Course MAE 4344 Computer Aided Engineering

Spring 2015

TR 9:30 - 10:50 am

Room 406 WH

Instructor: Kent L. Lawrence Office: 300D Woolf Hall

Office Hours: 2:00 - 3:00 TR or by appointment or any time I'm in the office & available. Phone: 817 272-2019

Mailbox: Room 204 Woolf Hall, PO Box 19023 Email: lawrence@uta.edu

Course web site: http://mae.uta.edu/~lawrence/mae4344/mae4344.htm

Teaching Assistant: Xin Heng Office: 226 WH TA Office Hours: 2:00-4:00MW

Course Prerequisites: MAE 2206, 3319, 3342, or equivalent.

Required Textbook: Kent L. Lawrence, ANSYS Workbench Tutorial, Release 14, SDC Publications, 2012, ISBN: 978-1-58503-754-4

Course Description: This course consists of a study of the principles of computer-aided engineering in mechanical and aerospace engineering. Parametric, feature-based solid modeling, kinematics & dynamics of assemblies and finite element modeling for design are considered.

Course Learning Goals/Objectives: Course goals include development of an understanding of the basics of computer aided engineering and its use in mechanical & aerospace engineering practice.

Attendance and Drop Policy: Students are expected to arrive on time and to attend all classes and exams. Please advise the instructor by email if you must miss a class and provide the reason. The Drop Policy is consistent with the University drop schedule; the student must be passing to receive a W/P. See the UTA Undergraduate Catalog.

Tentative Schedule:

Week 1 - CAE Introduction; Review Feature-Based Parametric Solid Modeling

Week 2 - Solid Mechanics, Solid Modeling

Week 3 - FEM Fundamentals, ANSYS APDL Trusses, MATLAB

Week 4 - ANSYS Workbench Tutorial Chapters 1-5, Quiz

Week 5 - ANSYS Workbench Chapter 6 Wizards and Tools

Week 6 - ANSYS Workbench Chapter 7 Heat Transfer and Thermal Stress Exam 1, 2-26-15

Week 7 - ANSYS Workbench Chapter 8 Surface and Lines Models

Week 8 - ANSYS Workbench Chapter 9 Natural Frequencies & Elastic Buckling

Week 9 - ANSYS Workbench Chapter 10 Nonlinear Problems Project Proposal Due

Week 10 - Multi-Body Kinematics & Dynamics EXAM 2,

Week 11 - Multi-Body Kinematics & Dynamics

Week 12 - ANSYS APDL Plane Stress/Strain Project Progress Report Due

Week 13 - ANSYS APDL Axisymmetric and Three Dimensional Problems

Week 14 - Dynamics Exam 3,

Week 15 - Project Presentations

Week 16 Final Exam

Specific Course Requirements

Quizzes: Unannounced

Examinations: Exams 1, 2, 3, FINAL EXAM

Major Assignments

Homework: See web page link Assignments.

Worksheets are two-person in-class exercises.

The Lifelong Learning assignment is a Key Assignment. Key assignments are used for assessment in order to collect input for improvement of the MAE program.

Log Book Use a 16 page Blue Book to record significant items from each class meeting. Your log will be due near the end of the semester on the first day of the project presentations.

Projects: Project reports are due on the last day of class.

Labs: None

Research Papers: None

Missed Exams: Excused missed exams will be given during the last week of class. Submit a note from your physician or the equivalent.

Makeup Work: HALF credit will be deducted for unexcused late homework. Late work that is excused can receive up to full credit if submitted within 72 hrs of due date.

FULL credit will be deducted for improper or incomplete problem definition, sloppy, results only, no units, scribble in the margins papers, etc. This applies to exams as well.

Do not engage in separate homework submissions, grade evaluations or negotiations with our MAE 4344 Teaching Assistant.

Course Evaluation & Final Grade:

Homework assignments - 25%, Exams - 25%, Project - 25%, Final - 25%

Letter Grades A > 89% of full credit, B > 79%, C > 69%, D > 59%, F below 60%.

Each assignment counts as one HW grade; Worksheets count as three HW's, Quizzes, the Life Long Learning exercise and the Log Book each count as five HWs.

Student Evaluation of Teaching: Conducted at end of semester. Your lowest HW grade will be dropped if your submit proof of completing the course evaluation.

Procedures:

Submit your work unfolded, stapled in the upper left corner with a COVER SHEET. In the upper third of your COVER SHEET put the following information:

Your Name - Last, First

MAE 4344

Date

Assignment Number

Use one side of the paper only. Include the date, your initials and page number in the upper right corner of ALL pages.

Use the Insert Note option in Creo / SolidWorks and the Print Preview option in ANSYS to include your name, the date, and the assignment number on the graphics output of ALL your work.

>>>>> TUTORIALS: Submit only the calculated output quantities and graphics that result from completing the tutorials. No problem statement is required.

For your Solid Modeling work, submit only a wire frame plot (hidden lines grayed or dashed) of the final version of the part(s) for the exercise. Dimensions are only needed for the assignments in which engineering working drawings are being created.

>>>>> ENGINEERING PROBLEMS: Provide a statement of the problem to be solved. (Restate the problem to demonstrate your understanding of what is required. Don't just cut the statement from our assignments page and paste it into your solution.) Indicate what is given and what is to be found. Include a good sketch that shows the geometry with dimensions, units, materials and their properties, loads, supports, axis systems used, and when appropriate, member cross section shapes and dimensions.

Documentation of FEM models should show loads, boundary conditions, a plot of the mesh employed and documentation of the material properties used.

The results should be summarized and any relevant conclusions drawn. If you are comparing an FEM solution to another known solution (theoretical or experimental), make a clear statement (per cent error or difference) of how the results compare.

Present your results first using the units of the problem definition and then in the alternative set of units commonly used in engineering, e.g. von Mises Stress A = 250 MPa = 36,260 psi.

In short, your work should stand alone; that is, another engineer should be able to reproduce your work using only the write-up you prepare. Failure to follow these guide lines will result in a significant loss of credit.

See – ANSYS > Sample Solution Format for problem solution examples http://mae.uta.edu/~lawrence/ansys/solutions/solutions.htm

Also see course Mavspace file Homework Format Requirements.

See ANSYS > Sample Solution Format for problem solution examples http://mae.uta.edu/~lawrence/mae4344/syllabus/Home\_Work\_Format.pdf

If you want to receive course related email at an address different from your student email address, join the listserve (see menu item Join Mail List).

Drop Policy:

Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Student Support Services:

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Final Review Week:

A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures:

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is the stairwell found by turning right upon exiting room 406 WH. Another stairwell is located to the left. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.