

# Civil Engineering (CE) 552

## Isolated Signalized Intersections – 3 credits

### Winter 2015

#### **Instructor:**

Dr. David S. Hurwitz  
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#### **Class Website:**

<http://myoregonstate.edu/> (This is the BlackBoard Login Site)

#### **Lecture Schedule:**

Monday, Wednesday, & Friday  
9:00 am - 9:50 am  
Room 205, Kearney Hall

#### **Office Hours:**

Mondays: 2:30 pm – 3:30 pm  
Wednesdays: 2:30 pm – 3:30 pm, or by appointment via email

#### **Email:**

Every student must have ENGR and ONID accounts. Read email daily. Note: a class email distribution list will be generated from ENGR accounts. You can “forward” ENGR or ONID to any account.

#### **Course Description:**

Relationships between signal display, user response, vehicle detection, and signal timing parameters are examined in detail. Traffic simulation is introduced to visualize and design the various elements of isolated signalized intersections.

#### **Course Prerequisite:**

CE 595 Traffic Operations & Design is recommended but not required.



**Course Learning Outcomes:**

By the end of the course, you will be able to:

1. Describe the relationship between signal displays, user response, detector design, and timing parameters;
2. Apply queuing theory for the purpose of selecting of timing parameters at isolated signalized intersections;
3. Apply time space diagram models for the purpose of selecting of timing parameters at isolated signalized intersections;
4. Analyze tradeoffs between intersection design elements, such as detector length and passage time, left turn operations, pedestrian operations, etc.; and
5. Design and analyze isolated traffic signal operations with micro-simulation software.

**Recommended Textbooks:**

1. Michael Kyte and Tom Urbanik. *Book 1: Isolated Intersections Traffic Signal Systems Operations and Design Activity-Based Learning*. Pacific Crest, Plainfield, IL 60585, 2012. Supplemental resources: <http://trafficsignalsystems.com/traffic/students/index.html>
2. *Traffic Signal Timing Manual*. Federal Highway Administration, Washington, D.C., 2009. [http://ops.fhwa.dot.gov/publications/fhwahop08024/fhwa\\_hop\\_08\\_024.pdf](http://ops.fhwa.dot.gov/publications/fhwahop08024/fhwa_hop_08_024.pdf)

**Supplemental Resources:**

1. Pline, J. *Traffic Engineering Handbook*. Sixth Edition, Institute of Transportation Engineers, Washington, D.C., 2010.
2. James Kell and Iris Fullerton. *Manual of Traffic Signal Design*. Second Edition, Institute of Transportation Engineers, Washington, D.C., 2006
3. *Manual on Uniform Traffic Control Devices*. FHWA, U.S. Department of Transportation, Washington, D.C., 2009. Web site: <http://mutcd.fhwa.dot.gov/>.
4. *Traffic Control Devices Handbook*. Institute of Transportation Engineers (ITE), Washington, D.C., 2001.
5. *Highway Capacity Manual (HCM)*. Transportation Research Board (TRB), Washington D.C., 2000.

**Homework:**

Homework is instrumental in helping you grasp fundamental concepts and in exposing you to techniques and skills for applying these principles to real-life situations. You may discuss homework problems with your classmates (NOT COPY THEIR SOLUTIONS), but please try all homework on your own initially. Additionally solutions must be developed and submitted independently. For homework activities that require the use of a computer software package, the student may be required to submit his or her input files. It is not appropriate to copy a computer file prepared by someone else and administrative actions will be taken if this occurs.

Use the following guidelines for homework preparation:

- Use clean, 8.5 x 11 inch paper. Engineering paper is also acceptable; neatness is important and appreciated.
- Write on only one side of the paper, and start a new problem on a new sheet of paper unless otherwise directed.
- Write your name and course number in the upper right corner of each page.
- Securely staple all pages.
- Show all of your work and state any assumptions clearly. Draw a block or a cloud around your final answer(s).
- For graphical solutions, use graph paper or computer generated plots. Label the axes of your graph and include units.
- When drawing sketches, use a straight edge.
- Write your name on the outside of the folded homework.

Late homework **is not accepted** unless specific arrangements are made with Dr. Hurwitz **prior** to the deadline.

### **Exams:**

There will be at least one exam during the quarter plus one final exam. The exams must be taken as scheduled. If you **MUST** miss an exam for an emergency situation, please let Dr. Hurwitz know as soon as possible (prior to the exam). If you oversleep or skip an exam you will not have an opportunity to make it up. If you have a valid (according to Dr. Hurwitz) time conflict and you let him know in advance, there is the possibility of taking an exam at an alternate time.

### **Class Attendance:**

You are expected to attend every class and participate in discussion. If you are not able to make class, notify the instructor before class. If you do miss class, it is your responsibility to find out what was covered and any administrative information that was presented.

### **Statement of Disruptive Behavior:**

In an academic community, students, faculty and staff each have responsibility for maintaining an appropriate environment conducive to learning. Students, faculty and staff have the responsibility to treat each other with understanding, dignity and respect.

OSU's policy on disruptive behavior may be found at:

<http://oregonstate.edu/studentconduct/disruptive-behavior>

The following specific behavior is never allowed:

- No cell phones or pagers in class.
- No use of Laptops or other electronic devices for activity outside of its use in **THIS** class.
- No reading the Barometer during class.

**Statement of Expectations for Student Conduct:**

OSU's policy on academic honesty may be found at:

<http://oregonstate.edu/studentconduct/http://%252Foregonstate.edu/studentconduct/code/index.php>

**Statement Regarding Students with Disabilities:**

"Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098."

**CLASS SCHEDULE**

<b>Week</b>	<b>Weekday</b>	<b>Date:</b>	<b>Content / Topic:</b>	<b>Readings:</b>
1	Monday	01-05	Overview, Syllabus, BB, etc.	TSTM Chp 1&2 Iso. Inter. Chp. 1
	Wednesday	01-07	The traffic control process	
	Friday	01-09		
2	Monday	01-12	<b>No Lecture - TRB</b>	TSTM Chp 3.3 to 3.4 Iso. Inter. Chp. 2
	Wednesday	01-14	<b>No Lecture - TRB</b>	
	Friday	01-16	Queuing systems	
3	Monday	01-19	<b>No Lecture - MLK Day</b>	TSTM Chp 4-1 to 1-10 Iso. Inter. Chp. 3
	Wednesday	01-21	Intersection Capacity Modeling	
	Friday	01-23	Phasing, Rings, and Barriers	
4	Monday	01-26	Actuated traffic controller timing processes	Iso. Inter. Chp. 4
	Wednesday	01-28		
	Friday	01-30		
5	Monday	02-02	The simulation environment	TSTM Chp 3-0 to 3-10 Traffic Analysis toolbox, I pg 1-18, III pg 35-43
	Wednesday	02-04		
	Friday	02-06		
6	Monday	02-09	<b>Mid Term Exam</b>	Iso. Inter. Chp 6
	Wednesday	02-11	Timing a single approach	
	Friday	02-13	<b>Guest Lecture – Ed Smaglik</b>	
7	Monday	02-16	<b>Journal Presentations - 1</b>	Iso. Inter. Chp 7
	Tuesday	02-18	<b>Journal Presentations - 1</b>	
	Friday	02-20	<b>No Lecture – ASCE CFD</b>	
8	Monday	02-23	Intersection Timing, Left Turn Phasing – PPLT, protected, permitted	TSTM Chp 4.3 to 4.4 Iso. Inter. Chp 8
	Wednesday	02-25		
	Friday	02-27		
9	Monday	03-02	Right of way change – Change & Clearance Intervals	TSTM Chp 4.5 Iso. Inter Chp 9
	Wednesday	03-04		
	Friday	03-06	<b>Field Visit - 15th and Washington</b>	
10	Monday	03-09	The design process	Iso. Inter. Chp 10
	Wednesday	03-11		
	Friday	03-13	Class Summary & Review	
11	Wednesday	03-18	Final Exam 6pm to 7:50pm	Cumulative

Note: This outline is flexible and subject to change.

**Course Evaluation:**

<b>Criteria</b>	<b>Percent of Final Grade</b>
Manuscript Presentation	15%
Average of Homework	20%
Mid Term Exam	25%
Final Exam	35%
Class Participation	5%
<b>Total</b>	<b>100%</b>

**Grading Scheme:**

92.0 - 100.0	➔	A
90.0 - 91.9	➔	A-
88.0 - 89.9	➔	B+
82.0 - 88.0	➔	B
80.0 - 81.9	➔	B-
78.0 - 79.9	➔	C+
72.0 - 78.0	➔	C
70.0 - 71.9	➔	C-
60.0 - 69.9	➔	D
59.9 or lower	➔	F