SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Manufacturing Engineering Technology Program
Revision Date: August 22, 2022

I. CATALOG DESCRIPTION

Course Number:	MFGT2643
Course Title:	Engineering Statics and Strength of Materials
Prerequisite(s):	PHYS1017 or PHYS1150 and MFGT2680
Catalog Description:	Study of resultant and equilibrant of forces, moments, simple stresses, properties of materials, practical design guidelines, bolted, riveted, and welded joints, centroids, moment of inertia, and torsion.
Credit Hours:	2
Class Hours:	23
Lab Hours:	23
Total Contact Hours:	46

II. COURSE OBJECTIVES: *Course will:*

A. Introduce the techniques and formulas to calculate stresses, forces and their areas to provide engineering with the necessary information to guarantee the product has been designed to the proper safety level required based upon the products use.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

A. Student Learning Outcomes: *Student will be able to:*

1. Solve problems in British and Metric units, determine numerical accuracy and utilize dimensional analysis.

2. Determine resultant and equilibrant forces, use Newton's Third Law "To every action there is an equal and opposite reaction", and be able to define axial forces, solve problems by means of a force triangle, and solve problems by means of the Pythagorean Theorem, the Law of Sines, and the Law of Cosines.

3. Solve equilibrium problems using Moment Equations.

4. Use properties of materials in design in order to determine stress, strain, and ductility, factor of safety, Poisson's Ratio, thermal expansion, thermal stress, loads, and loads of members composed of two materials in parallel.

5. Determine the strength of bolted, riveted and welded joints, the maximum efficiency of bolted joints, define the various loads found in shear, tension and bearing, calculate allowable loads for fillet welds, and calculate the length of fillet weld needed given the load and allowable load per inch.

6. Calculate the centroid of composite areas.

7. Determine the appropriate design stress for use in designing beams, design beams to carry a given load safely, and select standard structural shapes for use as beams.

8. Solve problems involving torsional shearing stress, power transmission and shaft couplings.

B. General Education Learning Outcomes (GELOs)

1. GELO #5: Analytical, Quantitative and Scientific Reasoning
Outcome 4: Manipulate formulas, data sets, graphs, tables, etc. in a way to produce a meaningful outcome.

IV. CONTENT/TOPICAL OUTLINE (CID may provide more detailed information)

A. Fundamental Terms. The student will solve problems in British and Metric units, determine numerical accuracy and utilize dimensional analysis.

B. Resultants and Equilibrant of Forces, Application of Equilibrium. The student will determine resultant and equilibrant forces, use Newton's Third Law "To every action there is an equal and opposite reaction", be able to define axial forces, solve problems by means of a force triangle, and solve problems by means of Pythagorean Theorem, the Law of Sines, and the Law of Cosines.

C. Moments. The student will solve equilibrium problems using Moment Equations.

D. Simple Stresses. The student will solve problems involving simple stresses in tension, compression, shear, and bearing loads. Design guidelines using factors of safety will be applied.

E. Properties of Materials. The student will be able to use properties of materials in design in order to determine stress, strain, ductility, factor of safety, Poisson's Ration, thermal expansion, thermal stress, loads, and loads of members composed of two materials in parallel.

F. Bolted, Riveted and Welded Joints. The student will be able to determine the strength of bolted, riveted and welded joints, the maximum efficiency of bolted joints, define the various loads found in shear, tension and bearing, calculate allowable loads for fillet welds, and calculate the length of fillet weld needed given the load and allowable load per inch.

G. Center of Gravity, Centroids, and Moment of Inertia. The student will be able to calculate the centroid of composite areas.

H. Beams, Shear Forces and Bending. The student will determine the appropriate design stress for use in designing beams, design beams to carry a given load safely, and select standard structural shapes for use as beams.

I. Torsion, Shafts, Shaft Couplings and Keys. The student will solve problems involving torsional shearing stress, power transmission and shaft couplings.

V. INSTRUCTIONAL MATERIALS

A. Required Text(s): George F. Limbrunner, *Applied Statics and Strength of Materials* (Refer to CID and/or instructor for current edition)

VI. METHODS OF PRESENTATION/INSTRUCTION

A. Methods of presentation typically include a combination of the following:

1. Lecture
2. Group discussion
3. Problem solving
4. Homework

VII. METHODS OF EVALUATION (*course outline will provide more detailed information)*

A. Methods of evaluation typically include a combination of the following:

1. Quizzes, tests, and exams

VIII. SPECIFIC COURSE REQUIREMENTS:

A. Completion of all tests, projects, assignments, and notebook (if required).

B. Must earn a final grade of 70% (2.0) or higher.

C. Program safety rules will be followed, **please see the course outline for any additional safety rules established by the instructor.**