

COURSE CHANGE FORM

Complete 1a – 1f & 2a – 2c. Fill out the remainder of the form as applicable for items being changed.

1. General Information.	
a. Submitted by the College of: <u>Engineering</u>	Today's Date: <u>12/1/2010</u>
b. Department/Division: <u>Mechanical Engineering</u>	
c. Is there a change in "ownership" of the course? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>	
If YES, what college/department will offer the course instead? _____	
d. What type of change is being proposed? <input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor ¹ (place cursor here for minor change definition)	
e. Contact Person Name: <u>John R. Baker</u>	Email: <u>jbakcr@cng.uky.cd</u> Phone: <u>270-534-3114</u>
f. Requested Effective Date: <input checked="" type="checkbox"/> Semester Following Approval OR <input type="checkbox"/> Specific Term ² : _____	
2. Designation and Description of Proposed Course.	
a. Current Prefix and Number: <u>ME-514</u>	Proposed Prefix & Number: <u>ME-514</u>
b. Full Title: <u>Computational Techniques in Mechanical System Analysis</u>	Proposed Title: <u>Computational Techniques in Mechanical System Analysis</u>
c. Current Transcript Title (if full title is more than 40 characters): <u>Comput Mech Sys Analysis</u>	
Proposed Transcript Title (if full title is more than 40 characters): <u>Comput Mech Sys Analysis</u>	
d. Current Cross-listing: <input type="checkbox"/> N/A OR Currently ³ Cross-listed with (Prefix & Number): _____	
Proposed – <input type="checkbox"/> ADD ³ Cross-listing (Prefix & Number): _____	
Proposed – <input type="checkbox"/> REMOVE ^{3,4} Cross-listing (Prefix & Number): _____	
e. Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours ⁵ for each meeting pattern type.	
Current:	<input type="checkbox"/> Lecture <input type="checkbox"/> Laboratory ⁵ <input type="checkbox"/> Recitation <input type="checkbox"/> Discussion <input type="checkbox"/> Indep. Study
	<input type="checkbox"/> Clinical <input type="checkbox"/> Colloquium <input type="checkbox"/> Practicum <input type="checkbox"/> Research <input type="checkbox"/> Residency
	<input type="checkbox"/> Seminar <input type="checkbox"/> Studio <input type="checkbox"/> Other – Please explain: _____
Proposed:	<input type="checkbox"/> Lecture <input type="checkbox"/> Laboratory <input type="checkbox"/> Recitation <input type="checkbox"/> Discussion <input type="checkbox"/> Indep. Study
	<input type="checkbox"/> Clinical <input type="checkbox"/> Colloquium <input type="checkbox"/> Practicum <input type="checkbox"/> Research <input type="checkbox"/> Residency
	<input type="checkbox"/> Seminar <input type="checkbox"/> Studio <input type="checkbox"/> Other – Please explain: _____
f. Current Grading System: <input type="checkbox"/> Letter (A, B, C, etc.) <input type="checkbox"/> Pass/Fail	
Proposed Grading System: <input type="checkbox"/> Letter (A, B, C, etc.) <input type="checkbox"/> Pass/Fail	
g. Current number of credit hours: _____ Proposed number of credit hours: _____	

Comment [OSC1]: Excerpt from SR 3.3.0.G.2 Definition. A request may be considered a minor change if it meets one of the following criteria:
a. change in number within the same hundred series*;
b. editorial change in the course title or description which does not imply change in content or emphasis;
c. a change in prerequisite(s) which does not imply change in content or emphasis, or which is made necessary by the elimination or significant alteration of the prerequisite(s);
d. a cross-listing of a course under conditions set forth in SR 3.3.0.E;
e. correction of typographical errors.

*...for the specific purposes of the minor exception rule, the 600-799 courses are the same "hundred series," as long as the other minor change requirements are complied with. [RC 1/15/09]

¹ See comment description regarding minor course change. Minor changes are sent directly from dean's office to Senate Council Chair. If Chair deems the change as "not minor," the form will be sent to appropriate academic Council for normal processing and contact person is informed.
² Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.
³ Signature of the chair of the cross-listing department is required on the Signature Routing Log.
⁴ Removing a cross-listing does not drop the other course – it merely unlinks the two courses.
⁵ Generally, undergrad courses are developed such that one semester hr of credit represents 1 hr of classroom meeting per wk for a semester, exclusive of any lab meeting. Lab meeting generally represents at least two hrs per wk for a semester for 1 credit hour. (See SR 5.2.1.)

COURSE CHANGE FORM

h. Currently, is this course repeatable for additional credit?	YES <input type="checkbox"/>	NO <input type="checkbox"/>
<i>Proposed to be repeatable for additional credit?</i>	YES <input type="checkbox"/>	NO <input type="checkbox"/>
<i>If YES: Maximum number of credit hours:</i> _____		
<i>If YES: Will this course allow multiple registrations during the same semester?</i>	YES <input type="checkbox"/>	NO <input type="checkbox"/>
i. Current Course Description for Bulletin: _____		
<i>Proposed Course Description for Bulletin:</i> _____		
j. Current Prerequisites, if any: _____		
<i>Proposed Prerequisites, if any:</i> _____		
k. Current Distance Learning(DL) Status: <input type="checkbox"/> N/A <input type="checkbox"/> Already approved for DL* <input checked="" type="checkbox"/> <i>Please Add⁶</i> <input type="checkbox"/> <i>Please Drop</i>		
*If already approved for DL, the Distance Learning Form must also be submitted <u>unless</u> the department affirms (by checking this box <input type="checkbox"/>) that the proposed changes do not affect DL delivery.		
l. Current Supplementary Teaching Component, if any: <input type="checkbox"/> Community-Based Experience <input type="checkbox"/> Service Learning <input type="checkbox"/> Both		
<i>Proposed Supplementary Teaching Component:</i> <input type="checkbox"/> <i>Community-Based Experience</i> <input type="checkbox"/> <i>Service Learning</i> <input type="checkbox"/> <i>Both</i>		
3. Currently, is this course taught off campus?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
<i>Proposed to be taught off campus?</i>	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
4. Are significant changes in content/teaching objectives of the course being proposed?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
If YES, explain and offer brief rationale: _____		
5. Course Relationship to Program(s).		
a. Are there other depts and/or pgms that could be affected by the proposed change?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
If YES, identify the depts. and/or pgms: _____		
b. Will modifying this course result in a new requirement⁷ for ANY program?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
If YES ⁷ , list the program(s) here: _____		
6. Information to be Placed on Syllabus.		
a.	<input type="checkbox"/> Check box if <u>changed to</u> 400G or 500.	If <u>changed to</u> 400G- or 500-level course you must send in a syllabus and <i>you must include the differentiation</i> between undergraduate and graduate students by: (i) requiring additional assignments by the graduate students; and/or (ii) establishing different grading criteria in the course for graduate students. (See <i>SR 3.1.4.</i>)

(taught as ME 599)

⁶ You must *also* submit the Distance Learning Form in order for the course to be considered for DL delivery.

⁷ In order to change a program, a program change form must also be submitted.

COURSE CHANGE FORM

Signature Routing Log

General Information:


Course Prefix and Number: ME-514

Proposal Contact Person Name: John R. Baker Phone: 270-534-3114 Email: jbaker@enr.uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
Mechanical Engineering Faculty	April 25, 2007	L. Scott Stephens / 257-6336, ext. 80649 / stephens@enr.uky.edu	
<i>Engineering faculty</i>	<i>3/15/11</i>	<i>Richard Sweigard / 785-717-1352 / rsweigard@enr.uky.edu</i>	<i>Richard Sweigard</i>
		/ /	
		/ /	
		/ /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision ⁸
Undergraduate Council	3/29/2011		
Graduate Council			
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

⁸ Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

Distance Learning Form

This form must accompany every submission of a new/change course form that requests distance learning delivery. This form may be required when changing a course already approved for DL delivery.

All fields are required!

Introduction/Definition: For the purposes of the Commission on Colleges Southern Association of Colleges and Schools accreditation review, *distance learning* is defined as a formal educational process in which the majority of the instruction (interaction between students and instructors and among students) in a course occurs when students and instructors are not in the same place. Instruction may be synchronous or asynchronous. A distance learning (DL) course may employ correspondence study, or audio, video, or computer technologies.

A number of specific requirements are listed for DL courses. **The department proposing the change in delivery method is responsible for ensuring that the requirements below are satisfied at the individual course level.** It is the responsibility of the instructor to have read and understood the university-level assurances regarding an equivalent experience for students utilizing DL (available at <http://www.uky.edu/USC/New/forms.htm>).

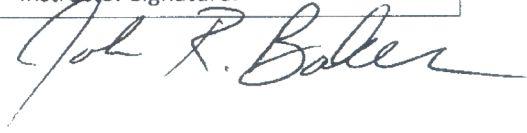
Course Number and Prefix: ME-514	Date: 9/20/2009
Instructor Name: John R. Baker	Instructor Email: jbaker@engr.uky.edu

Curriculum and Instruction	
1.	<p>How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?</p> <p>The course provides for interaction between the faculty and students and among students in a way that is similar to the interaction in a class that is not a Distance Learning class. It is an ITV (Interactive Television) class, so the students at the remote location (Lexington) are receiving the lectures simultaneously with the students at the originating location (Paducah), and can see and speak to the instructor. The tentative course syllabus for the next offering in Spring, 2010, is attached and it conforms to the guidelines.</p>
2.	<p>How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.</p> <p>All students who take this course actually have a classroom-based experience. The students in Lexington meet in a classroom at the same time the students in Paducah meet, and they have interaction with the instructor during each ITV class meeting. Also, the instructor travels to Lexington multiple times each time the course is offered to deliver some lectures from Lexington and meet the Lexington students in-person.</p>
3.	<p>How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.</p> <p>There is a TA who proctors the exams in Lexington. Students submit much of their homework and project work via email, or else submit directly to the TA. There is no real difference for the students in Lexington and Paducah in this regard, or any real difference for students taking this course as compared to those taking a course in which the instructor is physically located in Lexington.</p>
4.	<p>Will offering this course via DL result in at least 25% or at least 50%* (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?</p>

Abbreviations: TASC = Teaching and Academic Support Center DL = distance learning DLP = Distance Learning Programs

	<p>No</p> <p>If yes, which percentage, and which program(s)?</p> <p>*As a general rule, if approval of a course for DL delivery results in 50% or more of a program being delivered through DL, the effective date of the course's DL delivery will be six months from the date of approval.</p>
5.	<p>How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?</p> <p>Students taking this ITV course in Lexington are attending the class in basically a traditional classroom setting. The only difference is they see the instructor on a monitor and hear him on speakers, and they speak to him through a microphone and he sees them on a monitor. There is no difference for these students with regard to access to student services as compared to a Lexington student taking the course from an instructor who is physically located in Lexington.</p>
Library and Learning Resources	
6.	<p>How do course requirements ensure that students make appropriate use of learning resources?</p> <p>They are required to use software licensed by UK and available on the UK engineering computers in Lexington, MATLAB and ANSYS. The use of the software along with the course lecture notes, made available via Blackboard, and the lectures, transmitted via ITV, are the only learning resources the students need for this particular course.</p>
7.	<p>Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.</p> <p>This is handled in the same way it would be for students taking any other course in the engineering program at UK. They need accounts and access to the engineering computers, which they all have, since they are UK engineering students.</p>
Student Services	
8.	<p>How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Teaching and Academic Support Center (http://www.uky.edu/TASC/index.php) and the Information Technology Customer Service Center (http://www.uky.edu/UKIT/)?</p> <p>The students are strongly encouraged to contact the instructor by email or cell phone (even on evenings or weekends) if they have course questions or problems. In the event of a technical problem, the instructor strives to always ensure that any student with a problem that the instructor cannot resolve is put in contact with someone who can help. Since the instructor is available in Paducah, and TASC personnel are available in Lexington at the times the students are receiving the lectures, there is really no technical help needed for the individual students with regard to receiving the course lectures. For problems that may arise with regard to lectures or computer lab use, in the attached tentative syllabus for the next offering in Spring, 2010, the above web addresses are listed.</p>
9.	<p>Will the course be delivered via services available through the Teaching and Academic Support Center?</p> <p>Yes <input checked="" type="checkbox"/></p> <p>No <input type="checkbox"/></p> <p>If no, explain how students enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.</p>

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	<p>Does the syllabus contain all the required components, below? In the attached tentative syllabus for the next offering in Spring, 2010, the following items are listed.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Instructor's <i>virtual</i> office hours, if any. <input type="checkbox"/> The technological requirements for the course. <input type="checkbox"/> Contact information for TASC (http://www.uky.edu/TASC/; 859-257-8272) and Information Technology Customer Service Center (http://www.uky.edu/UKIT/; 859-257-1300). <input type="checkbox"/> Procedure for resolving technical complaints. <input type="checkbox"/> Preferred method for reaching instructor, e.g. email, phone, text message. <input type="checkbox"/> Maximum timeframe for responding to student communications. <input type="checkbox"/> Information on Distance Learning Library Services (http://www.uky.edu/Libraries/DLLS) <ul style="list-style-type: none"> <input type="checkbox"/> Carla Cantagallo, DL Librarian <input type="checkbox"/> Local phone number: 859 257-0500, ext. 2171; long-distance phone number: (800) 828-0439 (option #6) <input type="checkbox"/> Email: dllservice@email.uky.edu <input type="checkbox"/> DL Interlibrary Loan Service: http://www.uky.edu/Libraries/libpage.php?lweb_id=253&llib_id=16
10.	<p>I, the instructor of record, have read and understood all of the university-level statements regarding DL.</p> <p>Instructor Name: John R. Baker</p> <p>Instructor Signature: </p>

Abbreviations: TASC = Teaching and Academic Support Center DL = distance learning DLP = Distance Learning Programs

ME 514
Computational Techniques in Mechanical System Analysis
Section 201
Spring, 2010

INSTRUCTOR: John Baker, Extended Campus Program – Paducah, Crouse Hall, Rm. 206
Address: University of Kentucky, P.O. Box 7380, Paducah, KY 42002-7380
Phone: Office (270) 534-3114; Cell (270) 994-7902
Email: jbaker@engr.uky.edu
FAX: (270) 534-6292
Office Hours: T-Th: 8:30 a.m. – 9:45 a.m. (Central Time)

TEACHING ASSISTANT: Andrew Niehaus (Lexington)
Email: Andrew.Niehaus@uky.edu

CLASS MEETINGS: Paducah: T-Th: 10:00 am – 11:15 pm/Crouse Hall, Room 228
Lex.: T-Th: 11:00 am - 12:15 pm/Whitehall Classroom Bldg-Rm319-CB

PREREQUISITES: ME 340

REFERENCES: There is no required textbook for the course. Two helpful references are listed below:

1. D.L. Logan: A First Course in the Finite Element Method, 3rd Edition, Brooks/Cole Thomson Learning, 2001.
2. Thomson and Dahleh, Theory of Vibration with Applications, 5th Edition, Prentice-Hall Inc., 1998.

TECHNOLOGICAL REQUIREMENTS: Students will need Internet access to download course information available on Blackboard. They will also need to use Microsoft Word, and the engineering software tools MATLAB and ANSYS available on the computers in the engineering computer labs.

GRADING:

Scale

<u>Undergraduate Students</u>		<u>Graduate Students</u>	
90%-100%	A	90%-100%	A
80%-89.9%	B	80%-89.9%	B
70%-79.9%	C	70%-79.9%	C
60%-69.9%	D	0%-69.9%	E
0%-59.9%	E		

Distribution	<u>Undergraduate Students</u>	<u>Graduate Students</u>
	Homework 25%	Homework 20%
	Application Projects 45%	Application Projects 40%
	Midterm Exam 15%	Graduate Student Project 10%
	Final Exam 15%	Midterm Exam 15%
		Final Exam 15%

NOTES

- The instructor will be available at other times, in addition to those listed above, for office hours. Students are encouraged to stop by the office, call, or send an email, whenever help is needed. Feel free to call on the cell phone on evenings and weekends. The instructor will typically respond to email or phone messages during regular business hours within four hours of receipt of the message. Usually, the response will be faster than four hours.
- The grading scale shown is a guideline, so adjustments may be made.
- There will be course information posted on the UK Blackboard system, such as some course notes and handouts. Grades will also be posted on Blackboard.
- Students are responsible for checking their email regularly for course announcements and other course information.
- Discussion among students regarding Homework assignments is allowed and encouraged. However, for assignments denoted as Application Projects and for the Graduate Student Project, students may only discuss the work with the instructor. Also, no discussion is allowed among students during an exam.
- Late assignments will not typically be accepted. They will only be accepted at the instructor's discretion under unusual circumstances. In some cases, portions of homework may be submitted via email to the instructor. Pages of assignments must be stapled together when hard copies are turned in.
- There will be one midterm exam and a final exam. Make-up exams will only be given in special circumstances. If any student cannot attend class, for some excusable reason, on one of the exam dates, it is essential that the instructor be notified as soon as possible, so that other arrangements can be made. Anyone who misses an exam without being granted approval in advance may receive a grade of zero for the exam.
- Undergraduate students will be provided with a Midterm Evaluation (by the midterm date) of course performance based on criteria in syllabus.
- Graduate students will be assigned a final project that will not be completed by the undergraduate students. This difference is reflected in the grade distribution shown.

POLICY ON ACADEMIC ACCOMMODATIONS DUE TO DISABILITY

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

TECHNICAL ASSISTANCE

In the event of technical difficulties regarding course delivery, including problems with Blackboard, please inform the instructor via either phone or email. The personnel at the Teaching and Academic Support Center may also be of help at:

<http://www.uky.edu/TASC/index.php>
Phone: 859-257-8272

For problems that may arise with regard to computer use, the personnel at the Information Technology Customer Service Center may be of help at:

<http://www.uky.edu/UKIT>
Phone: 859-257-1300

DISTANCE LEARNING LIBRARY SERVICES

If students taking this course have a need for use of the Distance Learning Library Services, the contact information is below:

Librarian: Carla Cantagallo
Phone: 859-257-0500 ext. 2171
800-828-0439 (Option 6)
Email: dllservice@email.uky.edu
Interlibrary Loan Service:
http://www.uky.edu/Libraries/libpage.php?lweb_id=253&llib_id=16

OTHER TOPICS

Student Conduct: University policy on student conduct, including that regarding academic honesty, plagiarism and cheating will be followed. Use of a cell phone without explicit permission during exams is not allowed, and will result in a charge of cheating. Student's work should be individual. For a discussion of the overall issue and guidelines, refer to the document on the website of the Ombud of the University of Kentucky at:

<http://www.uky.edu/Ombud/Plagiarism.pdf>

The Ombud web site also includes a link to a Prentice Hall Companion Website "Understanding Plagiarism", found at:

http://wps.prenhall.com/hss_understand_plagiarism_1/0,6622,427064-,00.html.

Be sure you understand the expectations of your university in this regard. All exams will be proctored.

Classroom attendance is expected, and excessive absences will affect the final grade, consistent with the university policy. Above in the notes was a mention of excused absences. Acceptable reasons for excused absences are consistent with university policy, but are typically:

- 1) serious illness;
- 2) illness or death of family member;
- 3) University-related trips;
- 4) major religious holidays;
- 5) other circumstances found to be "reasonable cause for nonattendance by the instructor."

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day for adding a class.

COURSE DESCRIPTION:

This course will include theory and application for computer-based methods of analyzing mechanical systems. The primary software tools used will be the finite element software, ANSYS, and MATLAB. Linear and nonlinear static and dynamic structural systems will be analyzed. Numerical solution techniques will be studied.

COURSE GOALS:

The primary goals of the course are to provide students with an understanding of the types of mechanical system analyses that can be carried out with modern software tools and with an understanding of the basic mathematical approaches used in the analyses. Also, students will become familiar with methods for performing analyses efficiently using software. They will learn to automate the analysis process by writing macros, which is useful, for instance, in a design optimization study.

OUTCOMES

Students will:

1. Understand how mathematical models of mechanical systems are formulated in matrix form using the finite element method.
2. Understand the types of mechanical system analyses that can be carried out with the mathematical models using modern software tools, such as static, modal, forced harmonic response, and transient analyses.
3. Understand the basic mathematical approaches used in the analyses.
4. Know how to perform analyses efficiently with the finite element software, ANSYS and the scientific computing software, MATLAB.
5. Understand the differences in linear and nonlinear system analysis, and when each type of analysis is appropriate.
6. Know the basics of structured programming by writing short programs using MATLAB.

ME-514 –Spring, 2010 - Tentative Course Schedule

Below “AP” denotes Application Project and “HW” denotes Homework.

Date	Class #	Lecture Notes Set or Exam	Assignment Due / Comments
R, 1/14	1	1	
T, 1/19	2	1	
R, 1/21	3	1	
T, 1/26	4	2	HW1 – Finite element static solution calculated by hand.
R, 1/28	5	2	
T, 2/2	6	3	HW2 – Finite element static solution using ANSYS.
R, 2/4	7	3	
T, 2/9	8	4	AP1 Due – Optimized design using static analysis in ANSYS.
R, 2/11	9	4	
T, 2/16	10	5	HW3 – Modal Analysis by hand and using MATLAB and ANSYS.
R, 2/18	11	5	
T, 2/23	12	6	
R, 2/25	13	6	HW4 – Harmonic response by hand and using MATLAB and ANSYS.
T, 3/2	14	7	
R, 3/4	15	Exam 1	Includes material through Lecture Notes Set 5 and HW4
T, 3/9	16	8	
R, 3/11	17	9	AP2 Due – Modal and Harmonic Response in ANSYS including stress effects.
T, 3/16			No Class – Spring Break
R, 3/18			No Class – Spring Break
T, 3/23	18	10	
R, 3/25	19	10	HW5 – Numerical integration solutions using MATLAB and ANSYS.
T, 3/30	20	11	
R, 4/1	21	11	HW6 – Transient analysis using mode superposition and matrix reduction.
T, 4/6	22	12	
R, 4/8	23	12	AP3 Due – MATLAB/Simulink transient simulation.
T, 4/13	24	12	HW7 –Nonlinear large deflection analysis in ANSYS.
R, 4/15	25	13	
T, 4/20	26	13	HW8 – Nonlinear contact analysis in ANSYS.
R, 4/22	27	13	
T, 4/27	28	14	
R, 4/29	29	14	AP4 Due – Nonlinear material analysis in ANSYS.
TBA	30	Final Exam	Exam is comprehensive. The exam time is TBA.

ME-514 – Spring, 2010 - Tentative Primary Lecture Topics by Lecture Notes Set

Note that some lecture material will be presented that is not in the handout sets of lecture notes.

Lecture Notes Set	Primary Lecture Topics
1	Lumped mass system models. Spring, bar, lumped mass, and beam finite element formulations. Assembling global matrices.
2	ANSYS software overview, example analyses.
3	Multi-dof modal analysis calculations, modal Analysis in ANSYS, convergence of natural frequencies with mesh refinement.
4	MATLAB Overview, Modal Analysis Using MATLAB, Harmonic Response Analysis in MATLAB and ANSYS.
5	Stress effects in modal analysis and inclusion of stress effects in an ANSYS analysis, including rotating blade example.
6	Review of closed-form solutions for single DOF response, use of central difference method to obtain response numerically.
7	Central Difference Method for Multi-DOF Systems, Newmark's Method of Numerical Integ., Transient Analysis in ANSYS
8	Runge-Kutta numerical integration, Numerical integration in MATLAB including use of MATLAB/Simulink.
9	MATLAB Simulink Simulation Example: Mult-DOF System with complicated forcing function.
10	Transient Simulation Options in ANSYS: Mode Superposition Method and Matrix Reduction Method.
11	Nonlinearities – Large Deflections, Material Nonlinearity, Contact. Newton-Raphson method. Large deflections in ANSYS.
12	Nonlinear material models implemented in ANSYS, examples showing plastic deformation in stress concentration regions.
13	Modeling of contact situations in ANSYS.
14	Selected Topics