AE 731 - Elasticity Theory

Fall 2021

Instructor:	Dr. Nicholas A Smith	**Time:**	TR 5:35 – 6:50 pm
Department:	Aerospace Engineering	**Place:**	209 Wallace Hall
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Phone:	(316) 978-5919	**Office Hours:**	TBD

How to use this syllabus: This syllabus provides you with information specific to this course, and it also provides information about important university policies. This document should be viewed as a course overview; it is not a contract and is subject to change as the semester evolves. Any changes to the syllabus will be uploaded to Blackboard and e-mailed to all students (at their e-mail address listed on Blackboard, make sure this is up-to-date).

Academic Honesty: Students are responsible for knowing and following the Student Code of Conduct http://webs.wichita.edu/inaudit/ch8_05.htm and the Student Academic Honesty policy http://webs.wichita.edu/inaudit/ch2_17.htm.

Course Description: Develops the equations of the theory of elasticity and uses them to determine stress and displacement fields in linear elastic isotropic bodies; uses Airy stress functions to obtain solutions.

Definition of a Credit Hour: Success in this 3 credit hour course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction and preparation/studying or course related activities for a total of 135 hours.

Measurable Student Learning Outcomes: Upon successful completion of this course, students will be able to

- Derive equations governing linear, isotropic solids
- Formulate stress analysis problems in 2D and 3D
- Analyze stress and strain states for small-strain problems
- Calculate stress and strain in cartesian, cylindrical, and spherical coordinates

Course Textbook: This is the textbook we will use for this course. Homework assignments will be given separately, so the edition number is not important. Note that chapter numbers from other versions may not align with the chapter numbers I use.

- Martin H. Sadd, *Elasticity: Theory, Applications, and Numerics*, Elsevier, Inc., 2014.

Other References: The textbook we use in this course provides a very good base, but sometimes more specialized information is needed. The following texts are recommended as additional references:

- H. Reismann and P. Pawlik, *Elasticity - Theory and Applications*
- C. T. Wang, *Applied Elasticity*
- Timoshenko and Goodier, *Theory of Elasticity*

- Boresi, *Elasticity in Engineering Mechanics*

Prerequisites: AE 525 or AE 733.

Grading Policy: Homework (5%), Midterm 1 (30%), Midterm 2 (30%), Final (35%). Final grades follow a traditional scale of:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
93-100	90-93	87-90	83-87	80-83	77-80	73-77	70-73	67-70	63-67	60-63	0-60

Per department policy, final course grades will not be disclosed before the official notifications by the University.

Homework: Homework will be submitted online via Blackboard, half the homework credit will be granted for completion. Homework solutions will be posted to Blackboard, and the remaining half of the homework credit will be assigned after you complete (and submit) your self-grade. You do not lose credit for incorrect answers, but your self-grade should explain the differences between your answer and the correct solution. Tentative homework due dates are given in the course schedule. Late homework will not be accepted.

Exams: There will be two major midterm exams during the semester and one comprehensive final exam. The final exam is scheduled for Tuesday, December 7 from 5:40 - 7:30 pm. You must take the final exam at this time, so do not make any travel plans that will prevent you from attending the final exam.

Tentative Course Outline:

Calculus of tensors (Ch 1) ..... 4 days
Kinematics (Ch 2) ..... 3 days
Exam 1
Equilibrium (Ch 3) ..... 3 days
Constitutive relations (Ch 4) ..... 3 days
Solution strategies (Ch 5) ..... 3 days
Exam 2
Energy principles (Ch 6) ..... 3 days
Two-dimensional problems (Ch 7-8) ..... 3 days
Complex variable methods (Ch 10) ..... 3 days
Special topics ..... As available
Final Exam

Undergraduate vs. Graduate Credit: Undergraduate students enrolled in 700 level courses will receive undergraduate credit (not graduate credit) unless they have a previously approved senior rule application or dual/accelerated enrollment form on file in the Graduate School. Undergraduate credit earned in 700 level courses cannot later be counted toward a graduate degree.

Important Academic Dates: Classes begin August 16, there are official University holidays on Sept 6 (Labor Day), Oct 9-12 (Fall Break), Nov 24-26 (Thanksgiving Break).

Disabilities: If you have a physical, psychiatric/emotional, or learning disability that may impact on your ability to carry out assigned course work, I encourage you to contact the Office of Disability Services (DS). The office is located in Grace Wilkie Annex, room 150, (316) 978-3309 (voice/tty) (316-854-3032 videophone). DS will review your concerns and determine, with you, what academic accommodations are

necessary and appropriate for you. All information and documentation of your disability is confidential and will not be released by DS without your written permission.

Counseling & Testing: The WSU Counseling & Testing Center provides professional counseling services to students, faculty and staff; administers tests and offers test preparation workshops; and presents programs on topics promoting personal and professional growth. Services are low cost and confidential. They are located in room 320 of Grace Wilkie Hall, and their phone number is (316) 978-3440. The Counseling & Testing Center is open on all days that the University is officially open. If you have a mental health emergency during the times that the Counseling & Testing Center is not open, please call COMCARE Crisis Services at (316) 660-7500.

Diversity and Inclusive: Wichita State University is committed to being an inclusive campus that reflects the evolving diversity of society. To further this goal, WSU does not discriminate in its programs and activities on the basis of race, religion, color, national origin, gender, age, sexual orientation, gender identity, gender expression, marital status, political affiliation, status as a veteran, genetic information or disability. The following person has been designated to handle inquiries regarding nondiscrimination policies: Executive Director, Office of Equal Opportunity, Wichita State University, 1845 Fairmount, Wichita KS 67260-0138; telephone (316) 978-3186.

Intellectual Property: Wichita State University students are subject to Board of Regents and University policies (see http://webs.wichita.edu/inaudit/ch9_10.htm) regarding intellectual property rights. Any questions regarding these rights and any disputes that arise under these policies will be resolved by the President of the University, or the President's designee, and such decision will constitute the final decision.

Shocker Alert System: Get the emergency information you need instantly and effortlessly! With the Shocker Alert System, we will contact you by email the moment there is an emergency or weather alert that affects the campus. Sign up at www.wichita.edu/alert.

Title IX: Title IX of the Educational Amendments of 1972 prohibits discrimination based on sex in any educational institution that receives federal funding. Wichita State University does not tolerate sex discrimination of any kind including: sexual misconduct; sexual harassment; relationship/sexual violence and stalking. These incidents may interfere with or limit an individual's ability to benefit from or participate in the University's educational programs or activities. Students are asked to immediately report incidents to the University Police Department, (316) 978- 3450 or the Title IX Coordinator (316) 978-5177. Students may also report incidents to an instructor, faculty or staff member, who are required by law to notify the Title IX Coordinator. If a student wishes to keep the information confidential, the student may speak with staff members of the Counseling and Testing Center (316) 978-3440 or Student Health Services (316)978-3620. For more information about Title IX, go to: http://www.wichita.edu/thisis/home/?u=titleixf