

Route Geometrics Design

SUR 4201 (3 credits) Fall, 2017

Catalog Course Description: The geometric design of transportation systems, computer applications and a comprehensive design project. Spiral curves, super-elevation theory and earthwork analysis are covered.

Instructor: Dr. Bon A. Dewitt, P.S.M.
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Office Hours: Period 7 – Monday, Wednesday, Friday (Other times by appointment)

Course Objectives/Outcomes

After successful completion of this course, each student will:

- Have a fundamental knowledge of basic surveys and coordinate systems
- Understand the design and geometry of horizontal and vertical highway routes
- Be able to design highway cross sections and compute end areas
- Be able to incorporate spiral curves into a horizontal alignment and calculate the necessary components
- Be able to design super-elevation for horizontal curves
- Know how to perform earthwork analysis in order to compute optimal balance of cut and fill, and hauling of soil
- Have knowledge of Geometric Design Standards for highways
- Be familiar with a set of highway construction plans.

Course Meeting Times: Period 5 (11:45AM – 12:35PM) Monday, Wednesday, Friday
Final Exam Group 14A (from official UF course schedule)

Required Text: (none)

Internet References: The Florida “Greenbook” and other useful references can be found at:
<http://www.dot.state.fl.us/rddesign/CS/CS.shtm>

Recommended Reference: “Elementary Surveying – An Introduction to Geomatics” by Wolf and Ghilani (10th edition or later: 15th is the current one and is listed as Ghilani and Wolf)

Assignments

There will be 7 **optional** homework exercises presented during the semester, worth a potential +5 course points each. If you submit them for grading, they must be complete solutions. (No partially finished work will be accepted for grading.)

Evaluation of Student Learning

Exam I	100 points
Exam II	100 points
<u>Final Exam</u>	<u>150 points</u>
Total	350 points

Points earned from homework will be added to total earned course points, giving the possibility for point percentages in excess of 100%. [Maximum possible points = $350 + 7 \times 5 = 385$. Maximum possible percentage = $(385/350) \times 100\% = 110\%$.]

Grading Scale

Course grades will follow the default Canvas grade scale:

A	94
A-	90
B+	87
B	84
B-	80
C+	77
C	74
C-	70
D+	67
D	64
D-	60
E	0

However, in order to avoid rare cases where letter grade groups would be separated by a small fraction of a percent, the grade cutoff percentages may be slightly adjusted (up or down) so that distinct percentage gaps will separate the letter grades. For an explanation of the UF letter grade scale, see:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Lecture Topics and Readings

Lec.	Topic	Reading assignment
1	Syllabus Review & Short Intro	
2	Overview of Route Design	
3-4	Angles, Azimuths, Bearings	Elementary Surveying: Chap 7
5	Traverse	Elementary Surveying: Chap 9
6-7	Compass Rule Adjustment	Elementary Surveying: Chap 10
8	State Plane Coordinates	Browse Elementary Surveying: Chap 20
9-10	Horizontal Alignments and Curves	Elementary Surveying: Chap 24
11	Horizontal Route Design Calculations	
12	Profiles and Vertical Route Tangents	Browse Elementary Surveying: Chap 25
13-14	Vertical Curves	Elementary Surveying: Chap 25
	Exam 1	
15	Vertical Alignment Design	
16	Cross Sections - 1	Browse Elementary Surveying: Chap 26
17	Cross Sections - 2	
18	End Areas and Volumes	Elementary Surveying: Chap 26
19	Surface Models, DEM and TIN	
20	Intro to Spirals	
21	Spiral Computations	Elementary Surveying: Chap 24
22-24	Spiral Design	
25	Intro to Super-Elevation	
26	Super-Elevation Design Standards	
27-28	Super-Elevation Transitions	
29-31	Earthwork Analysis –Mass Diagram	
	Exam 2	
32-34	Geometric Design Standards	Florida Green Book – Chap. 3
35	Route Project Time Line	
36-37	Review of Plans	

Other Information

Academic Honesty, Software Use, UF Counseling Services, Services for Students with Disabilities

In 1995 the UF student body enacted an honor code (see link below) and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students. <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>

Preamble: In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. Student and faculty support are

crucial to the success of the Honor Code. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code.

On all work submitted for credit by students at the university, the following pledge is either required or implied: **"On my honor, I have neither given nor received unauthorized aid in doing this assignment."**

The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior.

Student Responsibility. Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student Honor Council or Student Conduct and Conflict Resolution in the Dean of Students Office.

Faculty Responsibility. Faculty members have a duty to promote honest behavior and to avoid practices and environments that foster cheating in their classes. Teachers should encourage students to bring negative conditions or incidents of dishonesty to their attention. In their own work, teachers should practice the same high standards they expect from their students.

Administration Responsibility. As highly visible members of our academic community, administrators should be ever vigilant to promote academic honesty and conduct their lives in an ethically exemplary manner.

(Source: 2011-2012 Undergraduate Catalog)

Homework submissions for this course may not be copied in part or in whole. While students are allowed to discuss concepts from the assignments with other students, all work must be independently produced.

This policy, along with the principles of the Student Honor Code, will be vigorously upheld at all times in this course.

Software Use:

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/*

Counseling Services

Groups and Workshops

Outreach and Consultation

Self-Help Library

Training Programs

Community Provider Database

- *Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/*

Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Fall 2017

Monday	Tuesday	Wednesday	Thursday	Friday
8/21 Lec. 1	8/22	8/23 Lec. 2	8/24	8/25 Lec. 3
8/28 Lec. 4	8/29	8/30 Lec. 5	8/31	9/1 Lec. 6
9/4 Labor Day	9/5	9/6 Lec. 7	9/7	9/8 Lec. 8
9/11 Lec. 9	9/12	9/13 Lec. 10	9/14	9/15 Lec. 11
9/18 Lec. 12	9/19	9/20 Lec. 13	9/21	9/22 Lec. 14
9/25 Exam 1	9/26	9/27 Exam 1 discussion	9/28	9/29 Lec. 15
10/2 Lec. 16	10/3	10/4 Lec. 17	10/5	10/6 Homecoming
10/9 Lec. 18	10/10	10/11 Lec. 19	10/12	10/13 Lec. 20
10/16 Lec. 21	10/17	10/18 Lec. 22	10/19	10/20 Lec. 23
10/23 Lec. 24	10/24	10/25 Lec. 25	10/26	10/27 Lec. 26
10/30 Lec. 27	10/31	11/1 Lec. 28	11/2	11/3 No Class
11/6 Lec. 29	11/7	11/8 Lec. 30	11/9	11/10 Veteran's Day Holiday
11/13 Lec. 31	11/14	11/15 Exam 2	11/16	11/17 Exam 2 discussion
11/20 Lec. 32	11/21	11/22 Thanksgiving Holiday	11/23 Thanksgiving Day	11/24 Thanksgiving Holiday
11/27 Lec. 33	11/28	11/29 Lec. 34	11/30	12/1 Lec. 35
12/4 Lec. 36	12/5	12/6 Lec. 37	12/7 Reading Day	12/8 Reading Day
12/11	12/12	12/13	12/14 Final Exam 7:30-9:30 am	12/15