

## CE 466/ 566 Highway Geometric Design Fall 2017 Course Syllabus

Catalog Description:	(3) CDT. Study of geometric elements of streets and highways, with emphasis on analysis and design for safety. Prerequisites: CE 363. Graduate-level requirements include a research paper or highway project.				
Course Objectives:	This course will provide students with an understanding of the basic principles and techniques of highway design. This will include laying out potential routes, detailed design of alignments, and evaluation of drainage, earthwork, and intersection requirements. The student should be able to understand and apply these principles to highway design problems. The student should also be able to use existing computer tools to generate and analyze designs. Upon completion, students should be prepared to work in the field of roadway design and to study advanced topics in this field.				
Instructor:	Frank E. Fry IV, PE	Office Phone:	(520) 838-3411	Office Hours:	By Appointment
E-mail:	frank.fry@wsp.com	Cell Phone:	(520) 661-6135		
Class Hours:	Tuesday and Thursday 3:30-4:45 pm, Civil Engineering, Room 201 Software tutorial sessions will be scheduled during the semester.				
Textbook:	American Association of State Highway and Transportation Officials (AASHTO), <i>A Policy on Geometric Design of Highways and Streets</i> , 6 <sup>th</sup> Edition, 2011, ISBN # 1-56051-508-1. <ul style="list-style-type: none"><li>▪ Regular Price (Printed Edition) \$240.</li><li>▪ Register as an AASHTO e-affiliate using your .edu email address to receive special discounted prices. <a href="https://register.transportation.org/EAffiliate_Register.aspx">https://register.transportation.org/EAffiliate_Register.aspx</a></li><li>▪ A Single-User Web-Based Life-of-Edition Subscription is available for \$160.</li></ul>				
Grading:	Undergrad Students: 25% Homework, 25% Exam 1, 25% Exam 2, 25% Final Project Graduate Students: 15% Homework, 25% Exam 1, 25% Exam 2, 20% Final Project, 15% Research Paper  A = above 90%; B = 80 to 89%; C = 70 to 79%; D = 60 to 69%; E = below 60%.				
Course Requirements:	The course includes two examinations during the semester and a final project. About 6 homework assignments (problems and design exercises) are also required during the semester. Homework and solutions will be posted on D2L. Homework assignments will be weighted evenly to calculate the final homework grade. Late homework will have the following penalties: up to 1 class late: 5 points; up to 1 week late: 10 points; after 1 week: no credit.  The homework will include computer exercises using standard highway design software. Free copies of AutoCAD/Civil 3D will be available in the Civil Engineering's building computer lab. Several computers will also have MicroStation V8i and InRoads V8i for use. MicroStation V8i and InRoads V8i may also be available for students to install on their computers.				
Homework Policies:	Working on homework in groups of up to two students is permitted. If two people work together; a single project or assignment should be turned in, with <u>both names</u> clearly indicated. There will be higher expectations for work done in groups, so more points may be deducted on a group assignment for a similar error. This reflects the expectation that groups should prepare higher quality work.  Copying another student's work <i>without attribution, including copying of any part or the whole of computer files</i> , is considered plagiarism. This and any other form of cheating and/or academic dishonesty will be prosecuted as a violation of the University of Arizona Student Code of Conduct, in accordance with the Code of Academic Integrity ( <a href="http://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity">http://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity</a> ).				
Accessibility And Accommodations:	It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations.				

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Graduate  
Students:

Graduate students will need to complete a research paper during the semester. The professor will provide a list of research topics and/or highway projects. The following milestones are required for completion of the research paper or project:

September 19th:	Draft Introduction (1 page)
October 12th:	Draft Literature Review (2 pages)
November 7:	Draft Methodology or Case Study Description (3 pages)
December 14:	Final Report due (10 pages)

### Course Outline

Topic	
Introduction and roadway function	Chapter 1, Pages 1-1 to 1-13
Design Plans Review	Supplemental
Design controls: vehicles and drivers	Sections 2.1 and 2.2 Pages 2-1 to 2-46
Design controls: speed, volume and access	Sections 2.3 and 2.5. Pages 2-46 to 2-59 and 2-70 to 2-77
Route layout and selection criteria	Supplemental
Sight distance & Intersection Sight Distance	Section 3.2 Pages 3-1 to 3-18 & Chapter 9, Pages 9-1 to 9-195
Clear Zone	AASHTO Roadside Design Guide
<b>Exam 1, tentatively September 26th</b>	
Horizontal alignment	Section 3.3 Pages 3-18 to 3-112
Superelevation	Section 3.3 Pages 3-18 to 3-112 & ADOT Roadway Design Guide (RDG)
Vertical alignment	Section 3.4 to 3.5, Pages 3-113 to 3-167
Cross-sections and drainage	Chapter 4, Pages 4-1 to 4-78
Earthwork calculations	Supplemental
ADA Compliance	Supplemental
<b>Exam 2, tentatively November 2nd</b>	
MicroStation & InRoads	Computer Lab
<b>Final Project Due, December 12th, 5:00 PM</b>	
<b>Research Paper Due, December 14th, 5:00 PM</b>	

### Additional References

AASHTO Roadside Design Guide, 4th Edition, AASHTO, 2011.

Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration, 2009. Free at [http://mutcd.fhwa.dot.gov/kno\\_2009.htm](http://mutcd.fhwa.dot.gov/kno_2009.htm)

Roadway Design Guidelines, Arizona Department of Transportation (ADOT), 2007. Free at [http://www.azdot.gov/highways/Roadway\\_Engineering/Roadway\\_Design/Guidelines/Manuals/PDF/RoadwayDesignGuidelines.pdf](http://www.azdot.gov/highways/Roadway_Engineering/Roadway_Design/Guidelines/Manuals/PDF/RoadwayDesignGuidelines.pdf)

INROADS Tutorial, with software (on line).

Schoon, J.G., Geometric Design Projects for Highways: An Introduction, 2<sup>nd</sup> Edition, American Society of Civil Engineers Press, 2000.

Mannering, F., S. Washburn, and W. Kilareski, Principles of Highway Engineering and Traffic Analysis, 4th edition, John Wiley and Sons, 2008.

Highway Capacity Manual 2010 (HCM 2010), Transportation Research Board, 2010.