

Highway Engineering

Course leader:	Dr Arnab Majumdar
Other contributors:	
Module status:	Elective
Pre- or co-requisites:	
Term:	Spring
Contact hours:	
ECTS units:	6 (MSc)
FHEQ Level:	7
Assessment:	Coursework, progress tests, written examination

1.0 Aims

- To follow the process of locating, designing, constructing and maintaining highways.

2.0 Syllabus

No.	Topic	Staff
Lecture 01	Highway planning process and principles of route location	AM
Lecture 02	Bitumen and the concept of design speed	AM
Lecture 03	Design speed factors and geometric link design 1	AM
Activity 1	Group presentations on factors associated with route location	AM
Lecture 04	Geometric link design 2	AM
Lecture 05	Pavement engineering 1	AM
Lecture 06	Pavement engineering 2	AM
Activity 2	Numerical exercise on highway design	AM
Lecture 07	Pavement design	AM
Lecture 08	Pavement maintenance	AM
Activity 3	Numerical exercise on pavement design	AM
Lecture 09	Road safety audits and surface drainage - 1	AM
Lecture 10	Sub-surface drainage - 2	AM

- Firstly, the course will cover the highway planning process and the principles of route location. The second part of the course introduces the concepts of design speeds, operating speeds and speed limits.
- Based upon the design speeds, consideration is then given to geometric link design and in particular vertical links and horizontal links. The optimisation of horizontal and vertical alignments is also presented in the second part.

- This is followed by pavement design, considering the design of both flexible and rigid pavements. This part also considers how such pavements deteriorate, and their maintenance.
- The final part of the course considers alternative methods of surface drainage for highways, as well as the earthworks requirement for the construction of highways. The quantitative methods taught in the lectures are practised in tutorials and there is a test in the latter half of the course.

3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to:

- Understand the use of different road types in the highway network.
- Design a highway allowing for differing terrains, horizontal and vertical curves.
- Assess alternative pavement designs and understand their maintenance.
- Assess alternative surface drainage schemes and calculate required lengths of drainage channels.
- Calculate earthworks quantities needed for highway construction.

4.0 Teaching methods

This module is taught via lectures and tutorials.

5.0 Assessment

(MSc) The assessment comprises a 2-hour written examination paper and one item of group coursework. The coursework is given in Week 7 and submitted in Week 10. The examination-coursework ratio is 55:45. The examination contains five questions of which three must be answered.

(UG) The assessment comprises a 3-hour written examination paper and one item of group coursework. The coursework is given in Week 7 and submitted in Week 10. The examination-coursework ratio is 55:45. The examination contains five questions all of which must be answered.

6.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

C	Highways, 5th Edition by Edited by Coleman A. O'Flaherty with David Hughes (Author), Coleman A. O'Flaherty (Editor), ICE Publishing.
C	Highway Engineering, 3rd Edition, Martin Rogers, Bernard Enright, Wiley-Blackwell.

7.0 Subject threads

The table below shows how the themes of design, sustainability and health & safety risk management are embedded in the curriculum (as defined by the JBM degree guidelines).

Key: Primary (P), Secondary (S) and Contributory (C).

Design	Health & Safety Risk Management	Sustainability
P	C	C