAN CARVER	530.241, Spring	3	2	0	0	1	0	2	6	5	25	18	3.65
RAJAT MITTAL	530.327, Fall	0	0	0	0	0	2	9	10	16	12	0	3.52
STEVEN MARRA	530.329, Fall	0	0	0	0	0	3	13	16	22	7	0	3.43
ANDREA PROSPERETTI	530.334, Spring	0	0	0	4	9	0	7	8	11	11	4	3.36
STEVEN MARRA	530.335, Spring	0	0	0	0	0	0	5	4	16	23	8	3.82
STEVEN MARRA	530.343, Spring	2	0	2	0	1	5	3	12	17	9	2	3.30
STEVEN MARRA	530.352, Fall	1	0	0	0	0	0	5	7	13	18	12	3.75
NATHAN SCOTT	530.403, Fall	0	0	0	12	0	0	12	3	0	9	6	3.14
STEPHEN BELKOFF	530.446, Fall	0	0	0	0	0	0	1	0	3	9	0	3.91

2012-13 Partial Grades Assessments – Criterion B - Laboratory skills

Course	Sample Laboratories	Work samples
530.105 Mechanical Engineering Freshman Lab 1	Uncertainty analysis, information resources; motion analysis, analysis of discrete data, statistical analysis, laboratory safety	All lab assignments
530.106 Mechanical Engineering Freshman Lab (lab for 530.102)	Uncertainty analysis, fluids, kinematics, kinetics, analysis of discrete data, statistical analysis, laboratory safety, reverse engineering, materials behavior and selection, manufacturing, design, mechanisms of machines, casting, power transmission, assembly.	All lab assignments
530.201 Statics and Mechanics of Materials	Tensile stress-strain, truss analysis, torsion of circular shafts, and beam bending.	Laboratory reports L2, L3, L4, L5
530.216 Mechanics Based Design Lab	Strain gauges, machine components, failure, design project	All laboratory assignments
530.232 Thermodynamics Lab	Temperature measurements; implementation of first and second laws of thermodynamics in internal combustion engines and refrigeration systems; Thermodynamics of alternative energy systems; Laboratory report writing.	Laboratory instructions and reports
530.241 Electronics and Instrumentation	Lab test equipment including digital multimeters, power supplies, oscilloscopes, prototyping boards, and signal generators. Electronic components including resistors, capacitors, inductors, diodes, LEDs, transistors, op-amps, instrumentation amps, supercapacitors, 555 timers, comparators, RSIPs, thermistors, zener diodes.	All lab reports and course design project report
530.329 Introduction to Fluid Mechanics Lab	Flow through a venturi; pipe flow; lift and drag; measurements of pressure and flow; laboratory report writing.	All laboratory reports
530.335 Heat Transfer Lab	Analysis of a heat exchanger; heat sink analysis; convection and radiation; temperature measurement; laboratory report writing.	Laboratory instructions and reports
530.343 Design and Analysis of Dynamic Systems	First order system (motor spin down), Second order system (bifilar pendulum) and electromechanics, System modeling and simulation, Feedback control.	L1, L2, L3, L4
530.446 Experimental Methods in Biomechanics	Wheatstone bridge, inertial compensation, kinematic measurement, calibration, noise reduction, pressure measurement, strain measurement	L1-L5

	Laboratory performance assessment for	**F**	**D**	**C-**	**C**	**C+**	**B-**	**B**	**B+**	**A-**	**A**	**A+**	**Mean**
		0	**1.00**	**1.67**	**2.00**	**2.33**	**2.67**	**3.00**	**3.33**	**3.67**	**4.00**	**4.33**	
STEVEN MARRA	530.105, Fall	0	0	0	0	2	0	0	1	3	26	33	4.09
STEPHEN BELKOFF	530.106, Spring	0	0	0	0	0	1	7	17	33	0	58	3.81
TAK IGUSA	530.201, Fall	2	0	2	1	0	0	1	5	41	53	0	3.69
STEVEN MARRA	530.216, Spring	0	0	0	0	0	0	0	0	0	59	0	4.00

2012-13 Partial Grades Assessments – Criterion B - Laboratory skills

STEVEN MARRA	530.232, Fall	0	0	0	0	0	2	4	5	14	40	0	3.77
SEAN CARVER	530.241, Spring	3	2	0	0	1	0	2	6	5	25	18	3.65
STEVEN MARRA	530.329, Fall	0	0	0	0	0	3	13	16	22	7	0	3.43
STEVEN MARRA	530.335, Spring	0	0	0	0	0	0	5	4	16	23	8	3.82
STEVEN MARRA	530.343, Spring	2	0	0	1	1	1	3	5	12	20	8	3.61
STEPHEN BELKOFF	530.446, Fall	0	0	0	0	0	0	1	0	3	9	0	3.91

2012-13 Partial Grades Assessments – Criterion C - Design skills

Course	Sample design projects	Work samples
530.101 Freshman Experiences	Design processes and sketching, first/third angle projections. Also, student teams of three designed a device to drop a payload on a target. A competition is held at the end of the semester.	HW 1,2,3,4,5,7,8,9 Design Project, Design Notebooks, Final Exam
530.102 Freshman Experiences	Design processes and sketching, first/third angle projections. Students compete in design contest to employ a 4-bar link mechanism to dispense Pez candy. Students CAD and rapid prototype designs.	HW1, labs and design project
530.215 Mechanics Based Design	Most homework and exam problems asked to quantify specific design aspects. Emphasis in class (in both lectures and discussions) on best ways to achieve specific ends.	All homeworks and exams
530.216 Mechanics Based Design Lab	Laboratory assignments require students to design, fabricate, and test at least one component in each lab. A design project is assigned in which students work in teams to design, fabricate, and test a mechanical device.	All laboratory assignments
530.334 Heat Transfer	Many homework problems asked to quantify specific design aspects.	H1-H12
530.343 Design and Analysis of Dynamic Systems	Students are asked to select system parameters in order to design dynamic systems with a particular response in order to meet stable dynamic systems, students are asked to design stable controllers with specific characteristics	HW10, Final exam, Lab 4
530.403/404 Engineering Project (Senior Design)	Students are asked to take the role of design engineers in an industry project. The sponsor organization or industry provides a mentor and funding of about $10k to $15k. Students present their work through a series of formal project meetings to Instructor and Sponsor (Client) every two weeks. A report is tabled at each meeting and the team give a presentation.	Team reports for Fall 2012 for team FLU and team ANT; feedback documents for each report.
530.420 Robot Sensors and Actuators (elective)	Design input and output circuits to perform functions, step motors, circuits	Labs 4, 6, 8
530.454 Manufacturing Engineering	This course is focused on manufacturing processes as an objective science rather than a descriptive art. Quantitative and engineering-oriented approach provides numerical problem homework exercises, practical labs and quizzes and final.	HW1-HW10 C Lab1-Lab5 K Lab instruction sheet and report
530.467 Thermal Design Issues (elective)	In this class some of the homework assignments support the development of design skills through analyzing equipment or component performance. The key design element is the final project. In this project students use a commercial computer code to design a simplified aerospace system or component.	Final project grades and assignment 4

	Design performance assessment for	F 0	D 1.00	C- 1.67	C 2.00	C+ 2.33	B- 2.67	B 3.00	B+ 3.33	A- 3.67	A 4.00	A+ 4.33	Mean
STEVEN MARRA	530.101, Fall	1	0	4	5	4	9	11	11	12	8	2	3.05
STEVE BELKOFF	530.102, Spring	0	0	0	0	0	0	8	16	34	0	58	3.82
STEVEN MARRA	530.215, Spring	0	0	2	3	5	11	8	9	10	5	4	3.13
STEVEN MARRA	530.216, Spring	0	0	0	0	0	0	0	0	0	59	0	4.00
ANDREA PROSPERETTI	530.334, Spring	0	0	0	4	0	11	7	6	9	11	6	3.25
STEVEN MARRA	530.343, Spring	3	2	1	0	0	4	4	14	13	12	0	3.18
NATHAN SCOTT	530.403, Fall	0	0	0	6	6	0	9	3	0	12	6	3.26

2012-13 Partial Grades Assessments – Criterion C - Design skills

NOAH COWAN	530.420, Fall	0	0	1	0	0	5	14	10	18	14	2	3.45
YURY RONZHES	530.454, Fall	0	0	0	1	1	3	3	4	15	24	6	3.75
CILA HERMAN	530.467, Fall	0	0	0	0	0	5	4	4	6	4	6	3.54

2012-13 Partial Grades Assessments – Criterion D - Teamwork skills

Course	Coursework samples stressing ability to work in teams.	Work samples
530.101 / .102 Freshman Experiences	The mousetrap design project is the students' first university experience involving engineering teams. Mock Trial. The class was broken into four groups, Defendants (BP & EPA) and Plaintiffs (State of LA and Businesses) to present their respective positions in the civil trial regarding the BP Gulf oil spill.	Design Project Mock Trial
530.105/106 ME Freshman Lab	All labs were done in small 2-3 person teams.	All lab assignments
530.216 Mechanics Based Design Lab	All laboratories were done in 3-4 person teams. Students worked in 2-3 person teams to complete the design project.	All laboratory assignments
530.335 Heat Transfer Lab	All laboratories were conducted by students in groups of 3-4.	All laboratory assignments
530.343 Design and Analysis of Dynamic Systems	All Laboratories were done in small 2-3 person teams. Data was shared among the teams	All Labs
530.352 Materials Selection	Students worked in teams of 3-4 to research materials and determine best materials for specific applications. The groups then gave oral presentations of their work.	Lab 1, 2, 3
530.403 Engineering Project	All students worked in a team of 3 or 4 on the substantial, year-long project. In many teams there was new learning of the importance of clear communication; of the diversity of life goals and of conflict resolution strategies; and of the importance of loyalty.	The team reports generally do not include much comment about team function. This came out "live" in the project meetings.
530.420 Robot Sensors and Actuators (elective)	In the laboratories and course project, students with different backgrounds work together to create complex systems that have software, electrical, and mechanical components.	Labs and course projects
530.464 Energy Systems Analysis (elective)	The course had a two part group project. The students were organized into groups of two based on their interests and assigned a project area. Then they had to do two group presentations and a group report.	Project presentations I and II and final report
530.467 Thermal Design Issues (elective)	Several assignments in the class promote teamwork skills, including group discussions and projects. For example, one team argues in favor of manned spaceflight, one team opposes it an the third one is the jury. Teams prepare joint presentations and reports. In the final project the teams divide the design tasks among members. Each student will participate in the grading with the aid of grading forms.	First discussion or final project

	Solving engineering problems performance assessment for	F 0	D 1.00	C- 1.67	C 2.00	C+ 2.33	B- 2.67	B 3.00	B+ 3.33	A- 3.67	A 4.00	A+ 4.33	Mean
STEVEN MARRA	530.101, Fall	1	0	0	2	1	3	15	22	20	0	3	3.27
STEVE BELKOFF	530.102, Spring	0	0	0	0	0	3	0	15	0	0	41	3.99
STEVEN MARRA	530.105, Fall	0	0	0	0	2	0	0	1	3	26	33	4.09
STEVEN MARRA	530.216, Spring	0	0	0	0	0	0	0	0	0	59	0	4.00
STEVEN MARRA	530.335, Spring	0	0	0	0	0	0	5	4	16	23	8	3.82
STEVEN MARRA	530.343, Spring	2	0	0	1	1	1	3	5	12	20	8	3.61
NATHAN SCOTT	530.403, Fall	0	0	0	0	3	0	18	6	0	12	3	3.24

2012-13 Partial Grades Assessments – Criterion D - Teamwork skills

NOAH COWAN	530.420, Fall	0	0	1	0	0	5	14	10	18	14	2	3.45
DENNICE GAYME	530.464, Spring	0	0	0	0	0	1	1	4	1	3	0	3.48
CILA HERMAN	530.467, Fall	0	0	0	0	0	2	0	4	4	4	2	3.63

2012-13 Partial Grades Assessments
Criterion E - Engineering Problem Solving skills

Course	Coursework samples stressing ability to identify, formulate and solve engineering problems	Work samples
530.101 Freshman Experiences	Text and homework assignments throughout the course emphasize these abilities.	HW 1-11
530. 102 Freshman Experiences	Text and homework assignments throughout the course emphasize these abilities.	HW 1-10
530.215 Mechanics Based Design	In homework and exams, the students focus on solving problems involving statics, stress analysis, deflection analysis, material selection, and failure analysis	All written work
530.216 Mechanics Based Design Lab	A design project is assigned in which students work in teams to design, fabricate, and test a mechanical device from scratch	Design project
530.231 Thermodynamics	Discussions in class included: Advantages and disadvantages in various engine cycles as a function of specific tasks that they have to perform; methods for improving efficiency of power and refrigeration cycles. Homework included comparative calculations of modified cycles.	HW 8-9
530.232 Thermodynamics Lab	Students were required to optimize modeling parameters and determine the response characteristics and performance of various thermodynamic systems from experimentally obtained data.	All laboratory assignments.
530.327 Intro to Fluid Mechanics	Emphasis on all written work was on problems reflective of engineering problems associated with practical engineering fluid flow devices.	All homework assignments
530.329 Intro to Fluid Mechanics Lab	Students were required to validate classic fluid mechanics principles and characterize the aerodynamic properties of objects using experimentally obtained data.	All laboratory assignments.
530.334 Heat Transfer	All the homework assignments dealt with engineering problems	H1-H12
530.343 Design and Analysis of Dynamic Systems	In all homework assignments, students were asked to solve difficult engineering problems involving modeling, mathematical solution and sometimes explanation of what happens upon varying system parameters	All Problem Sets
530.405 Mechanics of Solids and Structures (elective)	Course includes weekly lectures and homework assignments. Lectures are used to build concepts and a unifying framework for solving an engineering problem. Breakdown of homeworks (HW) is as follows: HW1 reviews/builds necessary vector and tensor calculus and algebra skills; HW2 tests ability to identify and mathematically describe 3D deformations; HW3-4 tests ability to identify stresses and strains as well as implement governing laws of physics; HW5 combines all the elements and emphasis is on formulating and solving engineering problems, involving simple structural members such as bars, beams, etc.; HW6-7 emphasis is on the formulation and solution of more complicated engineering problems involving curved beams and beams with unregularly cross-sections; HW 8 covers formulating and solving circular and rectangular plates under different loadings; Finally HW9 covers some special and approximate techniques to solve statically indeterminate structures.	HW 1-9
530.420 Robot Sensors and Actuators (elective)	Course work includes weekly lectures and hands-on laboratory exercises in which the students construct and use various mechatronic sensors and actuators. This cumulative sequence concludes with students integrating the modules they have developed (incremental encoders, a quadrature decoder chip, a current-mode power-amplifier, interface to a microcomputer, BASIC-stamp microcomputer, and BASIC programs) to perform closed-loop position control on a DC electric motor. Course final grade is based on 12 labs, a midterm exam, and a final exam.	Lab assignments
530.464 Energy Systems Analysis	Homework assignments 1-7 and the midterm involved technical problem solving using engineering related skills. The material mainly covered analyzing models of various aspects of the power system.	HW 1-7, Midterm
530.467 Thermal Design Issues (elective)	Engineering problem solving skills are developed through some of the homework assignments as well as the final design project that involves the design of a simplified real system.	Final Project grades

2012-13 Partial Grades Assessments
Criterion E - Engineering Problem Solving skills

530.470 Space Vehicle Dynamics and Control (elective)	All of our homeworks require the students to set up and solve engineering problems, many of which are drawn from real life examples from the Lecturers careers of development spacecraft missions. On many of the homeworks, the students are asked to think critically about their resulting answers, and how they could even improve the solution of the problem that they've been asked to solve. The students are also rewarded on exams when good engineering judgement is used to solve a problem, especially when they obtain answers that help them question the correctness of their result.	HW 1-10

	Solving engineering problems performance assessment for	**F 0**	**D 1.00**	**C- 1.67**	**C 2.00**	**C+ 2.33**	**B- 2.67**	**B 3.00**	**B+ 3.33**	**A- 3.67**	**A 4.00**	**A+ 4.33**	**Mean**
STEVEN MARRA	530.101, Fall	2	0	0	4	0	4	8	19	24	6	0	3.25
STEVE BELKOFF	530.102, Spring	0	0	0	2	3	2	3	9	18	21	1	3.55
STEVEN MARRA	530.215, Spring	0	0	2	3	5	11	8	9	10	5	4	3.13
STEVEN MARRA	530.216, Spring	0	0	0	0	0	0	0	0	3	43	13	4.06
JOE KATZ	530.231, Fall	10	2	0	3	1	3	5	7	10	17	11	3.03
STEVEN MARRA	530.232, Fall	0	0	0	0	0	2	4	5	14	40	0	3.77
RAJAT MITTAL	530.327, Fall	0	0	0	0	0	2	9	10	16	12	0	3.52
STEVEN MARRA	530.329, Fall	0	0	0	0	0	3	13	16	22	7	0	3.43
ANDREA PROSPERETTI	530.334, Spring	0	0	0	4	0	9	7	8	11	11	4	3.36
STEVEN MARRA	530.343, Spring	2	4	0	1	0	4	3	10	8	16	5	3.28
JAAFAR EL-AWADY	530.405, Fall	0	0	0	0	2	0	0	2	0	2	0	3.22
NOAH COWAN	530.420, Fall	0	0	1	0	0	5	14	10	18	14	2	3.45
DENNICE GAYME	530.464, Spring	0	2	1	0	1	0	1	1	0	2	2	2.90
CILA HERMAN	530.467, Fall	0	0	0	0	0	2	0	4	4	4	2	3.63
TIM MCGEE, MARTIN OZIMEK	530.470, Spring	0	1	0	3	0	0	4	4	2	4	2	3.22

2012-13 Partial Grades Assessments - Criterion F - Ethics skills

Course	Covered material dealing with ethics	Work Samples
530.102 Freshman Experiences	The Mock Trial provided an opportunity for the students to explore legal, professional and ethic responsibility	Final Exam
530.403/404 Engineering Project (Senior Design)	Ethical behavior in engineering practice is emphasized in the course assessment guidelines. More importantly there are opportunities to discuss real-world ethical situations in the context of the project work.	

	Ethics appreciation assessment for	F 0	D 1.00	C- 1.67	C 2.00	C+ 2.33	B- 2.67	B 3.00	B+ 3.33	A- 3.67	A 4.00	A+ 4.33	Mean
STEVE BELKOFF	530.102, Spring	0	0	0	0	0	0	0	8	16	32	0	3.82
NATHAN SCOTT	530.403/404, full year	0	0	0	3	6	0	9	3	0	18	3	3.38

2012-13 Partial Grades Assessments
Criterion G - Written and Oral Communication skills

Course	Sample course material dealing with written and oral communication skills	Work Samples
530.101 Freshman Experiences	Students provide narrative answers to questions about engineering design process (HW 2 and 8), differences between discrete and continuous data (HW 3) and between computational and analytical models (HW 4), and about technical writing (HW 9). These assignments were graded on writing as well as content. Students prepared resumes (HW 7). An important part of written communication in engineering is sketching. This was assessed in HW 1, 2, 3, 4, 5, 7, 8, and 9.	Homework 1-5 and 7-9
530.102 Freshman Experiences	Students explored society's reliance on technology by explaining what has made them 'dumber' than previous generations.	HW 7, mock trial
530.216 Mechanics Based Design Lab	Design project report, drawings	Design project
530.232 Thermodynamics Lab	Students prepared written laboratory reports. The reports were graded in part by quality of presentation.	Sample laboratory reports
530.241 Electronics and Instrumentation	Students prepare written reports on weekly laboratories. The write-ups are graded on the students' ability to present engineering and scientific data clearly and precisely.	Laboratory reports
530.327 Intro to Fluid Mechanics	Exams with questions that target broader concepts in the application of fluid mechanics to engineering	Exam 1, 2 and Final Exam
530.329 Intro to Fluid Mechanics Lab	Students prepared written laboratory reports. The reports were graded in part by quality of presentation.	All laboratory assignments
530.335 Heat Transfer Lab	Students prepared written laboratory reports. The reports were graded in part by quality of presentation.	All laboratory assignments
530.352 Materials Selection	Students worked in teams of 3-4 to research materials and determine best materials for specific applications. The groups then gave oral presentations of their work.	Lab 1, 2, 3
530.403/404 Senior Design Project	Student teams prepare a report every two weeks and it is submitted to both instructor and client at least 24 hours prior to the regular meeting. At the meeting each team makes a presentation to client and instructor (usually from a separate document such as a PowerPoint™ slide set). Verbal feedback is given to the team immediately following the presentation on many aspects of good practice including clarity of slides, use of graphics, labeling, referencing, and attention to the needs of the listeners. Written feedback about the report, with comments about both the project direction as well as presentation and language matters, is given to the team.	See 530.403 senior design sample work Fall 2012 for two complete sets of reports and feedback documents.
530.464 Energy Systems Analysis (elective)	The two part final project involved a written proposal, a phase I report and group presentation, along with a final report and final presentation. The class was also graded on participation in class discussions	Final Project and class discussions
530.467 Thermal Design Issues (elective)	The group discussions, the midterm presentations as well as the final project promote verbal communication skills.	final and midterm project grades

	Broad perspectives assessment for	F 0	D 1.00	C- 1.67	C 2.00	C+ 2.33	B- 2.67	B 3.00	B+ 3.33	A- 3.67	A 4.00	A+ 4.33	Mean
STEVEN MARRA	530.101, Fall	2	0	0	4	0	4	8	10	24	6	0	3.25
STEVE BELKOFF	530.102, Spring	0	1	0	0	0	0	0	0	3	15	40	4.16
STEVEN MARRA	530.216, Spring	0	0	0	0	0	0	0	0	3	43	13	4.06
STEVEN MARRA	530.232, Fall	0	0	0	0	0	2	4	5	14	40	0	3.77

2012-13 Partial Grades Assessments
Criterion G - Written and Oral Communication skills

SEAN CARVER	530.241, Spring	3	2	0	0	1	0	2	6	5	25	18	3.65
RAJAT MITTAL	530.327, Fall	0	0	0	2	11	21	9	8	6	4	2	2.95
STEVEN MARRA	530.329, Fall	0	0	0	0	0	3	13	16	22	7	0	3.43
STEVEN MARRA	530.335, Spring	0	0	0	0	0	0	5	4	16	23	8	3.82
STEVEN MARRA	530.352, Fall	0	0	0	0	0	3	13	16	22	7	0	3.43
NATHAN SCOTT	530.403/404, full year	0	0	0	0	9	0	9	9	0	3	12	3.38
DENNICE GAYME	530.464, spring	0	0	0	0	1	0	1	2	1	5	0	3.57
CILA HERMAN	530.467, Fall	0	0	0	0	0	3	4	8	9	7	3	3.55

2012-13 Partial Grades Assessments - Criterion H - Broad Education skills

Course	Sample course material and projects including broader perspectives to engineering solutions	Work Samples
530.231 Thermodynamics	Discussions in class included: Emission and pollution problems associated with fuels (global warming), additives (e.g. lead tetra-chloride) and refrigerants (ozone layer depletion), methods to improve efficiency of engine cycles were discussed extensively.	Class notes, and homework assignments
530.403/404 Engineering Design Project	Most of the projects are from industry as a deliberate way of exposing students to real world practices, attitudes and technology. Most students are expected to travel to their client's premises to meet people concerned with the work and to interact with existing systems related to the work. The reports of Team THD are a good example that shows a team gradually getting their heads around the real issues in a complicated factory environment.	THD reports from Fall 2012.
530.464 Energy Systems Analysis	Discussions in class related to current problems in power systems, guest speakers from academia and industry regarding current practices in energy systems. Final projects required doing background research related to assigned topics. Sample project topics include new technologies for wind energy.	Final Project and class participation

	Broad perspectives assessment for	F 0	D 1.00	C- 1.67	C 2.00	C+ 2.33	B- 2.67	B 3.00	B+ 3.33	A- 3.67	A 4.00	A+ 4.33	Mean
JOE KATZ	530.231, Fall	2	2	6	10	4	9	11	6	6	9	4	2.90
NATHAN SCOTT	530.403/404, full year	0	0	0	3	0	0	18	6	0	15	0	3.33
DENNICE GAYME	530.464, spring	0	0	0	0	1	0	1	2	1	5	0	3.57

2012-13 Partial Grades Assessments
Criterion J - Contemporary Knowledge

Course	Sample course material and projects including broader perspectives to engineering solutions	Work Samples
530.102 Freshman Experiences II	Product liability of firearms sales and manufacture was the topic of the Mock trial. Lead poisoning via leaded gasoline was discussed in class. Lead was used as an antiknock agent when ethanol was a known solution. Part of question 1 on the final exam addressed this topic.	Mock Trial, Final Exam
530.241 Electronics and Instrumentation	Laboratories emphasize the use of modern electronic components.	2013: Lab reports.
530.334 Heat Transfer	An under-determined designed project for which several engineering decisions had to be made.	Text of assignment, sample student solutions
530.403 Engineering Project (Senior Design)	Design projects with industry are inherently broadening and modern, real-world issues are encountered. The detail depends on the project. The three examples (ANT, FLU and THD) show some of the usual range. ANT required the team to become aware of cultural attitudes towards people with disability and sensitive to engineering solutions that inadvertently draw attention to it. FLU required the team to think about how undergraduates learn and therefore how lab equipment should be designed. THD required the team to enter a workplace where progress in gender equality of employment has meant continual innovation in the ergonomic design of the plant. Their design is to make it possible for a small woman to do the work previously done by a large man.	Three sets of reports from Fall 2012.
530.464 Energy Systems Analysis	Discussions in class related to current problems in power systems, guest speakers from academia and industry regarding current practices in energy systems. Final projects required doing background research related to assigned topics and current state of the art in either the analysis technique or the topic chosen. Sample project topics include new technologies for wind energy.	Final Project

	Broad perspectives assessment for	F 0	D 1.00	C- 1.67	C 2.00	C+ 2.33	B- 2.67	B 3.00	B+ 3.33	A- 3.67	A 4.00	A+ 4.33	Mean
STEVE BELKOFF	530.102, Spring	0	0	0	0	0	3	0	15	0	0	41	3.99
SEAN CARVER	530.241, Spring	3	2	0	0	1	0	2	6	5	25	18	3.65
ANDREA PROSPERETTI	530.334, Spring												
NATHAN SCOTT	530.403/404, Fall/Spring	0	0	0	3	0	0	24	3	0	9	3	3.26
DENNICE GAYME	530.464, spring	0	0	0	0	1	0	1	4	1	3	0	3.43

2012-13 Partial Grades Assessments - Criterion K - Modern Tools skills

Course	Coursework examples stressing ability to use modern engineering tools	Work Samples
530.216 Mechanics Based Design Lab	Students develop skills in using CAD and machining tools	All laboratory assignments
530.241 Electronics and Instrumentation Lab	In all of the laboratories, students use modern electronic instruments, such as digital storage oscilloscopes. In the later labs, the students use a BASIC STAMP microcontroller to interface with their digital and analog electronics.	2013: Lab reports
530.334 Heat Transfer	Students had to write a Matlab code to integrate a differential equation with two-point boundary conditions	H3
530.343 Design and Analysis of Dynamic Systems	Students were asked to use Matlab, data acquisition systems and basic engineering tools such as power supplies and oscilloscopes	Some Problem Sets and all labs
530.403/404 Engineering Project (Senior Design)	Students readily apply tools and skills learned in other courses and usually need no prompting to do so. Most are adept with either SolidWorks™ or Creo™ and use these to both explore and publish designs. FEA capabilities within the CAD packages are sometimes used. Nearly all students know MATLAB™ and use it as a spreadsheet, calculator, optimizer and data display. COMSOL is also sometimes used.	See Team FLU report 3 for an example of COMSOL use. FLU report 4 has 2D CAD as well as a MATLAB script for a flow analysis.
530.414 Computer Aided Design (elective)	Students use Pro/Engineer, Pro/Mechanica, and Pro/NC (PTC Corp.) computer design, analysis, simulation, and respectively manufacturing software on a continuous basis for the class and gain extensive hands-on experience with modern CAD/CAM software. These software packages are among the most advanced tools in the field.	All HW assignments.
530.446 Experimental Methods in Biomechanics	Modern (and traditional) measurement techniques and instruments were introduced and used.	Labs 1-5
530.454 Manufacturing Engineering	During labs students use modern tools as G-code to create machining Program for CNC Milling operation. Also they use new device to perform Lathe Machine lab to recognize cutting force for different material (steel, bronze, aluminum, etc.). Rapid Prototyping Machine gives them opportunity to build prototype part from creating drawing, 3D model in STL file and build in laser prototyping Machine.	Reports L1, L2, L3, L4, L5 and some labs samples
530.467 Thermal Design Issues (elective)	Students use the finite element code FEMLAB to analyze and design thermal systems.	Final project, assignment 4
530.495 Microfabrication Lab (elective)	Students learn the principles and develop the skills of microfabrication processes, such as lithography, etch, thin film deposition, and oxidation.	Homework and Lab report

	Modern tools performance assessment for	F 0	D 1.00	C- 1.67	C 2.00	C+ 2.33	B- 2.67	B 3.00	B+ 3.33	A- 3.67	A 4.00	A+ 4.33	Mean
STEVEN MARRA	530.216, Spring	0	0	0	0	0	0	0	0	0	59	0	4.00
SEAN CARVER	530.241, Spring	3	2	0	0	1	0	2	6	5	25	18	3.65
ANDREA PROSPRETTI	530.334, Spring	0	0	0	3	0	0	12	0	0	39	0	3.67
STEVEN MARRA	530.343, Spring	2	0	0	1	1	1	3	5	12	20	8	3.61
NATHAN SCOTT	530.403/404, full year	0	0	0	3	0	0	12	12	0	6	9	3.45
DAN STOIANOVICI	530.414, Fall	0	1	1	1	1	3	9	17	17	18	3	3.46

2012-13 Partial Grades Assessments - Criterion K - Modern Tools skills

STEPHEN BELKOFF	530.446, Fall	0	0	0	0	0	0	1	0	3	9	0	3.91
YURY RONZHES	530.454, Fall	0	0	0	0	2	3	3	4	15	24	6	3.72
CILA HERMAN	530.467, Fall	0	0	0	0	0	5	4	4	6	5	6	3.54
JEFF WANG	530.495, Fall	0	0	0	0	0	1	4	7	4	9	3	3.63