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SET 178.01: Marine Electrical and Fuel Systems

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**THE UNIVERSITY OF MONTANA
COLLEGE OF TECHNOLOGY
INDUSTRIAL TECHNOLOGY DEPARTMENT**

COURSE SYLLABUS

COURSE NUMBER AND TITLE: SET 178T Marine Electrical and Fuel Systems

DATE REVISED: 2010

SEMESTER CREDIT: 4

CONTACT HOURS PER SEMESTER: 110 (5 week class)
Lecture hours per week: 10
Lab hours per week: 14

PREREQUISITES: SET 160T Basic Electricity

INSTRUCTOR: Mike Steffenson
E-mail: michael.steffenson@mso.umt.edu
Phone: 406-243-7693
Office Location: T & T II, West Campus
Office Hours: By appointment OR as posted on Faculty Office Door

RELATIONSHIP TO PROGRAM: Recreational Power Equipment technicians must have the fundamental knowledge and skills necessary to service and repair personal watercraft and outboard motors. This course, along with the prerequisites, provides the foundation necessary for entry level technicians to be successful on the job.

COURSE DESCRIPTION:

Theory of and testing and troubleshooting of problems with ignition, charging, and cranking systems. Includes the design, testing, and troubleshooting of marine carburetion and fuel injection systems.

STUDENT PERFORMANCE OUTCOMES:

Occupational Performance Objectives

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

1. Test various electrical components and systems with a multi-meter.
2. Test and adjust ignition components used in marine applications.
3. Test and service charging system components used in marine applications.
4. Trace and troubleshoot wiring diagram simulated problems.
5. Identify various types of carburetors, identify their circuits, and troubleshoot associated problems.
6. Complete synch. and link adjustments.
7. Test and adjust fuel injection systems.
8. Remove, inspect, and replace necessary components of the fuel pump, fuel tank, and carburetor.

STUDENT PERFORMANCE ASSESMENT METHODS AND GRADING PROCEDURES:

Grading Scale:

A= 93-100
B= 86-92
C= 75-85
D= 65-74
F= Below 65

NOTE: Courses must be passed with a 'C minus (C-)' or greater to count toward degree/certificate requirements.

The following criteria will be used for grading this course:

1. Written Tests 25%
2. Written Final Test 15%
3. Lab 45%
 - a. Accuracy and quality of required worksheet completion
 - b. Good use of lab time and following instructions
 - c. Use of shop manuals and forethought
4. Complete, neat and organized notebook of all handout materials and notes 5%
5. Demonstrating skills on a daily basis 5%
6. Lab organization, management, and neatness 5%

Safety:

1. College of Technology safety rules will be followed at all times. Each student will receive a copy of the safety rules. A copy of the rules are posted on the classroom bulletin board.
2. Safety glasses will be worn at **ALL** times when working in the lab, and in the classroom when working with storage batteries, chemicals, and when soldering.
3. Failure to follow the rules can result in removal from class.

EXPECTATIONS FOR STUDENT SUCCESS IN THE RPE PROGRAM:

1. Attitude is everything
2. Regular attendance is critical; tardiness is unacceptable.
3. Take good notes.
4. Pay attention.
5. Study all assigned material on a regular basis and for tests

HOW VARIOUS ASSESSMENT METHODS WILL BE USED TO IMPROVE THE COURSE:

1. Student course evaluations
2. Peer feedback
3. Advisory committee feedback

ATTENDANCE POLICY:

1. If a student will not be able to attend class, the instructor **MUST** be called at 243-7693 to notify the instructor of the absence.
2. The student is responsible to make-up all assignments, lab work, etc. missed during the absence.
3. Test dates and times will be announced in advance.
4. There will be no make-up tests except for extreme extenuating circumstances.

REQUIRED TEXT:

Understanding the Outboard Motor 2nd Edition; Author: Stagner; Publisher: Prentice Hall.
Mercury/Mariner Student Training Notebook (when available)

REQUIRED SUPPLIES: Digital multi-meter with a minimum of 10 amp DC capabilities.

ACADEMIC INTEGRITY: All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at <http://www.umt.edu/SA/VPSA/index.cfm/page/1321>.

DISABILITY ACCOMMODATION: Eligible students with disabilities will receive appropriate accommodations in this course when requested in a timely way. Please contact me after class or in my office. Please be prepared to provide a letter from your DSS Coordinator. For more information, visit the Disability Services website at <http://www.umt.edu/dss/> or call 406.243.2243 (Voice/Text).

NOTE: Faculty reserves the right to modify syllabi and assignments as needed based on faculty, student, and/or environmental circumstances.

COURSE OUTLINE:

1. Alternator charging systems
 - A. Principles of operation
 - B. Types of charging systems
 1. Full wave
 2. Three phase
 - C. Components
 - D. Troubleshooting
2. Ignition systems
 - A. Types
 1. Magneto (point type)
 2. CDI
 3. Battery CD
 - B. OMC
 - C. Mercury
 - D. Yamaha
 - E. Troubleshooting
 - F. Testing
 1. Resistance
 2. Peak voltmeter
3. Fuel systems
 - A. Carburetor fundamentals
 - B. Synchronization and linkage adjustments
 - C. Carburetor circuits
 1. Float
 2. Backdraft
 3. Idle
 4. High speed
 5. Choke
 6. Enrichment
 - D. Fuel system testing
 - E. Fuel pumps
 1. Types
 2. Testing

- F. Fuel tanks
- G. Two-stroke fuel injection systems
- H. Four-stroke fuel injection systems