

Course MAE 4344-001, Computer Aided Engineering

Fall 2016

TR 9:30 - 10:50 am

Room 339 COBA

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

Email: lawrence@uta.edu

Faculty Profile: <http://www.uta.edu/profiles/kent-lawrence>

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

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

Teaching Assistant: Office: TA Office Hours: 1:00-2:30 MW

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

Other materials may be placed on Mavspace, Blackboard and on this web site for your use.

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.

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

Attendance: Students are **expected to arrive on time and to attend all classes and exams.** Attendance will be recorded. 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 and paragraph below.

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://www.uta.edu/aao/fao/>).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA), and Section 504 of the Rehabilitation Act. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

The Office for Students with Disabilities, (OSD)

www.uta.edu/disability or call 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or call 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy: *The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender,*

sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

Per UT System Regents' Rule 50101,§2.2 , suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at <https://www.uta.edu/conduct/>.

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. **Quiz**

Week 4 - ANSYS Workbench Tutorial Chapters 1-5

Week 5 - ANSYS Workbench Chapter 6 Wizards and Tools **Exam 1**

Week 6 - ANSYS Workbench Chapter 7 Heat Transfer and Thermal Stress

Week 7 - ANSYS Workbench Chapter 8 Surface and Line Models

Week 8 - ANSYS Workbench Chapter 9 Natural Frequencies & Elastic Buckling **Project Proposal Due**

Week 9 - ANSYS Workbench Chapter 10 Nonlinear Problems **Exam 2**

Week 10 - Multi-Body Kinematics & Dynamics

Week 11 - Multi-Body Kinematics & Dynamics

Week 12 - ANSYS APDL Plane Stress/Strain

Week 13 - ANSYS APDL Axisymmetric and Three Dimensional Problems
Proj Progress Report Due, Exam 3

Week 14 - Dynamics

Week 15 - Project Presentations

Week 16 Final Exam

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. KLL

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: See instructor to schedule *Excused* missed exams. 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. 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 \geq 90% of full credit, B \geq 80%, C \geq 70%, D \geq 60%, F below 60%.

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

Student Evaluation of Teaching: Conducted at end of semester.

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

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>

If you also wish to receive mail for this class at another email address, join the mae4344 LISTSERVE See menu item 'Join Mail List'. (<http://mae.uta.edu/~lawrence/mae4344/mae4344.htm>)

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is

not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>

Student Feedback Survey: At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit <http://www.uta.edu/sfs>.

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 to your left as you leave 339COBA. 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.

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-

3003(campus phone). You may also dial **911**. Non-emergency number 817-272-3381