

Minnesota State College Southeast

BIKE 2060: Bicycle Electronics & Test Fixture Automation

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 the basic principles of electrical theory and measurement, and common electrical bicycle systems. The fundamental concepts of electricity and electronics that involve direct current (dc), alternating current (ac), resistive circuits, inductance, capacitance, batteries, transformers, motors, and other electronic components are introduced. Electronic shifting and electronic peddle-assist systems are explored and analyzed. The safety aspects of working with electrical systems is covered. The course covers the use of test and measurement equipment commonly found in industry, including: pneumatically driven endurance testing, corrosion and heat testing, performance benchmarking (stiffness/strength), and impact failure testing. (Prerequisite: none) (3 credits: 2 lecture/1 lab)

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

C. OUTLINE OF MAJOR CONTENT AREAS

1. Use of tools, meters, and test equipment used to measure electrical quantities and analyze circuits
2. A fundamental understanding of voltage, current, resistance, and power in ac and dc circuits and basic circuit analysis using Ohms Law
3. Knowledge of common electrical circuit components (motors, transformers, resistors, etc.) and their function
4. A working knowledge of electronic shifting systems for various bicycles types and applications (road, mountain, gravel, etc.)
5. Knowledge of e-assist systems and components, and selection criteria for differing riding applications
6. Electrical safety
7. An understanding of the range of testing procedures available for the bicycle industry
8. Knowledge of legally required bicycle tests in various countries
9. An understanding of which tests are relevant for the different disciplines of cycling

D. LEARNING OUTCOMES (General)

1. Understand basic electrical concepts, electrical quantities, and units
2. Understand basic circuits, laws, and measurements
3. Understand the basic function and purpose of circuit components
4. Understand power supply options in AC and DC circuits
5. Ability to operate common electrical measurement tools and interpret instrument readings
6. Understand the operation of electronic shifting systems and their operating parameters and specifications
7. Understand the basic types of e-assist drives, hubmotors, and mid-drive and related trade-offs
8. Understand the typical wiring of e-bikes, user controls, batteries, and charging systems
9. Understand the specifications and terminology of e-drive systems and how systems are specified
10. Demonstrate knowledge of electrical safety practices and ability to work safely
11. Demonstrate ability to select proper test to obtain specific information about the performance or safety of a bicycle
12. Ability to set-up and execute a standard bicycle performance test
13. Ability to assemble a pneumatic or hydraulic endurance test apparatus

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

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted