**CIVL 447 – Traffic Engineering**
**Syllabus**
**1st Semester 2012/2013**

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|---|---|---|---|
| Coordinating Unit: | Department of Civil and Environmental Engineering,<br>Faculty of Science and Technology | | |
| Supporting Unit(s): | Nil | | |
| Course Code: | CIVL447 | Year of Study: | 4 |
| Course Title: | Traffic Engineering | | |
| Compulsory/Elective: | Elective | | |
| Course Prerequisites: | Nil | | |
| Prerequisite Knowledge: | Basic Statistics ; Computer Skills | | |
| Duration: | One semester | Credit Units: | 3 |
| Class/Laboratory Schedule: | Three hours of lecture per week along the traffic counts sessions | | |
| Laboratory/Software Usage: | Nil | | |
| Course Description: | This course deals with fundamental introduction of traffic engineering, such as human factor design, geometric design and section design, traffic flow theory analysis, capacity analysis, traffic count methods, signalized intersection analysis; introduction of ITS | | |
| Course Objectives: | 1. To appreciate the traffic engineering as application of engineering techniques to achieve the safe and efficient movement of people and goods.<br>2. To understand the relationship between different parts of traffic engineering | | |
| Learning Outcomes (LO): | Upon completion of this course, students should be able:<br>1. To understand the human factors in traffic engineering design (POs: a, e)<br>2. To design the cross-section and alignment of highway (POs: a, c, e)<br>3. To use an appropriate traffic flow theory for traffic characteristics (POs: a, e)<br>4. To practice the traffic count methods (POs: b, d)<br>5. To comprehend the capacity and signalized intersection analysis (POs: a, c, e)<br>6. To understand the basic knowledge of ITS (POs: h) | | |
| Texts & References:<br><br>*(* recommended textbook(s))* | 1. *Traffic Engineering (3rd Edition) by Roger P. Roess, Elena S. Prassas, and William R. McShane (Hardcover - Jan 24, 2004).<br>2. Principles of Highway Engineering and Traffic Analysis, by F L Mannering and W P Kilareski, Wiley, New York, September 2008.<br>3. Fundamentals of Transportation Engineering, by Jon D. Fricker and Robert K. Whitford , latest edition, Prentice Hall, New Jersey, 2004.<br>4. Transportation Engineering: An Introduction, by C J Khisty & B K Lall, 3rd edition, Prentice Hall, New Jersey, 2002. | | |
| Student Assessment: | • Assignments, presentation and report: 25%;<br>• One midterm: 25%;<br>• One final examination: 50% | | |
| Learning Outcome Assessment: | • Midterm and final examination.<br>• Course evaluation | | |

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|---|---|---|
| Pedagogical Methods: | ☑ Lecture | ☐ Service learning |
| | ☐ Guest speakers | ☐ Internship |
| | ☐ Case study | ☐ Field study |
| | ☐ Role playing | ☐ Company visits |
| | ☑ Student presentation | ☐ e-learning |
| | ☐ Project | ☑ Independent study |
| | ☐ Simulation game | ☐Others: Computer software Lab. |
| | ☑ Exercises and problems | |

| Major Assessment Methods: For each Major Assessment Method below, please indicate the specific pedagogical methods involved (by putting a ✓ in the relevant box(es) on the right-hand side). | Case Study | Role Playing | Student Presentation | Individual project/paper | Group project/paper | Simulation Game | Exercises & problems | Service learning | Internship | Field Study | Company visits | Written examination | Oral examination | Others (please specify) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Class Participation/ Discussion (0%) | | | | | | | | | | | | | | |
| Quiz/Assignment/Report(s) (25%) | | | ✓ | | | | ✓ | | | ✓ | | | | |
| Test(s) (25%) | | | | | | | | | | | | ✓ | | |
| Examination (50%) | | | | | | | | | | | | ✓ | | |
| Others *(please specify)* _____ (0 %) | | | | | | | | | | | | | | |
| Course Web: (if any) | Course materials are available in UMMoodle (http://webcourse.umac.mo/ ). | | | | | | | | | | | | | |

## Syllabus

| Weeks | Topics | LO No. |
|---|---|---|
| 1-2 | Introduction<br>◆ Traffic engineering discipline<br>◆ Transportation engineering<br>◆ The transportation system<br>Vehicle motion and human factors<br>◆ Vehicle motion<br>◆ Human factors: perception reaction<br>◆ Human factors: dilemma zones | 1 |
| 3-4 | Geometric design of highways<br>◆ Principles of highway alignment<br>◆ Vertical alignment<br>◆ Horizontal alignment<br>Fundamentals of pavement design<br>◆ Pavement types: flexible and rigid pavements<br>◆ Principles of flexible pavement design<br>◆ The AASHTO flexible pavement design procedure<br>◆ The AASHTO rigid pavement design procedure | 2 |
| 5-7 | Elements of traffic flow analysis<br>◆ Traffic flow, speed and density<br>◆ Basic traffic stream models<br>◆ Models of traffic flow<br>◆ Queuing theory and traffic flow analysis<br>◆ Traffic analysis at highway bottlenecks | 3 |
| 8-9 | Traffic Count Method<br>◆ Traffic flow counting<br>◆ Travel speed measurement | 4 |
| 10 | Mid Term Examination | 1,2,3 |
| 11-12 | Traffic analysis at signalized intersections<br>◆ Analysis of signalized intersections with D/D/1 Queuing<br>◆ Analysis of signalized intersections with probabilistic arrivals<br>◆ Signal timing design procedure | 5 |
| 13 | Highway capacity and level of service analysis<br>◆ Level of service<br>◆ Service flow rate and level of service<br>◆ Capacity for freeway segments | 5 |
| 14 | Intelligent Transportation System<br>◆ Background<br>◆ Objective of ITS development<br>◆ Area and current trends | 6 |

Percentage Content of:

| Math | Engineering Science | Engineering Design and Synthesis | Complementary Studies | Computer Studies | Total |
|---|---|---|---|---|---|
| 20 | 60 | 20 | | --- | 100 |

Timetabled work in hours per week:

| Lecture | Tutorial | Laboratory | Other | Total |
|---|---|---|---|---|
| 3 | --- | | --- | 3 |

Contribution to Program Outcomes:

| Program Outcomes | Contribution to POs# 5 ----------> 1 Significant Least | | | | |
|---|---|---|---|---|---|
| | 5 | 4 | 3 | 2 | 1 |
| (a) apply knowledge of mathematics, science, and engineering | ✓ | | | | |
| (b) design and conduct experiments, and analyze data | | | | ✓ | |
| (c) design components, systems or processes in presence of constraints | | ✓ | | | |
| (d) Function in a multi-disciplinary team | | | | ✓ | |
| (e) Engineering problem solving | ✓ | | | | |
| (f) Understand professional and ethical responsibility | | | | | |
| (g) Communicate effectively | | | | | |
| (h) Understand the impact of engineering solutions to the society | | | | ✓ | |
| (i) Recognize the need and have the ability for lifelong learning | | | | | |
| (j) Have knowledge of contemporary issues | | | | | |
| (k) Apply the skills, techniques, modern engineering tools | | | | | |
| (l) Use the computer/IT tools relevant to the discipline | | | | | |

*# Note* 5: Significant contribution; 4: Supporting contribution; 3: Moderate contribution; 2: Marginal support; 1: Least support

Course Instructor(s): Mr. I M Wan