

1: Course Number and Name

- a. **CENG 3361:** Structural Analysis I, Fall 2021
- b. Section 010, Tuesdays and Thursdays, 5:00 – 6:15pm, VIN 162

2: Credits and Contact Hours

- a. **Credits:** 3
- b. **Contact Hours:** 3 hours/week (Classroom)

3: Instructor Information

- a. **Course Coordinator:** Anthony Battistini
- b. **Instructors:**
 - i. Anthony Battistini, 325-486-5511, anthony.battistini@angelo.edu. Office: VIN 271. For office hours see [faculty homepage](#)¹.

4: Required Course Materials

- a. **Required Textbook:**
 - i. None
- b. **Recommended Textbooks:**
 - i. Hibbeler, R.C., Structural Analysis. 8th ed., Pearson Prentice Hall, 2012, ISBN: 978-0-13-257053-4.
- c. **Software:**
 - i. Microsoft Word, Excel, PowerPoint or equivalent
 - ii. Matrix Structural Analysis Software
 - i. MASTAN2 v3.5, Ziemian, Ronald and William McGuire- available for free download at the [MASTAN2 Website](#)²; or
 - ii. VisualAnalysis v19.0, Integrated Engineering Software, IES- available for free download at the [Visual Analysis Website](#)³; or
 - iii. Equivalent
 - iii. CAD Drawing Software such as AutoCAD and Autodesk Revit
- d. **Other Supplemental Materials:** Materials posted on Blackboard® Learning Management System

5: Technology Requirements

To successfully complete this course, you need to access to the Blackboard® Learning Management System. Homework will be submitted and subsequently graded online through Blackboard.

You may also have to watch some lessons using posted videos and to submit .pdf scans or copies of your notes. More details will follow, if necessary.

Laptops and tablets may be used in-class and on the final exam; however, calculation work may be necessary for inclusion on the final exam.

6: Specific Course Information

- a. **Catalog Description:** Statically determinate/indeterminate structures by consistent deformation. Loads, shear, moment, and deflected shape diagrams for beams and framed structures. Deformation calculations. Application of flexibility methods to frames and continuous beams. Influence lines for determinate and indeterminate beams. Theory of elastic buckling.
- b. **Prerequisites:** ENGR 2332 Mechanics of Materials
- c. **Required or elective:** Required for the BSCE Major

7: Specific Goals for the Course

- a. Course Learning Outcomes:
 1. Identify and explain the purpose of various structural elements and forms.
 2. Identify different types of loads and determine load path.
 3. Construct idealized structural models from real-world conditions.
 4. Design a truss using simplified LRFD provisions for tension and compression members, including elastic flexural buckling.
 5. Evaluate the determinacy and stability of structures.
 6. For a statically determinate truss, beam or frame subjected to an arbitrary load:
 - a. Compute internal forces (axial force, shear force, and bending moment) at any point within the structure.
 - b. Determine internal force functions for any member of the structure.
 - c. Construct internal force diagrams for any member of the structure.
 - d. Draw influence lines for any member of the structure for a given structural response.
 - e. Compute the deflection and slope (if applicable) at any point in the structure.
 7. Compute reactions and internal forces in statically indeterminate structures using classical and matrix methods.
 8. Analyze structures using structural analysis software and interpret results.

- b. Course Learning Outcome Mapping to ABET Criterion 3 Student Outcomes:

Table 1: Course Learning Outcomes mapped to ABET Student Outcomes

ABET Student Outcomes	1	2	3	4	5	6	7	8
1. Solve Problems	X	X	X	X	X	X	X	X
2. Design				X				
3. Communication				X				
4. Ethics & Professionalism								
5. Teamwork				X				
6. Experimentation								
7. Acquire New Knowledge				X				X

8: Topics Covered

1. Classification of Structures and Loads
2. Design Philosophy
3. Load Path
4. Tension/Compression Member Design
5. Static Determinacy
6. Determinate Truss Analysis
7. Beam and Frame Analysis
8. Influence Lines (if time permits)
9. Deflections- Integration, Tables, Virtual Work
10. Indeterminate Structures- Force Method
11. Indeterminate Structures- Stiffness Method

9: Course Delivery and Communications

9.1: Delivery Methods

The course will meet face-to-face, twice a week for class, where the instructor will be communicating engineering theories and information to the students. You are expected to complete any assignments prior to class so that you are prepared to ask questions, to solve problems, and to learn new material during class. Accommodations will be made for students who are in quarantine or isolation and are unable to attend.

Lesson materials will be organized on the [Blackboard](#)⁴ website for the course. Students should have access to the lesson handouts during class by either printing the handouts or having them available for modification on your computer/tablet. The handouts only outline the material for a given class and we will complete them together during class so you have the relevant information.

Attendance in class is expected. Some of the material presented will correlate with the textbook, but other material will not and/or may be presented differently. You are responsible for all topics that are covered in class. Please communicate to the instructor if you need to miss class so a suitable arrangement can be made.

Academic integrity is expected from all students at all times in accordance with [Part I, Section B.1](#)⁵ of the Angelo State University *Code of Student Conduct*.

Respect for your fellow classmates is required. Do not act in a manner that may distract others, including but not limited to: talking during lecture, texting, receiving obnoxious phone calls, watching YouTube videos, eating noisily, listening to loud music, walking to the front of the room during lecture just to turn your homework in because you were late to class, etc... If you need to do any of these activities, you are free to leave the classroom.

9.2: Communications

Important course announcements and changes will be sent by email via Blackboard. Students are expected to regularly check their Angelo State University email for these messages.

Students should feel free to contact the instructor regarding any issues with the class.

In-person and virtual office hours are available for students to directly meet with the instructor. Dr. Batts' office hours can be found on his [faculty website](#)⁶.

Students can also email or GroupMe text Dr. Batts with any questions and concerns. Dr. Batts will usually respond within a few hours, but definitely within 24 hours Monday through Friday. Weekend replies may take longer.

10: Professionalism

Professional engineering standards apply in this class. You are expected to demonstrate a behavior consistent with the conduct of an individual practicing in the engineering profession. You are expected to: (1) come prepared for class; (2) respect faculty and peers; (3) demonstrate responsibility and accountability for your own actions; (4) demonstrate sensitivity and appreciation for diverse cultures, backgrounds, and life experiences; (5) offer and accept constructive criticism in a productive manner; (6) demonstrate an attitude that fosters professional behavior among peers and faculty; (7) be punctual to class meetings; (8) maintain a good work ethic and integrity; and (9) recognize the classroom as a professional workplace.

11: Graded Material

11.1: Final Grades

Table 2: Grade Weighting

Item	Percent
Participation/In-Class Assignments	5%
World Structures Report/Presentation	5%
Truss Design Project	20%
Homework	15%
Exam I	20%
Exam II	20%
Final Exam	15%
Total	100%

All grades will be assigned on an absolute scale as a minimum. The instructor reserves the right to adjust the weights given to the assignments/homework/exams listed above. Any adjustments will be applied evenly to the entire class and never to the detriment of your grade. *In order to pass the course, your equal weight average on Exam I, II and Homework must be greater than 60%.*

11.2: Grading Scale

90.0% - 100%	A
80.0% - 89.9%	B
70.0% - 79.9%	C
60.0% - 69.9%	D
< 60.0%	F

11.3: Class Attendance, Participation, Timeliness and Teamwork

- A portion of your grade will be based on participation. For full credit, students are expected to arrive to class on time and adequately prepared, meaning that any assigned readings and/or homework are already completed by the time the class period begins.
- Participation and In-class assignment (ICA) points will be assigned at the discretion of the instructor, and may be based upon the following:
 - Attendance throughout the class period (sometimes recorded by photograph)
 - Completion of homework or reading assignments
 - Willingness to answer a question when called upon (answer does not have to be correct)
 - Effort displayed during group activities or in-class assignments
- Students may work together on in-class assignments, but may have to turn in his or her own problem work.
- If you will be absent, please make prior arrangements with the instructor. Make-up participation points will not be given.
- If you are sick, are quarantining, are recovering, have been exposed to COVID-19, or just feel you should not attend class for your health and/or the health of others, you must contact the

instructor at least two hours prior to class and he will livestream the class via the CENG 3361 Course Room in Blackboard Collaborate.

11.4: World Structures Report/Presentation

- You will each write a 2 page report and give a 5 minute oral presentation on a different world structure. You will select the assigned country, structure, and due date during the first class period.
- Your grade will be a combination of instructor and peer evaluations.
- Bonus point opportunities will be discussed.

11.5: Truss Design Project

- Teams will design and build a truss bridge to meet instructor provided requirements.
- Details will be given in Lesson 08.

11.6: Homework

- Homework is due on Blackboard by 5:00pm on the day specified on the course schedule unless otherwise posted with the assignment on Blackboard.
- Late homework is still accepted, but may not be eligible for full credit, unless previous arrangements with the instructor are made. The instructor recognizes that occasionally, other obligations may prevent you from completing a particular assignment on time, so please discuss with the instructor prior to the due date to make arrangements to complete and turn in the assignment. Please talk to me!!
- Late homework is subject to additional deductions at the discretion of the instructor. In general, it is more beneficial to turn in late homework that you have tried to complete than it is to turn in “junk” on time.
- Neatness counts! As an engineer and a professional, your work will often be read and scrutinized by others. In some instances, it could be a legal document or a piece of evidence in a court of law. It is your responsibility that the work you prepare is presented in a legible, methodical, and logical manner. Points may be deducted for messy work.
- Any handwritten homework should be performed directly on the printout of the homework, on one side of 8.5” x 11” engineering computation paper, either the “green” paper or a black and white copy of it (available on Blackboard), or on plain white paper.
- Each problem should start on a separate page.
- The solution should include: the problem statement, solution steps, and answer. Key intermediate values should be indicated by underlining or some other means, and the final answer should be **boxed/circled.**
- Units should be included with all answers.
- Sketches/diagrams should be made with a straight edge.
- Name, date, and problem info should be included on each page. See the example homework solution posted to Blackboard, which meets all of these requirements.
- Students may collaborate to complete the homework; however, each student must turn in his/her own assignment for grading. Direct copying of other’s work is not allowed and may be subject to disciplinary actions.
- Each homework problem will be assigned a particular value depending on the perceived difficulty and work required to solve it.
- Due to the length of solving problems, it is possible students may only have the opportunity to solve one of each type of problem on the assigned homework. Therefore, it is imperative that

each student attempt to solve each homework problem as it may be the only practice you will have to reinforce the learned material.

11.7: Exams

- Make-up exams will only be given for extenuating circumstances, unless prior arrangements with the instructor are agreed upon.
- Exam I and Exam II will not be open textbook or notes, but the use of a formula/cheat sheet will be permitted. Details will be discussed closer to the exam time.
- The Final Exam will be open textbook or notes. Details will be discussed closer to the exam time.
- Exams I and II will be 1.25 hours long and will be given during the class periods indicated on the course schedule.
- The scheduled final exam period will be used as a weather backup for your semester project presentations. Our class time was not given a standard exam time according to the university's standard schedule ([Angelo State University Final Exam Schedule](#)⁷). I am planning to administer the final exam on Tuesday, December 7, 2021 from 3:30pm – 5:30pm.

12: Classroom and University Policies and Student Support

12.1: General Policies

All students are required to follow the policies and procedures presented in the [Angelo State University Student Handbook](#)⁸ and [Angelo State University Catalog](#)⁹.

12.2: Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the [Student Disability Services website](#)¹⁰. The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dr. Dallas Swafford
Director of Student Disability Services
Office of Student Affairs
325-942-2047
dallas.swafford@angelo.edu
Houston Harte University Center, Room 112

12.3: Title IX at Angelo State University

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on

sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents of sexual misconduct directly to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Miller, J.D. You may submit reports in the following manner:

Online: [Incident Reporting Form](#)¹¹

Face to Face: Mayer Administration Building, Room 210

Phone: 325-942-2022

Email: michelle.miller@angelo.edu

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit [ASU's Title IX Website](#)¹².

12.4: Student Absence for Observance of Religious Holy Days

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for [Observance of Religious Holy Day](#)¹³ for more information.

12.5: Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 [Grading Procedures](#)¹⁴ for more information.

12.6: Information About COVID-19

Please refer to ASU's [COVID-19 \(Coronavirus Updates\)](#)¹⁵ webpage for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

12.7: Student Conduct Policies

12.7.1: Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

12.7.2: Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#)¹⁶ in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list. Just as you would not want someone to steal your hard work, you need to respect the work of others.

Papers are subject to be evaluated for originality via Turnitin or SafeAssign. Resources to help you understand this policy better are available at the [ASU Writing Center](#)¹⁷.

12.7.3: Copyright Policy

Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

13: Instructor Specific Information

The instructor reserves the right to change the policies and procedures of this course when he deems it necessary. Any such changes will be implemented fairly and will typically not be a detriment to your grade. The instructor will notify you of any such changes in a timely manner.

13.1: Photo/Video Policy

- Students are allowed to take photos/videos of lectures and classroom activities provided the following conditions are met:
 - The capturing of the photo/video is not disruptive to other students or the professor.
 - The photos/videos are for personal use only (not posted publicly), unless otherwise discussed.
 - Fun photos/videos are shared with the professor 😊

13.2: Diversity and Equity Statement

The instructor strives to promote a living and learning environment for outstanding growth and productivity among all students, faculty and staff. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, sexual orientation, or socio-economic background. Diversity also entails different viewpoints, philosophies, and perspectives. Course activities and attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected. All students in my classroom are expected to show respect for one another.

14: Course Outline

The course outline is presented in Table 3. Detailed reading and homework assignments along with updates to this schedule will be provided via Blackboard. Please note the references below to the Hibbeler textbook and throughout the course notes, reference the 8th edition.

Table 3: Course Lesson Outline

Lesson	Day	Date	Destination	Text	Notes/Topic	Assignment Due
01	Tuesday	8/24	San Angelo, TX		Syllabus, Course Discussion, Structures Trivia	
02	Thursday	8/26	Puerta Cabeza, Nicaragua	1.1-1.2; 3.1; 5.1; 5.4	Classification of Structures	
03	Tuesday	8/31	Genoa, Italy	1.3	Classification of Loads	Homework 01
04	Thursday	9/2	Tokyo, Japan	1.4	Design Methodology; LRFD vs ASD	
05	Tuesday	9/7	Ocean City, NJ	2.1-2.3	Load Path; Tributary Areas	Homework 02
06	Thursday	9/9	San Sabastian, Spain		Tension Member Design	
07	Tuesday	9/14	Montreal, Canada		Compression Member Design	Homework 03
08	Thursday	9/16	Glenfinnan, Scotland		Truss Bridge Design; Design Project Outline	
09	Tuesday	9/21	Shanghai, China	2.4-2.5	Static Determinacy	Homework 04
10	Thursday	9/23	Surfers Paradise, Australia	3.2-3.4	Determinate Truss Analysis I	
	Friday	9/24			PROJECT PROPOSAL DUE	Project 01
11	Tuesday	9/28	London, England	3.5-3.8	Determinate Truss Analysis II	
12	Thursday	9/30	Berlin, Germany	4.1-4.3	Beams and Frames- N, V, M Diagrams I	Homework 05
	Friday	10/1			PROJECT PRELIMINARY REPORTS DUE	Project 02
13	Tuesday	10/5	Kuala Lumpur, Malaysia	4.4	Beams and Frames- N, V, M Diagrams II	Homework 06
	Thursday	10/7			EXAM I	
14	Tuesday	10/12	Curitiba, Paraná, Brazil	4.4-4.5	Beams and Frames- N, V, M Diagrams III	Homework 07
15	Thursday	10/14	Lima, Peru	4.5	Beams and Frames- N, V, M Diagrams IV	
	Friday	10/15			PROJECT MEETINGS COMPLETE	Project 03
16	Tuesday	10/19	Manila, Philippines	6.1-6.6	Influence Lines	Homework 08
17	Thursday	10/21	Tehran, Iran	8.1-8.3	Deflections- Integration, Tables	
18	Tuesday	10/26	Atimpoku, Ghana	9.3-9.4; 9.7	Deflections- Virtual Work I	Homework 09
19	Thursday	10/28	Villa de Leyva, Columbia	9.7	Deflections- Virtual Work II	
20	Tuesday	11/2	Ismailia, Egypt	9.8	Deflections- Virtual Work III	
21	Thursday	11/4	Savar Upazila, Bangladesh	10.1-10.4	Indeterminate Structures- Force Method I	Homework 10
	Tuesday	11/9	?		EXAM II	
22	Thursday	11/11	Mexico City, Mexico	10.5; 10.8	Indeterminate Structures- Force Method II	Homework 11
23	Tuesday	11/16	New York, NY	14.1-14.2	Indeterminate Structures- Stiffness Method I	
24	Thursday	11/18	Dubai, United Arab Emirates	14.3-14.6; 15.1-15.4	Indeterminate Structures- Stiffness Method II	

Lesson	Day	Date	Destination	Text	Notes/Topic	Assignment Due
	Tuesday	11/23			Extra Class Day- To be Used for Catch-Up	
	Tuesday	11/23			BRIDGE DESIGN REPORT DRAFT DUE	Project 06A
	Thursday	11/25			NO CLASS- THANKSGIVING DAY	
	Tuesday	11/30			PROJECT BRIDGE DESIGN PAMPHLETS, COMPLETED BRIDGES	Project 04, 05A
	Tuesday	11/30			PROJECT BRIDGE DESIGN TESTING	Homework 12; Project 05B
25	Thursday	12/2	Outer Space, Milky Way Galaxy		Final Exam Review; Structures Escape Challenge	
	Friday	12/3			PROJECT FINAL REPORT AND PEER EVALUATION FORMS DUE	Project 06,07
	Tuesday	12/7			FINAL EXAM, 3:30pm-5:30pm	

15: End Notes

- ¹ <https://www.angelo.edu/live/profiles/6463-anthony-battistini>
- ² <http://www.mastan2.com/download.html>
- ³ <http://edu.iesweb.com/>
- ⁴ <https://blackboard.angelo.edu/>
- ⁵ <https://www.angelo.edu/student-handbook/code-of-student-conduct/misconduct.php>
- ⁶ <https://www.angelo.edu/live/profiles/6463-anthony-battistini>
- ⁷ <https://www.angelo.edu/current-students/registrar/final.php>
- ⁸ <https://www.angelo.edu/current-students/student-handbook/>
- ⁹ <https://www.angelo.edu/academics/catalog/>
- ¹⁰ <https://www.angelo.edu/current-students/disability-services/>
- ¹¹ <http://www.angelo.edu/incident-form>
- ¹² <https://www.angelo.edu/current-students/title-ix/>
- ¹³ <http://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>
- ¹⁴ <https://www.angelo.edu/content/files/14197-op-1011-grading-procedures>
- ¹⁵ <https://www.angelo.edu/covid-19/>
- ¹⁶ <http://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>
- ¹⁷ https://www.angelo.edu/current-students/writing-center/academic_honesty.php