University of Macau
Undergraduate Civil Engineering Programme

Coordinating Unit:	Department of Civil and Environmental Engineering, Faculty of Science and Technology		
Supporting Unit(s):	Nil		
Course Code:	CIVL4019	Year of Study:	3rd or 4th
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		
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. 2. To understand the relationship between different parts of traffic engineering		
Learning Outcomes (LO):	Upon completion of this course, students should be able: 1. To understand the human factors in traffic engineering design (POs: a, e) 2. To design the cross-section and alignment of highway (POs: a, c, e) 3. To use an appropriate traffic flow theory for traffic characteristics (POs: a, e) 4. To practice the traffic count methods (POs: b, d) 5. To comprehend the capacity and signalized intersection analysis (POs: a, c, e) 6. To understand the basic knowledge of ITS (POs: h)		
Texts & References: *(* recommended textbook(s))*	1. *Traffic Engineering (3rd Edition) by Roger P. Roess, Elena S. Prassas, and William R. McShane (Hardcover - Jan 24, 2004). 2. Principles of Highway Engineering and Traffic Analysis, by F L Mannering and W P Kilareski, Wiley, New York, September 2008. 3. Fundamentals of Transportation Engineering, by Jon D. Fricker and Robert K. Whitford , latest edition, Prentice Hall, New Jersey, 2004. 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%; • One midterm: 25%; • One final examination: 50%		
Learning Outcome Assessment:	• Midterm and final examination. • Course evaluation		

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

Major Assessment Methods:	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														
Quiz/Assignment/Report(s)			✓				✓			✓				
Test(s)												✓		
Examination												✓		
Others *(please specify)* _____														
Course Web: (if any)	Course materials are available in UMMoodle (http://webcourse.umac.mo/).													

Syllabus

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

Percentage Content of:

Mathematics and Basic Sciences	Engineering Subjects	Complementary Studies	Total
20	80	0	100

Timetabled work in hours per week:

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

Contribution to Programme Outcomes:	

Programme Outcomes	Contribution to POs	
	Primary	Secondary
(a) an ability to apply knowledge of mathematics, science, and engineering appropriate to the degree discipline	✓	
(b) an ability to design and conduct experiments, as well as to analyse and interpret data		✓
(c) an ability to design a system, component or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability	✓	
(d) an ability to function on multi-disciplinary teams		✓
(e) an ability to identify, formulate and solve engineering problems	✓	
(f) an ability to understand professional and ethical responsibility		
(g) an ability to communicate effectively		
(h) an ability to understand the impact of engineering solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public		✓
(i) an ability to stay abreast of contemporary issues		
(j) an ability to recognise the need for, and to engage in life-long learning		
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline		
(l) an ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations		

Course Instructor:	Mr. I M Wan (Please refer to the following link for the consultation hours of the course instructor: http://www.fst.umac.mo/cee/contacthour.html)