



## **I. COURSE DESCRIPTION:**

This course is intended to introduce the student to the design of concrete beams, columns, slabs and footings including selection and placement for reinforcing steel and anchorage requirements.

## **II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course, the student will demonstrate the ability to:

1. Relate methods of construction and the component materials of reinforced concrete to a complete reinforced concrete building.

### Potential Elements of the Performance:

- Review materials used in making concrete
- Describe how concrete is manufactured.
- Describe how concrete is formed.
- Give examples of reinforced concrete structural support systems for a building.
- Discuss the difference between allowable stress and limit state design.

2. Use design aids for the analysis/design of beams and beam reinforcing.

### Potential Elements of the Performance:

- Review basic concepts of strength of materials such as flexural formula, shearing formula and members composed of two materials in parallel.
- Introduce basic design equations for flexure.
- Explain the condition of balanced design, under-reinforced and over-reinforced sections.
- Outline Code provisions for the design of beams.
- Solve design problems for Rectangular and T sections.
- Detail reinforced concrete beams.
- Summarize Code provisions for control of deflection and cracking.
- Outline code provisions for the design of shear.
- Design beams with shear (stirrups) reinforcement.
- Explain the components of bond development.
- Describe the mechanics of bond failure.
- Outline Code requirements for lateral spacing, cover and development lengths.
- Determine bar cutoffs.

3. Use design aids for the analysis/design of columns and column reinforcing.

Potential Elements of the Performance:

- Identify the different types of columns.
- Outline Code requirements for reinforcement and tie requirements.
- Design short columns.
- Analyze and design columns using the interaction diagram.
- Describe the behaviour of slender columns.
- Explain the effective length concept.
- Design of columns in braced and unbraced frames.

4. Use design aids for the analysis/design of slabs including selection and placement of reinforcing steel.

Potential Elements of the Performance:

- Prepare steel slab designs indicating the selection and placement of steel.

5. Design footings including the selection of placement of reinforcing steel.

Potential Elements of the Performance:

- Identify various types of footings.
- Describe the shear and flexural behaviour of footings.
- Solve for allowable soil bearing pressures.
- List general design considerations for footings.
- Design and detail square and rectangular footings.

**III. TOPICS:**

1. Introduction To Reinforced Concrete.
2. Flexural Analysis and Design of Beams.
3. Analysis and Design of Columns.
4. Slab Design.
5. Footings.

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

As advised by instructor.

**V. EVALUATION PROCESS/GRADING SYSTEM:**

A final grade will be derived from the results of field testing, laboratory testing, tutorials and three tests weighed as follows:

Two term tests each worth 20%	40%
Final test	40%
Assignments/in class participation	20%
Total	100%

The following semester grades will be assigned to students in postsecondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
U	Unsatisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies &amp; Procedures Manual – Deferred Grades and Make-up</i> ).	
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has been impossible for the faculty member to report grades.	

**VI. SPECIAL NOTES:**

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course, as may be decided by the professor. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

**VII. PRIOR LEARNING ASSESSMENT:**

Students who wish to apply for advanced credit in the course should consult the instructor.

**VIII. DIRECT CREDIT TRANSFERS:**

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.