

<b>Course Number</b>	507 (Graduate)
<b>Title</b>	Introduction to Transportation Engineering Research Methods
<b>Section</b>	001
<b>CRN(s)</b>	15939 (Graduate)
<b>Credits</b>	2
<b>Prerequisite(s)</b>	Graduate Standing or Instructor Permission
<b>Days/Time</b>	Monday 4:00 PM to 5:50 PM
<b>Location</b>	EB315
<b>Final Exam Day/Time</b>	No Final
<b>Course Website</b>	<a href="http://www.cee.pdx.edu/~monserec/">www.cee.pdx.edu/~monserec/</a>
<b>Instructor</b>	Dr. Christopher M. Monsere, P.E.
<b>Office</b>	301B Engineering Building
<b>Phone</b>	503-725-9746
<b>E-mail</b>	monsere@pdx.edu
<b>Office Hours</b>	Tuesday 11-12, others by appointment
<b>Mailbox Location</b>	CEE Office, Engineering Building Room 200

**Required Text or Other Materials:**

Washington, S., Leonard, J., Manning, D. G., Roberts, C., Williams, B., Bacchus, A. R., Devanhalli, A., Ogle, J., Melcher, D. *Scientific Approaches to Transportation Research Volumes 1 and 2*. NCHRP 20-45, 2002. <http://onlinepubs.trb.org/Onlinepubs/nchrp/cd-22/start.htm>.

**Catalog Course Description**

This course will introduce first year transportation graduate students to appropriate research methods. The course content includes an overview of literature reviews, techniques for analyzing and presenting data, an introduction to academic journal writing and technical presentations, and a brief exposure to common software and statistical tools (postgreSQL, MySQL, R, Matlab, advanced Excel, and GIS).

**Course Statement and Learning Objectives**

This course is intended as an overview to many more complex and detailed topics that will be useful in transportation research. Students should expect to supplement class lectures with substantial independent learning for many topics. Software topics, especially, will only be briefly introduced and require more exposure to develop fluency. This course will introduce students to appropriate research methods for using transportation data sets and communicating the results of their work to a broad audience. The course content includes an overview of:

- (a) the research method,
  - a. distinguish between Research and research
  - b. formulating inquiry questions
  - c. using literature
  - d. identifying available resources
  - e. ethics
- (b) landscape of transportation research
- (c) basic statistical analysis applied to transportation problems (public transportation, traffic, probe vehicles, safety, freight) which will include a brief exposure to common software and statistical tools (MySQL, R, Advanced Excel, etc.)
- (d) hypothesis design and testing,
- (e) techniques for exploratory analysis and visualizing data

## **Course Evaluation**

The course grade will be determined with the following weight for class assignments:

### *Attendance (30% of final grade)*

Attendance and (primarily) participation will be a part of your grade. If you miss more than 2 class periods, expect your grade to be affected. It is suggested, though not required, to notify the instructor of an absence.

See attached "flu" policy

### *Written Assignments (60% of final grade)*

A number of assignments (to be determined) will be distributed in the class.

### *Group Work (10% of final grade)*

A significant part of this class will involve group work. A peer feedback mechanism will be used to determine this grade.

A grade of incomplete "I" is granted by the instructor *only* with prior approval and consent. Criteria are outlined in the PSU Bulletin.

## **Expectations of the Student**

### *Professionalism*

All assignments and class participation should be conducted in a professional manner. Attention to detail on class assignments and communication is important and is part of student evaluation.

### *Late Work*

The due date for each assignment is clearly indicated and the work must be turned in at the start of class unless indicated otherwise. Late assignments will lose between 5% and 10% of the total points (decided on case-by-case basis). There will be no credit if an assignment has already been returned.

### *Computer and E-mail Accounts*

You should obtain a CECS account as soon as possible to be able to use computer resources. You should request either a MySQL or PostgreSQL account. If you have no preference, select a MySQL account.

If you send me an email, I ask that you include CE507 and topic of your message in the subject line (be as specific as possible, use proper grammar, spell check, and proof read your message. **Before you ask a question, please do due diligence and try to find the answer yourself.**

### *Ethics and Professionalism*

As future professional engineers you should plan to take the Fundamentals of Engineering Exam (if you haven't already) and after the required experience, the Professional Engineering Exam (see the Oregon State Board of Examiners for Engineering and Land Surveying at [www.osbeels.org](http://www.osbeels.org)). You should also be familiar with the ASCE Code of Ethics ([www.asce.org/inside/codeofethics.cfm](http://www.asce.org/inside/codeofethics.cfm)), which includes the following:

***Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the engineering profession.***

The PSU Student Conduct Code prohibits all forms of academic cheating, fraud, and dishonesty. Further details can be found in the PSU Bulletin. Allegations of academic dishonesty may be addressed by the instructor, and/or may be referred to the Office of Student Affairs for action. Acts of academic dishonesty may result a failing grade on the exam or assignment for which the dishonesty occurred, disciplinary probation, suspension or dismissal from

the University. Questions about academic honesty may be directed to the Office of Student Affairs ([www.ess.pdx.edu/osa/](http://www.ess.pdx.edu/osa/)).

**Course Schedule:**

#	D	Date	Topic	Topic
1	M	28-Sep	Introduction to Transportation Research	Readiness with statistics The wide world of transportation research Conducting literature review Ethics
2	M	5-Oct	Research Methods	Formulating inquiry questions Peer-review process Introduction to R Wide world of transportation data
3	M	12-Oct	Transportation Data	Data types and data structures Querying data bases Preparing data for analysis (data entry into R)
4	M	19-Oct	Descriptive Statistics	Data exploration (pattern, rules, outliers, violations, gaps) R for basic descriptive statistics, plots, cross-tabulations Simple case studies Formulate relevant hypothesis
5	M	26-Oct	Modeling for Understanding	Simple R functions/loops/simple algorithm Guided case study (t-tests, ANOVA, distribution fitting)
6	M	2-Nov	Modeling for Understanding	Guided case study (model development, validation, etc) Linear regression exercise Data mining
7	M	9-Nov	Developing Research Team	Form research teams Generate research questions Validate research question Research plan /proposal
8	M	16-Nov	Visualization	Progress report Interactive lecture
9	M	23-Nov	Communication	Example paper poster Progress report
10	M	30-Nov	Project Results	

**Resources**

*Student Groups and Professional Organizations*

Participation in student and professional groups can be a valuable part of your education experience. Membership gives students opportunities to get to know fellow students better, meet and network with professionals, collaborate in solving real engineering problems, learn about internship or job possibilities, socialize and have fun. Your fellow students can be a great source of help and guidance in your academic endeavors. Consider becoming active with a student organization, such as the following:

- American Society of Civil Engineers Student Group (ASCE): [www.asce.pdx.edu](http://www.asce.pdx.edu)
- Institute of Transportation Engineers Student Chapter (ITE): [step.cecs.pdx.edu](http://step.cecs.pdx.edu)

Most professional organizations have monthly meetings and encourage student participation by providing discounts for lunch and dinner meetings. These meetings provide opportunities to network with potential future employers, learn about scholarships, and increasing your technical knowledge. Take a look at these organizations as a starting point:

- American Society of Civil Engineers (ASCE) Oregon Section: [www.asceor.org](http://www.asceor.org)
- Institute of Transportation Engineers (ITE) Oregon Section: [www.oregonite.org](http://www.oregonite.org)
- Society of Women Engineers (SWE) Columbia River Section: [www.swe-columbia-river.org](http://www.swe-columbia-river.org)
- Structural Engineers Association of Oregon (SEAO): [www.seao.org](http://www.seao.org)

#### *Research and Learning Opportunities*

Transportation is a growing and exciting research area at Portland State University. I invite you to review the research in the Intelligent Transportation Systems Laboratory ([www.its.pdx.edu/](http://www.its.pdx.edu/)). Also, every Friday during the semester a Transportation Seminar is presented. All are welcome. The schedule is available at [www.cts.pdx.edu](http://www.cts.pdx.edu)

#### *Campus Help*

As a PSU student, you have numerous resources at your disposal. Please take advantage of them while you are here. A small sample is listed below:

- CEE Website (includes program info, job listings, etc.): [www.cee.pdx.edu](http://www.cee.pdx.edu)
- Career Center: [www.career.pdx.edu/](http://www.career.pdx.edu/)
- Center for Student Health & Counseling: [www.shac.pdx.edu/](http://www.shac.pdx.edu/)
- The Writing Center: [www.writingcenter.pdx.edu/](http://www.writingcenter.pdx.edu/)
- PSU Disability Resource Center: The PSU Disability Resource Center is available to help students with academic accommodations. If you are a student who has need for test-taking, note-taking or other assistance, please visit the DRC and notify the instructor at the beginning of the term.

#### *Campus Safety*

The University considers student safety paramount. The Campus Public Safety Office is open 24 hours a day to assist with personal safety, crime prevention and security escort services. Call 503-725-4407 for more information. For Campus emergencies call 503-725-4404.

#### **Final Notes**

- The syllabus is subject to change at the discretion of the instructor as course or other circumstances requires.
- Students with documented disabilities are encouraged to discuss with me arrangements that will enhance their learning in this class.
- Please feel free to discuss with me problems/concerns with your other classes.