

CE 3201

Structural Analysis

Instructor: Daniel Kuemmerle, PE

Course Syllabus –



Course Description:

This course is the introductory course in identification and analysis of basic structural elements. Topics include the determination of beam deflections, methods for the computational analysis of statically indeterminate trusses, moment distribution, and the analysis of frames.

Course Goals:

This course will provide you with the knowledge and experience to analyze and design basic structural members subjected to the many various types of loads.

You will also be given the tools to synthesize correlations between engineering materials and their properties to predict performance using the fundamental concepts of stress, strain, and elastic behavior of materials.

While the content can be challenging, this course is a foundational building block that will give you the tools needed to excel in your future coursework in your engineering academic and professional career.

Instructor:

Daniel Kuemmerle, PE

Lecturer

Email Address: dkuemmer@kennesaw.edu

Phone: 470-578-5079

Office location: L-115

Class Time and Location:

Lecture: MW 3:30 pm – 4:45 pm

Room: Q-202

Credit Hours:

3-0-3 (Lecture-Lab-Total Credit Hours)

Required or Elective:

This course is required for all civil and construction engineering majors.

Textbook (Required):

This course is part of a textbook program called Day One Access. After enrolling in the course, you should receive an e-mail from KSU University Stores with instructions on how to access the course content. The purpose of Day One Access is to make sure that you have access to the digital course materials on or before the first day of class at a highly competitive rate. Everyone enrolled will automatically have access to the digital course materials for an introductory period set by University Stores (usually this is through the day after the end of Drop-Add, but verify with University Stores). If you have not opted-out or dropped the class by that date, you will receive a charge from the bookstore on your student account. You have the ability to Opt-Out through this period via the link in the email sent to you by University Stores.

Further, you must login and register your materials by the end of this period as well. If you do not do this by this date, you may lose access and an access code may be required despite not having opted out. If this happens, please email dayone@kennesaw.edu

You are required to obtain Modified Mastering Engineering, which is our online homework resource. Physical copies of the textbook are not required. Students will have access to an eBook through their Modified Mastering Engineering account. If you would like to know if a loose-leaf copy of the textbook is available or have any other questions or concerns, please email dayone@kennesaw.edu.

If you would like to know more about Day One Access, please visit https://ksustore.kennesaw.edu/textbooks/day_one_access.php. Questions or concerns can be directed to dayone@kennesaw.edu.

Again, if you choose to opt out of the discounted digital resources in the Day One Access program, your access to the resources will be removed and you will be responsible for purchasing access to the digital resources at full price on your own.

Textbook title: Hibbeler, R.C.: *Engineering Mechanics: Statics, 14th edition*, Pearson

Prerequisites:

ENGR 3131, ENGR 3132, CE 2003, and Engineering Standing

Co-requisite:

None

Learning Outcomes:

You, upon completion of this course, will be able to:

1. Evaluate various loading on structures according to IBC, and practice on the concept of load path.
2. Analyze determinate structures (truss, beam and frame) under various loading conditions.
3. Draw axial, shear, and bending moment diagrams for beams and frames.
4. Apply two methods (double integration, conjugate beam, moment-area, virtual work) to calculate slope and deflections of beams and apply virtual work energy method for deflection of trusses.
5. Use a displacement method (slope-deflection, moment distribution) to analyze indeterminate continuous beams and frames with and without side sway.
6. Construct influence lines for statically determinate beams,
7. Perform computer and approximate analyses of various structures.

Course Outcome Measures and Assessment:

Measures and assessment of the outcomes will be made by:

- Periodic homework assignments.
- Periodic quizzes—during class and/or through *D2L Brightspace* (D2L).
- Tests during the semester.
- One final exam.
- Course and instructor evaluation at the middle and end of the semester to provide student feedback on the quality of the course and effectiveness of the instructor.

Grading:

Homework and Coaching Activities: 10%

Quizzes: 20%

Test 1: 20%

Test 2: 20%

Project: 10%

Final Exam (during finals week): 20%

The grade scale is $A \geq 90.0\%$; $80.0\% \leq B < 90.0\%$; $70.0\% \leq C < 80.0\%$; $60.0\% \leq D < 70.0\%$; $F < 60.0\%$

Modified Mastering Engineering:

This course utilizes *Modified Mastering Engineering*, which is the textbook publisher's online learning portal. Your student access to this portal is granted as part of the textbook package listed in this syllabus. This learning portal contains a wealth of content for your use, ranging from some graded content (the "Coaching Activities") to additional tutorial videos and study areas that can help you with concepts that give you trouble. As some of the course's graded material is worked in this portal, it is required that you have access to *Modified Mastering Engineering*.

Please note that "*Modified Mastering Engineering*" is a different interface than "*Mastering Engineering*." The main difference is that *Modified Mastering Engineering* interfaces, links, and synchronizes directly with your course D2L page. You will obtain access to your *Modified Mastering Engineering* account through clicking on the "Pearson" widget located on the course's D2L homepage. Do not attempt to register for *Modified Mastering Engineering* by going any other route, including going directly to the publisher's website. Linking to the publisher's website through the course's D2L page is how the link is established between your D2L page and your *Modified Mastering Engineering* account. There is more detailed information about registering with *Modified Mastering Engineering* in the "Syllabus & Start Items" area of the course's D2L page.

Coaching Activities:

This course has "Coaching Activities" that usually consist of videos, interactive tutorials, and/or problems. These tutorials walk you through the problems, giving you feedback as you perform each step of a problem. Students are required to complete each coaching activity. You are allowed unlimited attempts per question for each coaching activity. However, some credit is deducted for each incorrect attempt (3% deduction per attempt for most problems). There are often "hints" within *Mastering Engineering* problems that can help you when you get stuck in a problem. There is a small bonus for answering a question without opening a hint (2%). Conversely, there is a small deduction of credit if opening a hint (3%). This policy is intended to let you use the hints when you need them without severe penalty, while at the same time rewarding you for the times you do not need the hint.

Homework:

The goal of the homework is to give the student practice in larger scope engineering problems, and usually cover topics in their entirety. These longer problems prepare the student for "real world" engineering type problems, and are also modeled to be similar to the types of questions found in the midterm exams. Unless specifically instructed otherwise, you are to submit all written work to the instructor in class in hard copy. Homework shall adhere to the following guidelines:

- Homework is due at the START of class on the due date.
- Homework shall be submitted on engineering calculation sheets or plain white copier paper and must be bound or stapled. Do not use notebook paper or ruled paper.
- All problems must be clearly delineated by starting a new page or, if placing more than 1 problem per page, by drawing straight lines between each problem (use of a straight edge is required). In no event shall more than 3 problems occupy one page!
- Write on one side of page only.
- Use a pencil when writing your work. Ink is not allowed.
- Draw figures, free body diagrams, or graphs where appropriate.
- All answers must be boxed.
- Units, where appropriate, should be written for the answer and in every step of each problem.

All students are expected to complete all assignments given. The homework is intended to give you the necessary exposure and experience for you to succeed in grasping a firm understanding of the course objectives. The instructor reserves the right to modify assignments as necessary. Work turned in late will not be graded/given credit except in approved cases of documented emergency. If you cannot make it to class on

a day when homework is due, send me an email with your reason for not making it to class, and include a legible, scanned copy of your completed homework.

Homework is usually returned within a week to give you feedback on your understanding of key concepts.

Quizzes:

The quizzes given in this course generally cover smaller, more concentrated learning objectives than do the homework and tests. The quizzes are meant to ensure that you are familiar with particular steps or components of larger problems.

Quizzes will be administered online through D2L Brightspace and/or during class time. It is your responsibility to ensure that the required technology is functional during the quiz window for D2L quizzes. Please be sure to check that D2L Brightspace is not down for maintenance during the desired quiz taking time. It is strongly recommended that you not wait until the very end of the quiz open window to attempt to take an online quiz.

Tests:

The tests assess your grasp of more in-depth, large-scale problems, and contain problems similar in size and scope to the assigned homework. Generally, the tests are not cumulative, but rather cover material delivered since the previous test.

Unless directed otherwise, tests will be held in the usual classroom during scheduled class meetings. Unless instructed otherwise, tests will be closed book and notes, with the exception that the current FE handbook can be used as a reference. The FE handbook shall be unmarked and bound (book form or stapled as one volume). "Unmarked" means that no handwritten notes or comments are allowed in the reference. The current FE handbook is available for purchase or free download at: <http://ncees.org/exams/study-materials/download-fe-supplied-reference-handbook/>.

Final Exam:

Unless directed otherwise, the final exam will be held during finals week in the usual classroom. Check the KSU registrar's website for additional scheduling information. Similar to the midterm exams, the exam will be closed books and notes, with the exception that the FE Handbook may be used.

Discussion/Dispute of Individual Graded Items:

Students have one week after receiving a grade for a graded item (assignment, quiz, etc.) to discuss/dispute it with the instructor. After that, the grade stands as assigned.

Course Schedule:

The schedule below is a guideline only. Topics, their order, and the time spent on each may change as time permits. Likewise, the dates of the tests are subject to change. Other important dates are listed.

Week	Week of	Topic	Textbook Sections	Remarks
1	1/6	Introduction/Statics Review/Building Code Basic Load Provisions	1.1-1.4	1/10: Last day of Drop/Add
2	1/13	Analysis of Statically Determinate Structures	2.1-2.6	
3	1/20	Analysis of Statically Determinate Structures	2.6	1/20: No classes
4	1/27	Internal Loadings Developed in Structural Members	4.1-4.5	
5	2/3	Influence Lines: Beams, Truss Members	6.1, 6.2, 6.5, 6.6	
6	2/10	Influence Lines: Beams, Truss Members	6.1, 6.2, 6.5, 6.6	
Test 1: 2/12 (Chapters 1, 2, 4, & 6)				
7	2/17	Beam Deflections: Double Integration	7.1-7.3	
8	2/24	Beam Deflections: Double Integration	7.1-7.3	2/26- Last day to drop without academic penalty
9	3/2	Virtual Work Method for Deflection of Trusses and Beams	8.1-8.4, 8.7	
10	3/9	Virtual Work Method for Deflection of Trusses and Beams	8.1-8.4, 8.7	
11	3/16	Fixed End Moments (FEMs), Sign Conventions of FEMs, Superposition of Load Cases	11.1	
Test 2 3/18 (Chapters 7, 8, 11.1)				
12	3/23	Moment Distribution Method for Reactions of Continuous Beams	11.2-11.3	
13	3/30	Spring Break—No Classes		
14	4/6	Moment Distribution Method for Reactions of Frames with Sidesway	11.4	
15	4/13	Moment Distribution Method for Reactions of Frames with Sidesway	11.5	
16	4/20	Approximate Analysis of Statically Indeterminate Structures	12.1-12.5	
17	4/27	Approximate Analysis of Statically Indeterminate Structures	12.1-12.5	4/27 Last day of classes
Final Exam:* in the usual classroom (Chapters 11 & 12)				

**Final Exam information is per the registrar's website and is subject to change. Consult the registrar's website for official information.*

Policies:

- **Class Attendance Policy:** Attendance is necessary for all class lectures unless you are ill or officially excused by the instructor (such as a result of official, documented participation in a university function). In the case of unavoidable absences, you are responsible for making up the work done in class. It is not the instructor's responsibility to provide the student with that information outside of class. It is the student's responsibility to obtain any missed information or handouts given in class from a classmate.
- **Make-up Policy (Assignments, Quizzes, Exams, etc.):** There will be no make-up exams under any circumstances, except medical reasons. Provide your instructor with a letter from your medical doctor. If your absence is excused, then the instructor reserves to have you either make up the exam, or to have subsequent exams/final exam weighted more heavily to make up for the missing points.
- **Methods of Communicating:** D2L shall be considered the primary method of communication from the instructor, and the student should check D2L regularly. You can ask questions and ask for clarification by e-mail, in class, or by visiting the instructor during office hours or by appointment. <http://d2l.kennesaw.edu>
- **Electronic Communications:** The University provides all KSU students with an "official" email account with the address "students.kennesaw.edu." As a result of federal laws protecting educational information and other data (see the following section entitled "FERPA," this is the sole email account you should use to communicate with your instructor or other University officials.
- **Response Timeframe:** Grading of homework/assignments may take up to a week. I will try to respond to any discussions, comments, and questions within 24 hours Monday through Friday.
- **Federal, BOR, & KSU Course Syllabus Policies:** Information contained in the links below constitutes the Federal, BOR, and KSU course syllabus policies and procedures.
 - **Academic Affairs - Federal, BOR, & KSU Policies**
http://curriculum.kennesaw.edu/resources/federal_bor_ksu_student_policies.php
 - **Academic Affairs - KSU Student Resources**
http://curriculum.kennesaw.edu/resources/ksu_student_resources_for_course_syllabus.php
- **Academic Integrity Statement:** Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section 5c of the Student Code of Conduct addresses the university's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to university materials, misrepresentation/falsification of university records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the Department of Student Conduct and Academic Integrity (SCAI), which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement. See also KSU Student Code of Conduct <https://web.kennesaw.edu/scai/content/ksu-student-code-conduct>.
- **Electronic Communication:** The University provides all KSU students with an "official" email account with the address "students.kennesaw.edu" or "kennesaw.view.usg.edu" (in D2L). As a result of federal laws protecting educational information and other data, this is the sole email account you should use to communicate with your instructor or other University officials.
- **Student Rights and Responsibilities:** Students of KSU are entitled to an environment that is conducive to learning and individual growth. To this end, students enrolling at KSU assume a responsibility to abide by the policies and regulations expressed in this section. By doing so, students may fulfill their responsibilities and enjoy the exercise of their own rights while also respecting the rights of others. Information about the student rights and responsibilities can be found at <http://catalog.kennesaw.edu/content.php?catoid=27&navoid=2263>

- **KSU Reasonable Accommodations Policy:** Students with qualifying disabilities under the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act who require “reasonable accommodation(s)” to complete the course may request those from Office of Student Disability Services. Students requiring such accommodations are required to work with the University’s Office of Student Disability Services rather than engaging in this discussion with individual faculty members or academic departments. If, after reviewing the course syllabus, a student anticipates or should have anticipated a need for accommodation, he or she must submit documentation requesting an accommodation and permitting time for a determination prior to submitting assignments or taking course quizzes or exams. Students may not request retroactive accommodation for needs that were or should have been foreseeable. Students should contact the office as soon as possible in the term for which they are seeking accommodations. Student Disability Services is located in the Carmichael Student Center in Suite 267 on the Kennesaw campus or Building A in Suite 160G on the Marietta campus. Please visit the Student Disabilities Services website for more information, or call the office at 470-578-2666 (Kennesaw campus) or 470-578-9111 (Marietta campus).
- **Policy Changes:** Information contained in the course syllabus may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Contacts to get Help:

- D2L Technical Support, go to <https://d2lhelp.view.usg.edu/> or call 678-915-HELP
- D2L Brightspace website at <https://kennesaw.view.usg.edu/d2l/login>
- KSU Help Desk Phone Number: (678) 915-HELP (4357).
- KSU Distance Learning at <http://distancelearning.kennesaw.edu/support/content-tools.php>
- KSU UITS at <http://uits.kennesaw.edu/>
- Accessibility policy of all technologies:
<https://softchalkcloud.com/lesson/serve/jV10GKPfztZwQn/html>

Additional Resources

- Remote access to Library Resources at <http://www.kennesaw.edu/library/Dl/dl.html>
- You can find The USG Copyright Policy at <http://www.usg.edu/copyright/>
- [Other help for student success at http://sss.kennesaw.edu/](http://sss.kennesaw.edu/)
- Academic support services and student services at (<http://kennesaw.edu/currentstudents.php>)
- KSU CETL Thank a Teacher at <http://cetl.kennesaw.edu/thank-a-teacher>