AE 831 - Continuum Mechanics

Fall 2020

Instructor:	Dr. Nicholas A Smith	**Time:**	TR 4:10 – 5:25 pm
Department:	Aerospace Engineering	**Place:**	228 Hubbard 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). Many University policies are summarized in this document, but a more up-to-date and complete list of University policies can be found at https://www.wichita.edu/faculty/development/syllabuspolicies.php

Academic Honesty: Students at Wichita State University are expected to uphold high academic standards. WSU will not tolerate a lack of academic integrity. 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. When the faculty member determines sanctions are warranted for violations of academic integrity, regardless of severity, the faculty member must report the infraction to the Office of Student Conduct and Community Standards. If you need more information about the process or wish to appeal a decision, please visit https://www.wichita.edu/about/student_conduct/ai.php

Course Description: Introductory treatment of the fundamental, unifying concepts of the mechanics of continua with applications to classical solid and fluid mechanics.

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 the mechanics of continua
- Analyze stress and strain states for large deformation problems
- Calculate the response in a viscoelastic body
- Analyze stress and strain in an anisotropic body

Course Textbook: The textbook used in this class is: *Introduction to Continuum Mechanics*, W. Lai, 4th Ed.

Other References: For further study, the following supplemental texts are recommended

- A.J.M. Spencer, *Continuum Mechanics*

- G.E. Mase, *Schaum's Outline of Continuum Mechanics*
- Y.C. Fung, *A First Course in Continuum Mechanics*

Prerequisites: AE 731 or equivalent

Grading Policy: Homework (10%), Research Project (20%), Midterm 1 (20%), Midterm 2 (20%), Final Exam (30%). Final grades follow a traditional scale of:

Score	93-100	90-93	87-90	83-87	80-83	77-80	73-77	70-73	67-70	63-67	60-63	0-60
Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
GPA	4.0	3.7	3.3	3.0	2.7	2.3	2.0	1.7	1.3	1.0	0.7	0

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 final exam at the end of the semester. Exams will be closed-book and closed-notes, but there will be an equation sheet provided. Anticipated exam dates are given the course schedule.

Final Exam: The final exam will be administered during the official exam time as determined by the University. For this class, that time is 3:00 - 4:50 pm on Wednesday Dec. 14. Attendance at the final exam is mandatory, so please plan your travel around this date.

Research Project: One research project will be assigned during the semester. The purpose of this project is for students to delve deeper into a particular portion or application related to continuum mechanics of interest to them. More details on this project will be provided during the semester. Presentations will likely occur via Zoom after Thanksgiving.

Hybrid Course Format: For Fall 2020 this course is being offered in a Hybrid format to facilitate reduced classroom occupancy requirements. Traditionally, as an 800-level class we will likely meet occupancy requirements to hold most of our lectures in-class. Alternatively, lecture content could be pre-recorded and available to access on Blackboard. In-class lecture time would then be dedicated to answering questions and working example problems.

Important Academic Dates: Classes begin August 18, there are official University holidays on Sep 7 (Labor Day), Nov 23-29 (Thanksgiving Recess), note that the traditional Fall Break has been canceled and there will be no in-class activities after Thanksgiving, but lecture, exams, and assignments will continue online.

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

Tentative Course Schedule:

Week	Date	Topics	Assignment/Exam
Week 1	Aug 18, 20	Tensor Algebra	
Week 2	Aug 25, 27	Tensor Calculus	Homework 1 Due
Week 3	Sep 1, 3	Kinematics	Homework 2 Due
Week 4	Sep 8, 10	Kinematics	Homework 3 Due
Week 5	Sep 15, 17	Exam Review	Exam 1
Week 6	Sep 22, 24	Stress Formulation	
Week 7	Sep 29, Oct 1	Isotropic Solids	Homework 4 Due
Week 8	Oct 6, 8	Anisotropic Solids	Homework 5 Due
Week 9	Oct 13, 15	Anisotropic Solids	Homework 6 Due
Week 10	Oct 20, 22	Large Deformation	
Week 11	Oct 27, 31	Large Deformation	Homework 7 Due
Week 11	Nov 3, 5	Exam Review	Exam 2
Week 12	Nov 10, 12	Newtonian Fluids	Homework 8 Due
Week 13	Nov 17, 19	Non-Newtonian Fluids	Homework 9 Due
	(Nov 24, 26)	(Thanksgiving)	
Week 14	Dec 1, 3	Research Presentations	Homework 10 Due

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