

# Minnesota State College Southeast

## BIKE 2040: Mechanics-Materials-Springs

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 2

Lab Hours/Week: 1

OJT Hours/Week: \*.\*

Prerequisites: None

Corequisites: None

MnTC Goals: None

This course covers materials commonly used in the construction of bicycle components and frames. The mechanical properties of each material type will be explored and compared in detail including composite materials. The advantages and disadvantages of utilizing different materials for various applications will be addressed. The fabrication properties of each material type will be explored and contrasted. The impact of secondary operations such as heat treatment or coating on the durability, strength, or other properties of materials will be covered. A practical application of spring design will be presented to demonstrate the dependencies between material properties and component performance. (Prerequisite: none) (3 credits: 2 lecture/1 lab)

**B. COURSE EFFECTIVE DATES:** 02/27/2018 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Discussion of frame and component (fork, crank, wheels, seat post, etc.) materials
2. Mechanical properties such as strength, stiffness, fatigue life, heat capacity, corrosion resistance, and other key properties of selected materials
3. Material selection process for desired mechanical and performance properties
4. Utilizing materials: fabrication and manufacturing processes
5. Secondary operations for modified mechanical properties, corrosion protection, and aesthetics
6. Material selection and component performance comparison. spring design

### D. LEARNING OUTCOMES (General)

1. Knowledge of materials commonly used in the construction of bicycle and components
2. An understanding of the key properties of commonly used materials
3. Understand trade-offs between material selection and the intended application based on material properties and processing
4. Knowledge of fabrication and manufacturing process available to build components or assemblies from various material types
5. Understanding how materials can be modified or protected using secondary processes such as heat treatment or plating
6. Gain an understanding of how material properties can impact desired component design and performance

### E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

**F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

**G. SPECIAL INFORMATION**

None noted