

Montana Tech
General Engineering Department

EGEN 452 Traffic Engineering
Fall 2013 Course Syllabus

Instructor: Yan Qi, PE, PhD
Assistant Professor
Office Location: Science and Engineering Building, Room 306
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Phone: (406) 496-4449
Class schedule: 9:00 – 10:15 TR
Office hours: 2:00 – 5:00 T
Class room: HSB 001

Description of Course:

ECIV 452 Traffic Engineering (3 credit hours). Introduction of basic components of the traffic system and fundamentals of traffic engineering; analysis of traffic stream characteristics, levels of service and capacity of urban and rural highways; study of warrants for traffic control devices; design and analysis of traffic signals and timing plans; analysis of urban and highway traffic characteristics using simulation software.

Prerequisite: Intro to Transportation Engineering

Textbook: Roger Roess, Elena Prassas, and William McShane, Traffic Engineering, 4th Edition, ISBN-10: 0-13-613573-0; ISBN-13: 978-0-13-613573-9, Prentice Hall, 2011.

References:

1. A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO), 6th Edition, 2011.
2. Highway Capacity Manual (HCM), Transportation Research Board (TRB), 2010.
3. Traffic Engineering Handbook, 6th Edition, Institute of Transportation Engineers (ITE), 2009.
4. Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration (FHWA), US Department of Transportation (USDOT), 2009.
5. Transportation Planning Handbook, 3rd Edition, Institute of Transportation Engineers (ITE), 2009.
6. Bell, G.H., Transportation Network Analysis, John Wiley & Sons, 1997.
7. Creighton, R. L., Urban Transportation Planning, 2nd Edition, University of Illinois Press, 2001.

8. Mannering, F.L. and Kilareski, W.P., Principles of Highway Engineering and Traffic Analysis, 3rd Edition, John Wiley & Sons, 2004.
9. Meyer, M.D. and Miller, E.J., Urban Transportation Planning, 2nd Edition, McGraw Hill, 2000.
10. Pignataro, L.J., Transportation Engineering, Prentice Hall, Latest Edition.

Course Objectives:

1. To acquaint the students with the basic components and design considerations in traffic engineering.
2. To introduce the students to the parameters, operations, and characteristics of traffic flow.
3. To address the design and analysis of traffic engineering problems dealing with traffic control devices, highway capacity analysis, and urban traffic signal design.
4. To introduce the students to popular traffic simulation software through conducting course projects.
5. To develop basic competencies in the preparation, presentation, and evaluation of oral and written engineering reports.

Topics:

1. Basic traffic engineering concepts (Weeks 1-2)
2. Manual on Uniform Traffic Control Devices (MUTCD) (Weeks 3-4)
3. Traffic flow characteristics (Week 5)
4. Highway capacity analysis (Weeks 6-7)
5. Review and midterm Exam (Week 8)
6. Level of Service analysis (Week 9)
7. Traffic signal timing and control strategies (Weeks 10-11)
8. Intersection capacity analysis (Week 12)
9. Traffic simulation skills and software (Week 13-14)
10. Final project presentation (Week 15)
11. Review for Final and final exam (Week 16)

Course Outcomes: Students will be able to

1. Learn basic traffic engineering concepts.
2. Understand the warrants for traffic control devices.
3. Understand the characteristics and flow capacity of traffic flow.

4. Design and analysis of the capacity of urban and rural highways.
5. Design and analysis of intersection capacity and traffic signal timing.
6. Design and analysis traffic engineering problems using digital computer simulation skills.

Criteria for Determining Final Grade:

The final grade will be based on the following percentages:

Homework	Mi-Term Exams	Project	Final Exam	Total
20	30	20	30	100

Grade Scale:

90-100	A
80-89	B
70-79	C
60-69	D
Below 60	F

Computer Usage:

Traffic simulation software-VISSIM will be used in this course.

Assignments:

Students are responsible to solve all assigned homework problems.

Course Project: A traffic simulation project will be assigned. The students will use simulation software to conduct the project, and an oral presentation is required to present the design, simulation, results, and evaluation of the project.

A typical project is to design a pre-timed signal plan for a single four-way intersection, simulate the design in VISSIM, and evaluate the design using simulation data.

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Description of Course:

ECIV 552 Traffic Engineering (3 credit hours). Introduction of components of the traffic system and fundamentals of traffic engineering; traffic flow theory; levels of service, and capacity of urban and rural highways; fundamentals of queuing theory; study of warrants for traffic control devices; design and analysis of traffic signals and timing plans; advanced applications of traffic simulation software to analyze urban and highway traffic.

Prerequisite: Intro to Transportation Engineering

Textbook: Roger Roess, Elena Prassas, and William McShane, Traffic Engineering, 4th Edition, ISBN-10: 0-13-613573-0; ISBN-13: 978-0-13-613573-9, Prentice Hall, 2011.

References:

1. A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO), 6th Edition, 2011.
2. Highway Capacity Manual (HCM), Transportation Research Board (TRB), 2010.
3. Highway Safety Manual, American Association of State Highway and Transportation Officials (AASHTO), 1st Edition, 2010
4. Traffic Engineering Handbook, 6th Edition, Institute of Transportation Engineers (ITE), 2009.
5. Manual on Uniform Traffic Control Devices (MUTCD), Federal Highway Administration (FHWA), US Department of Transportation (USDOT), 2009.
6. Transportation Planning Handbook, 3rd Edition, Institute of Transportation Engineers (ITE), 2009.
7. Bell, G.H., Transportation Network Analysis, John Wiley & Sons, 1997.

8. Creighton, R. L., Urban Transportation Planning, 2nd Edition, University of Illinois Press, 2001.
9. Mannering, F.L. and Kilareski, W.P., Principles of Highway Engineering and Traffic Analysis, 3rd Edition, John Wiley & Sons, 2004.
10. Meyer, M.D. and Miller, E.J., Urban Transportation Planning, 2nd Edition, McGraw Hill, 2000.
11. Pignataro, L.J., Transportation Engineering, Prentice Hall, Latest Edition.
12. Vuchic, V.R., Urban Transit: Operations, Planning and Economics, John Wiley & Sons, 2005.

Course Objectives:

1. To acquaint the students with the components and design considerations in traffic engineering.
2. To introduce the students to the theory, operations, and characteristics of traffic flow.
3. To introduce the students to the fundamentals of queuing theory and its application in traffic study.
4. To address the design and analysis of traffic engineering problems dealing with traffic control devices, highway capacity analysis, and urban traffic signal design.
5. To introduce the students to popular traffic simulation software through conducting course projects.
6. To develop basic competencies in the preparation, presentation, and evaluation of oral and written engineering reports.

Topics:

1. Basic traffic engineering concepts (Weeks 1-2)
2. Manual on Uniform Traffic Control Devices (MUTCD) (Weeks 3-4)
3. Traffic flow characteristics and theories (Week 5)
4. Highway capacity analysis and queuing theory (Weeks 6-7)
5. Review and midterm Exam (Week 8)
6. Level of Service analysis (Week 9)
7. Traffic signal timing and control strategies (Weeks 10-11)
8. Intersection capacity analysis (Week 12)
9. Traffic simulation skills and software (Week 13-14)
10. Final project presentation (Week 15)
11. Review for Final and final exam (Week 16)

Course Outcomes: Students will be able to

1. Learn traffic engineering concepts.
2. Understand the warrants for traffic control devices.
3. Understand the characteristics and flow capacity of traffic flow.
4. Apply traffic flow theory to traffic analysis
5. Analysis of traffic delay using queuing theory.
6. Design and analysis of the capacity of urban and rural highways.
7. Design and analysis of intersection capacity and traffic signal timing for a coordinated system.
8. Design and analysis traffic engineering problems using digital computer simulation skills.

Criteria for Determining Final Grade:

The final grade will be based on the following percentages:

Homework	Mi-Term Exams	Project	Final Exam	Total
10	30	30	30	100

Grade Scale:

90-100	A
80-89	B
70-79	C
60-69	D
Below 60	F

Computer Usage:

Traffic simulation software-VISSIM will be used in this course.

Assignments:

Students are responsible to solve all assigned homework problems.

Course Project: A traffic simulation project will be assigned. The students will use simulation software to conduct the project, and an oral presentation is required to present the design, simulation, results, and evaluation of the project.

A typical project is to design the single plan for a coordinated system with several intersections (dynamic signal plan may be considered), simulate the design in VISSIM, and evaluate the design using queuing theory.