CVEN 626 – HIGHWAY SAFETY
3 Credits
Fall 2019

Elective

Description: Fundamental concepts for performing traffic safety analyses; crash data collection and database management; safety improvement programs; accident data analysis; development of statistical models; before-after studies; economic analyses; accident risk.

Lecture: Thursday, 12:40-3:10 pm, CVLB 419
Office hours: Wednesday: 12:00-2:00 pm


Highly recommended Textbooks:


Additional relevant material:


Additional reading material will be provided in class. I attached a partial list of documents relevant for this course. Additional references will be provided during class.

**Prerequisites:**

Recommended courses: traffic engineering (CVEN 457), geometric design (CVEN 456) and statistics (STAT 601 or STAT 211) and/or approval from the instructor.

**Course Philosophy and Structure:**

During each session (week) I will assign work to be done. I strongly believe that one learns more from reading and discussing with your colleagues than from listening. The work may take the form of problem sets, readings, or small projects. Class participation is essential for course. In addition, I will ask each student to prepare a term paper on a specific topic in traffic safety. The paper will deal with a specific problem statement in traffic safety. At the end of the course, each student will present the results of their research/term paper. Additional information will be provided at the beginning of the class.

**Instructor:**

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**Course objectives:**

Provide fundamental engineering bases for conducting traffic safety analyses and a critical look at the state-of-the-art methods in traffic safety.
Course Outcome:

Understand the basic concepts of highway safety and the crash process. Conduct safety-related studies: safety performance functions, before-after studies and identification of hazardous sites. Critically review the literature.

Topics:

1. **Introduction: What is Traffic Safety? (1 week)**

   *Key Topics:* Definition and meaning of “safety” and “motor vehicle accident.” Magnitude of the problem in the U.S. and around the world.

   **Material:** RSM: Chapter 1, Hauer: Chapter 1, WHO: Chapter 2.

2. **Human Factors in Traffic Safety (1 week)**

   *Key Topics:* Interaction between the driver, the road and the vehicle. Human contribution in road accidents. Effects of gender and age on crash risk. Issues with perception, work load and driver expectancies.


3. **Economic Costs of Crashes and Value of Life (1 week)**

   *Key Topics:* Economic costs of crashes, both societal and human related. Methods for evaluating crash costs (value of life). Relationship between crash costs and injury costs in other health areas.

   **Material:** RSM: Chapter 1, Evans (1991): Chapter 1, WHO: Chapter 2.
4. Crash Data Collection and Database Management (1 week)


Material: RSM: Chapter 4, Hauer: Chapter 4.


5. Elements of Statistics and Crash Count Distributions (1 week)


Material: RSM: Chapter 4, Hauer: Chapter 4, Class notes

6. Exploratory Analysis of Crash Data (1 week)

Key Topics: Exploratory Data Analysis of Crash Data. Estimation of confidence intervals.

Material: RSM: Chapter 4, Tukey (1977) Exploratory Data Analysis: Chapters 1-5, Class notes.


7. Regression Analysis of Count Data and Development of Statistical Models (2 weeks)

Key Topics: Development and application of statistical predictive models in traffic safety.


8. Before-After Studies (2 weeks)

Key Topics: Fundamental principles for evaluating the effects of traffic safety interventions. Before-after study with and without control groups. Site selection and regression-to-the-mean biases. Empirical Bayes and full-Bayes methods.

Material: RSM: Chapter 4, Hauer: Chapters 6-12, Persaud: Chapter 2 & Appendices D & E


9. Network Screening and Diagnosis (Identification of Hazardous Sites) (1 week)

Key Topics: Methods for identifying deviant or high hazardous sites. Black Spot Analysis. Diagnosis techniques.
Material: RSM: Chapters 5 & 6, Persaud: Chapter 2.


10. Study Design (1 week)

Key Topics: Characteristics of different study types. Estimation of sample size. Use of appropriate statistical tests.

Material: Class Notes.


11. Crash Modification Factors & HSM (Only if time permits)

Key Topics: Development and application of crash modification factors (CMFs). Relevant issues and assumptions about their development and use.

Material: Research papers, Class notes
- Bonneson, J., K. Zimmerman, and K. Fitzpatrick (2005) Road Safety Design Synthesis. Report No. FHWA/TX-05/0-4703-P1, Texas Transportation Institute, College Station, TX.

Attendance:

Valid reason must be given for nonattendance (see TAMU policy – Section 10 of Student rules; http://student-rules.tamu.edu/rule07).

Course Evaluation:

Assignments: 40% (6-8 assignments)
Term Paper: 40% (grading criteria and due date will be provided when the paper is assigned)
Class Participation: 20%

Note: This course requires the participation of the attendees. The students are expected to read assigned material beforehand and be ready to discuss it during the class.

Grading Scheme:

A = above 90%, B = 80 to 89%, C = 70 to 79%, D = 60 to 69%, F = below 60%

Academic Honesty:

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work.
Ignorance of the rules does not exclude any member of the TAMU community from

E-mail:

Communication via e-mail (questions on homework, exams, class examples, etc.) is
couraged. As much as possible, questions submitted via e-mail will be answered to
the sender as soon as possible. The instructor will use the e-mail system to make any
relevant notifications. E-mails may also be used to distribute clarifications on class
lectures, homework, exams and problem solutions. Use of e-mail is strictly voluntary.
If you would like to receive course-related e-mail, send the instructor an e-mail
message, indicating your name, the course, the section, and your e-mail address.

ADA Policy:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute
that provides comprehensive civil rights protection for persons with disabilities.
Among other things, this legislation requires that all students with disabilities be
guaranteed a learning environment that provides for reasonable accommodation of
their disabilities. If you believe you have a disability requiring an accommodation,
please contact Disability Services, currently located in the Disability Services
building at the Student Services at White Creek complex on west campus or call 979-
845-1637. For additional information visit http://disability.tamu.edu/

Note: Any alterations about the content of the course will be discussed in class before
implementation. The student is responsible for all the material presented above and covered in
the textbooks, manuals and papers.

Prepared by: Dominique Lord  Date of Preparation: August 23, 2019