Broward Community College
Course Outline

STATUS: A

COMMON COURSE NUMBER: ETC 2450

COURSE TITLE: Structural Design

CREDIT HOURS: 3

CONTACT HOURS BREAKDOWN:

Lecture/Discussion	48
Lab	
Other	
Contact Hours/Week	3

CATALOG COURSE DESCRIPTION:

Prerequisite: ETG 2530 or equivalent

Corequisite: None

Simplified design of reinforced concrete structures including beams, columns, footing, retaining walls and pile foundations; Classification of soils and interpretation of borings from the standard penetration test. Prerequisite: ETG2530 or equivalent.

General Education Requirements - Associate of Arts Degree, meets Area(s):
General Education Requirements - Associate in Science Degree, meets Area(s):

UNIT TITLES:

1. Analysis of Continuous Beams
2. History and Structural Properties of Concrete
3. Design of Beams and One-way Slabs by The Alternate Design Method
4. Design of Beam and One-way Slabs by The Strength Design Method
5. Application of The Strength Design Method to Structural Building Elements

I. Course Overview:

Upon successful completion of this course, the students should be able to demonstrate a proficiency in the analysis and design of structural reinforced concrete elements applying the alternate and strength design methods as outlined in the latest building code requirements for reinforced concrete (ACI 318-77) with a high degree of accuracy.

II. Units:

Unit 1. Analysis of Continuous Beams

General Outcome:

1.0 The students should be able to demonstrate a proficiency in the basic methods of shear and moment analysis for continuous beams.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

1.1 Determine shear and moment in continuous beam structures with equal spans and uniform loading.

1.2 Determine shear and moment in continuous beam structure with unequal spans using the ACI Building Code.

1.3 Draw a shear diagram of a continuous beam structure with uniform loading.

1.4 Draw the moment diagram of a continuous beam structure with uniform loading.

1.5 use an electronic computer to determine the shear and moment in continuous beam structures with unequal spans and concentrated and distributed loading.

Unit 2. History and Structural Properties of Concrete

General Outcome:

2.0 The students should be able to demonstrate a proficiency in the history of reinforced concrete and its structural properties.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

2.1 Describe the practical uses of reinforced concrete since the invention of Portland Cement.

2.2 Explain the compressive strength of concrete and its modulus of elasticity.

2.3 Explain the tensile and shear strength of concrete.

2.4 Describe the advantages and disadvantages of reinforced concrete in modern construction.

Unit 3. Design of Beams and One Way Slabs by the Alternate Design Method

General Outcome:

3.0 The students should be able to demonstrate proficiency in the design of rectangular flexural members by the Working Stress Method, as outlined in the latest ACI Building Code.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

3.1 Identify the four basic assumptions used in the Working Stress Method for flexural members.

3.2 Investigate rectangular sections in bending with tension reinforcement only.

3.3 Design rectangular sections for bending with tension reinforcement only.

3.4 Design rectangular sections for bending with both tension and compression reinforcement.

3.5 Design beams for shear stress and diagonal tension.

3.6 Design one way slabs for shear and bending.

Unit 4. Design of Beams and One Way Slabs by the Strength Design Method

General Outcome:

4.0 The students should be able to demonstrate a proficiency in the design of rectangular flexural members by the Strength Design Method as outlined in the latest ACI Building Code.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

4.1 Describe the basic assumptions used in the Strength Design Method.

4.2 Investigate rectangular sections in bending with tension reinforcement only.

4.3 Design rectangular sections for bending with tension reinforcement only.

4.4 Design rectangular sections for bending with both tension and compression reinforcement.

4.5 Design beams for shear stress and diagonal tension.

4.6 Design one way slab for shear and bending.

Unit 5. Applications of the Strength Design Method to Structural Building Elements.

General Outcome:

5.0 The students should be able to demonstrate a proficiency in the design of columns and footings according to the Strength Design Method.

Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

5.1 Design short columns using interaction diagrams.

5.2 Investigate the development and splicing of reinforcement.

5.3 Describe types of footings used in building.