



The University of Southern Queensland

Course specification

The current and official versions of the course specifications are available on the web at <http://www.usq.edu.au/coursespecification/current>. Please consult the web for updates that may occur during the year.

Description: Advanced Design Practice using Finite Element Analysis

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
ENG	8804	91142	2, 2009	WEB	1.00	Toowoomba

Academic group:	FOENS
Academic org:	FOENSV
Student contribution band:	2
ASCED code:	030903

STAFFING

Moderator: Karu Karunasena

RATIONALE

Frame analysis packages such as Space Gass and Microstan have been developed by and for structural designers to assist with code based design of conventional structures. They generate analysis output that is directly applicable to code based design. Finite element analysis packages such as Strand7 have been developed as general purpose analysis tools. Structural designers are making increasing use of finite element analysis as a design tool particularly for non-standard structures. FEA can provide results that allow design of non standard structures where code methods are not directly applicable. This course is concerned with developing an understanding of FEA and equally importantly, with reaching responsible and informed designed decisions on the basis of FEA results. The course is intended to be broadly applicable to designers of building, civil and industrial structures.

SYNOPSIS

This course is concerned with the mechanics of "driving" an FEA package, using FEA output to develop a more sophisticated qualitative understanding of structural phenomena, and using quantitative FEA results as the basis for design decisions particularly where code methods are not directly applicable. A considerable emphasis is placed on using FEA to consolidate and extend the understanding of a number of phenomena likely to have been introduced in an undergraduate course. The course includes a substantial amount of design relevant theory required to understand the analysis of plate element models.

OBJECTIVES

the course objectives define the student learning outcomes for a course. The assessment item(s) that may be used to assess student achievement of an objective are shown in parenthesis. On completion of the course, students should be able to:

1. display proficiency in the mechanics of using FEA software (assignments);
2. demonstrate a disciplined approach to the documentation and self checking of computer models and results (assignments);

3. use FEA software for frame analysis and demonstrate an understanding of the difference between an FEA beam element and the beam element normally used in frame analysis packages (assignments);
4. display an in-depth understanding of the full range of buckling phenomena and an ability to model these phenomena (assignments);
5. use explicit modelling of imperfections to undertake design by advanced analysis of assemblies (assignments);
6. display an understanding of the importance of mesh subdivision and of the relative accuracy of different plate element types (assignments);
7. interpret results of plate element analysis and make use of such results for both steel and reinforced concrete structures (assignments);
8. develop models for dynamic analysis and use natural frequency, transient dynamic and harmonic analysis (assignments).

TOPICS

	Description	Weighting (%)
1.	Apply the mechanics of modelling using a typical FEA package	10.00
2.	Undertake and interpret non-linear and buckling analysis using beam elements	10.00
3.	Undertake and interpret non-linear and buckling analysis using plate elements	10.00
4.	Undertake design by advanced analysis using explicit imperfection modelling	10.00
5.	Undertake design using plate element models of steel assemblies	10.00
6.	Plate element theory - including Von Mises stress and Wood Armer equations	20.00
7.	Design using plate element models of reinforced concrete assemblies	20.00
8.	Undertake and interpret different forms of dynamic analysis	10.00

TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

Strand7 Version 2.3 or later with the Linear, Non Linear and Buckling Analysis modules and preferably the Natural Frequency, Linear Transient Dynamic and Harmonic Response Analysis modules. Students should purchase or have access to this software package.

REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessments	55.00
Directed Study	55.00
Private Study	55.00

ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
ASSIGNMENT 1	200.00	20.00	27 Jul 2009
ASSIGNMENT 2	250.00	25.00	27 Aug 2009
ASSIGNMENT 3	150.00	15.00	28 Sep 2009
ASSIGNMENT 4	200.00	20.00	27 Oct 2009
ASSIGNMENT 5	200.00	20.00	27 Oct 2009

IMPORTANT ASSESSMENT INFORMATION

- Attendance requirements:**

There are no attendance requirements for this course. However, it is the students' responsibility to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.
- Requirements for students to complete each assessment item satisfactorily:**

To satisfactorily complete an assessment item a student must achieve at least 50% of the marks or a grade of at least C-. Refer to Statement 4 below for the requirements to receive a passing grade in this course.
- Penalties for late submission of required work:**

If students submit assignments after the due date without extenuating circumstances then a penalty of 5% of the assigned mark may apply for each working day late up to a maximum of ten working days at which time a mark of zero can be recorded for that assignment.
- Requirements for student to be awarded a passing grade in the course:**

To be assured of receiving a passing grade in a course a student must obtain at least 50% of the total weighted marks for the course.
- Method used to combine assessment results to attain final grade:**

The final grades for students will be assigned on the basis of the weighted aggregate of the marks (or grades) obtained for each of the summative assessment items in the course.
- Examination information:**

There is no examination in this course.

- 7 Examination period when Deferred/Supplementary examinations will be held:
Not applicable.
- 8 University Regulations:
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

ASSESSMENT NOTES

- 1 The due date for an assignment is the date by which a student must email the assignment to USQ. The onus is on the student to provide proof of the dispatch date, if requested by the Examiner.
- 2 Students must retain a copy of each item submitted for assessment. This must be dispatched to USQ within 24 hours if required by the Examiner.
- 3 In accordance with University's Assignment Extension Policy (Regulation 5.6.1), the examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances.
- 4 In this course students may submit assignments electronically in the format specified in the assignment requirements.
- 5 The Faculty will NOT accept submission of assignments by facsimile.
- 6 In the event that a due date for an assignment falls on a local public holiday in their area, such as a Show holiday, the due date for the assignment will be the next day. Students are to note on the assignment cover the date of the public holiday for the Examiner's convenience.
- 7 Students who have undertaken all of the required assessments in a course but who have failed to meet some of the specified objectives of a course within the normally prescribed time may be awarded the temporary grade: IM (incomplete - Make up). An IM grade will only be awarded when, in the opinion of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non directed personal study.
- 8 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. The following temporary grade may be awarded: IDM (Incomplete Deferred Make-up).

OTHER REQUIREMENTS

- 1 Students must have access to e-mail and internet access to UConnect for this course.
 - 2 Students are strongly advised to have a minimum 256K broadband internet connection to USQ for the satisfactory operation of the Strand 7 software required for Assignments in this course. While you might be able to run the program over a dial-up 56K connection, the experience may be far from satisfactory given the heavy graphics component of Strand 7.
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