

1: Course Number and Name

- a. **CENGR 4311:** Transportation Design, Spring 2021
- b. Section 010, VIN 238, TR 11:00 am – 12:15 pm

2: Credits and Contact Hours

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

3: Instructor Information

- a. **Course Coordinator:** Dr. Dick Apronti
- b. **Instructor:** Dick Apronti, 325-486-5512, dick.apronti@angelo.edu. Office: VIN 275.
- c. **Office hours:** TR 7:00 pm – 9:00 pm (online on [Microsoft Teams](#)¹ using link posted on Blackboard); F 11:00 am – 12:00 pm (face to face in VIN 275).

4: Required Course Materials

- Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, Seventh Edition, 2018. You can obtain the eBook from the Porter Henderson Library online resource.
- Additional readings will be posted on-line. You do not need to purchase a textbook.

5: Technology Requirements

To successfully complete this course, you need to have Respondus Lockdown Browser and Monitor (which requires a web cam), Blackboard Collaborate (which also requires a web cam), and remote access to the engineering virtual computer lab to utilize Autodesk Civil3D and HCS 7.

6: Specific Course Information

- a. **Catalog Description:** This course provides students with an understanding of the basic principles and techniques of highway design – criteria controlling geometric design of highways including design speed, design volume, and vehicle requirements. The course will explore design of alignments, evaluation of earthwork requirements, pavement management and design, and application of computer software in highway design. There will be two class projects. The first project involves the horizontal and vertical design of a given highway, and the second project requires the development of a pavement management program.
- c. **Prerequisites:** CENG 3311 – Transportation Engineering
- d. **Required or elective:** Elective design course for BSCE Majors.

7: Specific Goals for the Course

- a. Course Learning Outcomes:
 1. Identify and characterize the key attributes of vehicles, operators, and highway systems that affect the geometric design of highways.
 2. Undertake design of horizontal and vertical alignment of a road utilizing a geometric design software.
 3. Determine pavement condition and recommend appropriate rehabilitation strategies.
 4. Design a flexible and a rigid pavement using the AASHTO method.

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 |
|-----------------------------|---|---|---|---|
| 1. Solve Problems | X | X | X | X |
| 2. Design | X | X | | X |
| 3. Communication | | | X | |
| 4. Ethics & Professionalism | | | | |
| 5. Teamwork | | | X | |
| 6. Experimentation | | | | |
| 7. Acquire New Knowledge | X | | X | |

8: Topics Covered

1. Geometric design of highways
2. Pavement management
3. Design of flexible highway pavements
4. Design of rigid pavements

9: Course Delivery and Communications

9.1: Delivery Method(s)

This is a face-to-face course with learning resources and supplemental materials posted in Blackboard. Lectures shall be recorded and made available online when students are unable to attend class due to Covid related quarantines.

9.2: Communications

The primary means of communication during this course are Blackboard and Piazza. Lesson materials will be delivered via Blackboard. Piazza will be used for announcements and discussion of course materials. Please do not email your instructor with questions about class—instead, post your questions on Piazza. One reason for using Piazza is for you to benefit from the collective knowledge of your classmates and instructors. You are encouraged to ask questions when you are struggling to understand a concept—you can even do so anonymously or send private messages to the instructor.

The instructor will respond to Piazza messages within six to twelve hours during working hours Monday through Friday. Weekend messages may be responded to within 24 hours or until Monday. Message posted on Piazza will be sent to your ASU email address. Check frequently for announcements and policy changes.

Virtual communication: Office hours and/or advising may be done with the assistance of the Microsoft Team.

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: Class Attendance, Participation, Timeliness and Teamwork

The number one complaint of engineering clients is the timeliness of deliverables (reports, drawings, specifications, etc.). As a professional engineer you will be expected to arrive at scheduled meetings on time and prepared. Late proposals are not generally accepted. Late specifications or drawings may cost the engineer a monetary penalty. Professional engineering standards apply in this course.

You are expected to meet every class meeting on time and prepared. Attendance will be taken. Should you find it necessary to miss a class for any reason, you are expected to notify your instructor as early as the absence is known—preferably before the absence. It is important that you communicate clearly to your instructors.

Your online assignments will be due at the time specified on Blackboard. Any assignments submitted in hard copy are due at the beginning of class on the due date. Your instructor may assess penalties for late work.

11.2: Reading Assignments and Homework

You will be given reading and homework assignments nearly every lesson. Reading assignments will come from the assigned textbooks or other materials provided or available via the web. The homework assignments will consist of questions to be answered during your reading and preparation for class. Reading and homework assignments will be distributed via the Blackboard.

11.3: Quizzes

Instructors may give in-class quizzes. The quizzes will be unannounced and unscheduled. The quizzes are intended to determine whether or not you have completed the pre-class work and are prepared for class.

11.4: Course Exercises

There will be two in-class exercises in this course. Participation in both exercises is expected from all students. Zero points will be awarded for missed exercises. These exercises cannot be made up.

11.5: Exams

There shall be three exams. The weights for the three exams are 20%, 20% and 20% respectively. Make-up exams will only be given for extenuating circumstances unless prior arrangements with the instructor are agreed upon. Proof, such as a doctor's note or other official document, may be required for unexcused absences during an exam.

11.6: Projects

There will be two projects for this class requiring some hands-on design work and research. Project 1 is an individual project requiring you to use Civil3D to undertake a geometric design. Project 2 is a group project requiring your team to determine the pavement conditions of some pavements and recommending appropriate rehabilitation strategies.

11.7: Grades: Weighting and Letter Grades

The weighting system shown in Table 2 will be used in determining final grade for the course.

Table 2: Grade Weighting

| Item | Percent |
|--------------------|----------------|
| Homework | 15% |
| Quizzes/Attendance | 15% |
| Project 1 | 10% |
| Project 2 | 10% |
| Exam 1 | 15% |
| Exam 2 | 15% |
| Final Exam | 20% |
| Total | 100% |

The instructor will determine letter grades for the course using his professional judgment, and the following standards as described in the University Catalog:

A = excellent work B = good work C = average work D = poor work F = failing work

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](#)² and [Angelo State University Catalog](#)³.

12.2: Student Disability Services

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](#)⁴. The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

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

The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance.

Students are encouraged to report any incidents of sexual misconduct directly to ASU's Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Boone, J.D.

Director of Title IX Compliance/Title IX Coordinator

Mayer Administration Building, Room 210

325-486-6357, michelle.boone@angelo.edu

You may also file a report online 24/7 at www.angelo.edu/incident-form⁵

If you are wishing to speak to someone about an incident in confidence you may contact the *University Health Clinic and Counseling Center at 325-942-2173* or the *ASU Crisis Helpline at 325-486-6345*.

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit: www.angelo.edu/title-ix⁶.

12.4: Observance of Religious Holy Day

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](#)⁷ 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](#)⁸ for more information.

12.6: Student Conduct Policies

12.6.1: 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.

12.6.2: Plagiarism

Plagiarism is a serious topic covered in ASU's [Academic Integrity policy](#)⁹ 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.

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](#)¹⁰.

12.6.3: 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: Course Outline

The course outline is presented in the table next page. Detailed reading and homework assignments along with updates to this schedule will be provided via Bb. The following schedule may be modified as the semester progresses.

Table 3: Course Lesson Outline

| Week | Date | Topic | Reading Due | Assignment Due |
|------|--------|---|---------------------|----------------|
| | | Module I: Geometric Design | | |
| 1 | Jan 26 | Course introduction: Responsibilities of Road Design Engineer | Syllabus | |
| | Jan 28 | Circular Curve and Curve Coordinates | §4.3 & 4.32 | |
| 2 | Feb 2 | Spiral Curves and Spiral Coordinates | §4.3.3 | Homework 1 |
| | Feb 4 | Introduction to the Green Book and Highway Functions | GB §1.1 – 1.3 | |
| 3 | Feb 9 | Vertical Curves | §4.2 & 4.2.1 | Homework 2 |
| | Feb 11 | Vertical Curve and the Design Vehicle | §4.2.2 | |
| 4 | Feb 16 | Stopping Sight Distance and Decision Sight Distance | GB §3.2 – 3.2.3 | Homework 3 |
| | Feb 18 | Passing Sight Distance and Sight Distance on Curves | GB §3.2.4 – 3.2.6 | |
| 5 | Feb 23 | Exam 1 | | |
| | Feb 25 | <i>Project 1</i> and Introduction to Civil3D | | |
| 6 | Mar 2 | Earthworks and Mass Diagram | | |
| | Mar 4 | Superelevation Fundamentals | §4.4 | |
| 7 | Mar 9 | Distributions of Superelevation & Friction | GB §3.3.1 – 3.3.3.4 | Homework 4 |
| | Mar 11 | Superelevation for Low-Speed Urban Roadways | GB §3.3.4 – 3.3.6 | |
| 8 | Mar 16 | Superelevation for High-Speed Roadways | GB §3.3.7 – 3.3.8 | Homework 5 |
| | Mar 18 | Superelevation Runoff and Spiral Curve Transitions | | |

| Week | Date | Topic | Reading Due | Assignment Due |
|------|--------|---|---------------------|---------------------------|
| 9 | Mar 23 | Crest and Sag Vertical Curves | GB §3.4.6 – 3.4.6.3 | Homework 6 |
| | Mar 25 | General Controls Horizontal and Vertical Alignments | §4.5 | |
| 10 | Mar 30 | Exam 2 | | |
| | Apr 1 | Roadside Safety | GB §4.6 | |
| 11 | Apr 6 | Roadside Barrier | GB §4.10 | |
| | | Module II: Pavement Management and Design | | |
| 11 | Apr 8 | Pavement Deterioration Causes and Rehabilitation | PPD Ch. 18 | Homework 7 |
| 12 | Apr 13 | Pavement Rating Systems | PPD Ch. 19 | <i>Project 1 Check up</i> |
| | Apr 15 | Pavement Management Basics | PPD Ch. 20 | |
| 13 | Apr 20 | <i>Project 2</i> | | |
| | Apr 22 | Project 2 Field Work | | |
| 14 | Apr 27 | AASHTO Flexible Pavement Design | | <i>Project 2 Check up</i> |
| | Apr 29 | AASHTO Flexible Pavement Design Exercise | | |
| 15 | May 4 | Project 1 Presentation | | |
| | May 6 | Project 2 Presentation | | |
| 16 | May 11 | Final exam 10:30 am – 12:30 pm | | |

14: End Notes

¹ shorturl.at/pwzP7

² <http://www.angelo.edu/student-handbook/>

³ <http://www.angelo.edu/catalogs/>

⁴ <http://www.angelo.edu/services/disability-services/>

⁵ <http://www.angelo.edu/incident-form>

⁶ <http://www.angelo.edu/title-ix>

⁷ <http://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>

⁸ <https://www.angelo.edu/content/files/14197-op-1011-grading-procedures>

⁹ <http://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>

¹⁰ http://www.angelo.edu/dept/writing_center/academic_honesty.php