COURSE OUTLINE

Course Number	Course Title	Credits
CIV227	**Structural Steel Design**	**3**
Hours: Lecture/Lab/Other	**Co- or Pre-requisite**	**Implementation Semester & Year**
2/3/0	**CIV106 with a minimum C grade**	**Fall 2022**

Catalog description:
Application of basic principles of material mechanics to the analysis and design of structural steel members that occur most commonly in bridge and building construction. Requires thorough knowledge of the American Institute of Steel Construction Code as well as orderly computational procedures. Lab work involves the design of a building.

General Education Category:
Not GenEd

Course coordinator:
James Maccariella, 609-570-3462, maccarij@mccc.edu

Required texts & Other materials:

Applied Structural Steel Design, latest edition
Spiegel
Prentice Hall
ISBN-13: 978-0130889836

Course Student Learning Outcomes (SLO):

Upon successful completion of this course the student will be able to:

1. Demonstrate basic engineering terminology. [Supports ILG 1; PLO 1]
2. Demonstrate the relationship between external forces member reactions. [Supports ILG 1, 2; PLO 1]
3. Analyze various types of materials problems. [Supports ILG 2, 11; PLO 1]
4. Generate and interpret loading diagrams. [Supports ILG 2, 11; PLO 1]
5. Solve problems in a well-organized and logical manner. [Supports ILG 2, 11; PLO 1]

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 1. Written and Oral Communication in English. Students will communicate effectively in both speech and writing.
Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes for Civil Engineering Technology (PLO)

1. Prepare designs for highways, buildings, and bridges.
2. Perform route/construction surveys using survey equipment and methods.
3. Test and analyze various construction materials.
4. Prepare design drawings.

Units of study in detail – Unit Student Learning Outcomes:

Unit I **Introduction [Supports Course SLO #1, 2, 3, 4, ,5]**

Learning Objectives
The student will be able to:

- List and describe the different types of force systems.
- Calculate resultants and resolve a force into components.
- Analyze truss systems for member loads.
- Draw free body diagrams and calculate reactions using the three equilibrium equations.
- Calculate centroids and moments of inertia of inertia for geometric and structural composite shapes.

Unit II **Tension Members [Supports Course SLO #1, 2, 3, 4, ,5]**

Learning Objectives
The student will be able to:

- Analyze and design tension members considering net and gross area, shear lag, and block shear.

Unit III **Beams [Supports Course SLO #1, 2, 3, 4, ,5]**

Learning Objectives
The student will be able to:

- Generate loading diagrams from provided framing plans.
- Determine live and dead loads.
- Analyze and Design beams considering shear, bending and deflection.
- Demonstrate understanding of bracing the compression flange and adequate lateral support.

Unit IV **Columns [Supports Course SLO #1, 2, 3, 4, ,5]**

Learning Objectives
The student will be able to:

- Calculate the least moment of inertia with respect to the centroidal axes.
- Calculate the radius of gyration.
- Calculate the slenderness ratio from the radius of gyration.
- Use the Euler Formula to determine the buckling load for non-slender compression members.

Unit V **Deflection in Beams [Supports Course SLO #1, 2, 3, 4, ,5]**

Learning Objectives

The student will be able to:

- Solve for deflection in cantilever, simple, and overhanging beams.
- Understand the importance of deflections as a serviceability limit state.

Evaluation of student learning:

Course student learning outcomes will be assessed by the following activities:

Tests (3)	30%
Quizzes and Homework	20%
Lab Reports	20%
Final Exam	30%