

SCHOOL OF CIVIL ENGINEERING

Unit Outline Prepared by: UNIT TITLE: DISCIPLINE CODE: CREDIT POINTS PREREQUISITES: STAFF DETAILS: Dr. Jonathan Bunker Date: August 2002 Professional Studies 4 (Road Design Project) UNIT CODE: CEB317 SEMESTER/YEAR: Sem 1, Year 3 12 BNB007, CEB207, CEB214

Coordinator:

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1. Rationale

Civil engineers as professionals are responsible for the delivery of major transport infrastructure items through the stages of inception, planning, design, development, maintenance and management. The purpose of such projects is to improve the quality of life of the community by offering safe and efficient access to activity locations and mobility between locations. In delivering such infrastructure it is imperative that social, economic, and environmental impacts and benefits are considered and addressed. This unit offers students an opportunity to explore the role of the civil engineer in the preparation of a feasibility design study for a road as a major transport infrastructure item.

This unit is the fourth in the Professional Studies strand. Emphasis is given the development of the student's professional capabilities profile. Students will be expected to draw upon the knowledge and experience gained in Professional Studies 1, 2 and 3 as well as other sub-disciplinary units. In turn, subsequent Professional Studies units and other sub-disciplinary units will rely upon the knowledge and experience gained in this unit. In particular, the capabilities of work planning and documentation practices, communication, information retrieval, and interpersonal skills developed in this unit will be assumed in future units.

Technically, this unit links closely with the earthworks and surveying components Professional Studies 2, and the sustainable transport, land development and drainage components of Professional Studies 3. The future units Transport Engineering 1 and Transport Engineering 2, and Professional Studies 7 will in turn assume knowledge and experience of transport planning and road design gained in this unit.

2. Aims

The aim of this unit is to enable you to understand the role of the civil engineer in developing a feasibility design study for a major road project.

3. Objectives

Technical

If you participate in and pass this unit you should be able to:

- 1. offer an understanding of how to properly address a substantial engineering problem through development of a suitable feasibility design study framework;
- 2. offer an understanding of road design theory through applying it properly to produce a robust and efficient concept road design;
- 3. offer an understanding of the multi-disciplinary components of a major road project by investigating them as part of your feasibility design study;
- 4. demonstrate an ability to plan and document your work processes and outcomes in a professional manner; and
- 5. demonstrate an ability to work in a team to produce a successful project outcome on a defined schedule.

Generic Capabilities

By the completion of this unit, you should have become aware of your current abilities in the following generic and professional capabilities, and should have progressed in the development of them:

- (a) Communication written, oral and graphical communication
- (b) *Discipline Knowledge* extensive theoretical knowledge; apply knowledge; discern deficits and maintain awareness.
- (c) *Work Practices* manage time, achieve end results, accept responsibilities, deal with change, appreciate the multidisciplinary nature of professional endeavours, and work with other disciplines
- (d) Interpersonal Skills effective teamwork, emphathise, listening and negotiation skills, assertiveness
- (e) *Community & Global Awareness* awareness of global issues, appreciate differences and work sensitively.
- (f) *Environmental & Sustainability Awareness* awareness of environmental and sustainability issues; understand and apply ESD principles
- (g) Ethical Behaviour sense of professional responsibility, value honesty and accountability
- (h) Thinking Skills & Problem Solving critical, analytical, creative and reflective thinking skills
- (i) *Information Literacy* use current technologies, retrieve information, continued development, and lifelong learning.
- (j) *Systems Approach* identify the primary purpose and users, decompose a system, trade off between cost and performance, identify and contrast, describe and compare system.

4. Content

- Introductions to: Unit, Project Control and Documentation, Project.
- Road system planning principles network impacts, capacity requirements, access, form and function.

Route options investigation – right-of-way, geometric, access, social, economic, environmental, constructability

- Geographical information systems
- Road corridor geometric design principles cross sections, horizontal and vertical alignments, sight distances, speed environment
- Road corridor geometric design principles overtaking, intersections, functional design overview, suggestions and requirements
- Road design using software 12D
- Road design using software 12D
- Road corridor construction balancing earthworks, material selection and use, mass haul diagrams
- Road corridor drainage cross section, constructed system, surcharge conditions

- Design office
- Engineering surveying corridor set-out, construction surveying
- Design office
- Final assessment preparation overview

5. Teaching & Learning Approaches

This unit offers students an undertaking of a substantial feasibility design project. The emphasis is on problem based learning. Students will undertake their project in groups of four, emphasizing their interpersonal skills and ability to communicate professionally.

Special lectures on certain new material will be provided by a team with expertise in their respective fields. Students will be expected to use information and methodologies discussed, in the development of their project. The remaining contact time will consist of design office sessions where unit staff will be available to guide students on their projects. The unit coordinator will be available throughout the semester to provide guidance on general aspects of the project.

It is stressed that students must attend the contact sessions in order to gain full advantage of staff presence. Students will be encouraged to use the unit OLT web site, which will be provided as a central resource

Teaching Mode

Hours
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weekHours
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Problem- Based	Self- Learning	Individual	Team Based	Experiential Learning	Reflective	Exposition	Presentation
\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark

Learning Approaches

6. Assessment

Formative assessment for the unit is centred on an engineering project. Feedback will be provided through group activities and assessment of project documentation, which will enable students to understand how they are progressing and how their work can be improved.

Component	Formative	Summative	%	Objectives
Lectures	Х	-	-	1-4, (a)- (j)
Design office sessions	Х	-	-	1-5, (a)-(j)
Submission 1 (planning + investigation)	Х	Х	15%	1-5, (a)-(j)
Progress memo and briefing	Х	Х	10%	1-5, (a)–(j)
Submission 2 (geometric design)	Х	Х	25%	1-5, (a)-(j)
Submission 3 (construction + drainage)	Х	Х	20%	1-5, (a)-(j)
CEB207 mentoring	Х	Х	5%	5 (d)
Final assessment (formal submission +	-	Х	25%	1-5, (a)-(j)
presentation)				

7. Resource Materials

Required text:

Department of Main Roads 2001, *Road Planning and Design Manual*, Queensland Government. (Available electronically on web site. Suggested readings provided in Programme above.)

Useful Reference texts:

Austroads 1988, A Guide to the Geometric Design of Rural Roads, Sydney.
Austroads 2002, Urban Road Design, Sydney.
Underwood R.T. 1991, Geometric Design of Roads, Macmillan Australia.
Ogden K.W. and Taylor S.Y. 1996, Traffic Engineering and Management, Monash.
Lewis D. (ed) 1999, The Written Assignment, QUT, Brisbane.
Liston J.W. 1991, Project Engineering – A Text for Civil Engineers, QUT.

Resources:

A package of basic background information that is relevant to the project (including Project Brief) will be issued to each group. Students will be expected to identify any information further than that issued formally to the class, and where feasible, procure that information. *Notwithstanding, students shall not approach members of the public nor public officers in relation to this student project without authorisation of the unit coordinator*.

A unit web site will provide a clearinghouse for electronic resources as well as documentation on unit housekeeping. Students are expected to both review the unit web site and check their QUT student email account at least one day prior to each class.

8. Risk Management

Students will be informed of any requirements pertaining to a safe workplace. In lectures, tutorials and such, the information will include location of fire exits and meeting points in case of fire; in any laboratory practicals students will be advised of requirements of safe and responsible behaviour and will be required to wear appropriate protective items (e.g. steel capped shoes); on any field trips or site visits, all students will progress through a safety induction session and where necessary obtain a safety induction card. Students who do not follow legitimate instructions or who endanger the safety of others or do not act in accordance with the requirements of the Workplace Health and Safety Act, will be required to leave the session/site. Students will be responsible for their own health and safety, and that of other members of the community as a responsible citizen, should they elect in their own time to conduct any site visits related to the project.