

**STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK**



MASTER SYLLABUS

**COURSE NUMBER – COURSE NAME
MSPT 113 - Powersports Engine Diagnostics**

Created by: Christopher Mayville

Updated by:

Canino School of Engineering Technology

Department: Mechanical & Energy Technologies

Semester/Year: Fall 2018

A. **TITLE:** Powersports Engine Diagnostics

B. **COURSE NUMBER:** MSPT 113

C. **CREDIT HOURS:** 3 credit hour(s) per week for 15 weeks

- One hour (50 minutes) of lecture per week Three times
 Two to three hours of lab or clinical per week
 Two hours of recitation per week
 40 hours of internship

D. **WRITING INTENSIVE COURSE:** Yes No

E. **GER CATEGORY:** None: Yes: GER
If course satisfies more than one: GER

F. **SEMESTER(S) OFFERED:** Fall Spring Fall & Spring

G. **COURSE DESCRIPTION:**

With the completion of this course of study, the student will be able to diagnose and repair a machine with a no-start condition resulting from a fuel or ignition problem. Knowledge and understanding of sophisticated engine fuel and ignition systems is the focus of this course. Students study primary ignition circuits, secondary firing, points and condenser, magneto, capacitor discharge, hall-effect and transistor theory. Electronic computer scanners, gages and other diagnostic devices are used throughout the course. Study of fuel systems begins with fuel delivery and includes electronic fuel injection.

H. **PRE-REQUISITES:** None Yes If yes, list below:

MSPT 101-Powersports Service, MSPT 112-Powersports Electrical Systems, MSPT 122-Powersports Electrical Systems Lab, or with permission of instructor

CO-REQUISITES: None Yes If yes, list below:

MSPT 114-Powersports Engine Diagnostics Lab, or with permission of instructor

I. STUDENT LEARNING OUTCOMES: (see key below)

By the end of this course, the student will be able to:

<u>Course Student Learning Outcome</u> <u>[SLO]</u>	<u>Program Student Learning Outcome</u> <u>[PSLO]</u>	<u>GER</u> <u>[If Applicable]</u>	<u>ISLO & SUBSETS</u>	
Demonstrate knowledge and understanding of ignition systems.	MSPT SO 1		ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
Demonstrate procedures necessary in servicing engine ignition systems.	MSPT SO 1, MSPT SO 2		ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
Demonstrate knowledge and understanding of engine fuel injection systems.	MSPT SO 2		ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
Demonstrate procedures necessary in servicing fuel injection systems.	MSPT SO 2		ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
Apply electrical knowledge to engine performance sensors and the modules that control them.	MSPT SO 1, MSPT SO 2		ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
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KEY	<u>Institutional Student Learning Outcomes [ISLO 1 – 5]</u>
ISLO #	ISLO & Subsets
1	Communication Skills Oral [O], Written [W]
2	Critical Thinking <i>Critical Analysis [CA], Inquiry & Analysis [IA], Problem Solving [PS]</i>
3	Foundational Skills <i>Information Management [IM], Quantitative Lit./Reasoning [QTR]</i>
4	Social Responsibility <i>Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</i>
5	Industry, Professional, Discipline Specific Knowledge and Skills

*Include program objectives if applicable. Please consult with Program Coordinator

J. **APPLIED LEARNING COMPONENT:** Yes No

If YES, select one or more of the following categories:

- | | |
|---|--|
| <input type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement |
| <input type="checkbox"/> Internship | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement | <input type="checkbox"/> Research |
| <input type="checkbox"/> Practicum | <input type="checkbox"/> Entrepreneurship |
| <input type="checkbox"/> Service Learning | (program, class, project) |
| <input type="checkbox"/> Community Service | |

K. **TEXTS:**

Halderman, James D. Automotive Electrical and Engine Performance, 7th. Edition, Pearson Education, 2016.

Supplement book: AUTO 113/MSPT 113 booklet, ISBN 10: 1323722521, ISBN 13: 9781323722527

L. **REFERENCES:**

Shop manuals of manufacturers

M. **EQUIPMENT:** None Needed: Standard repair equipment

N. **GRADING METHOD:** A-F

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

Quizzes, exams, homework

P. **DETAILED COURSE OUTLINE:**

1. **Introduction**
 - a. **Course overview**
 - b. **Course requirements**

2. **Basic Ignition Overview**
 - a. **Types (Magneto, Capacitor discharge, Battery/DC powered)**
 - b. **Ignition system components**
 - c. **Ignition system operation**

3. **IGNITION PRIMARY SYSTEMS**
 - a. **CDI charging and signal**
 - b. **Points and condenser**
 - c. **Pickup coil (pulse generator)**
 - d. **Hall Effect sensors**
 - e. **Magnetic crankshaft position sensors**

- f. **Optical sensors (marine engines)**

- 4. **IGNITION SECONDARY SYSTEMS**
 - a. **Secondary windings of a coil (field build-up vs field collapse)**
 - b. **Distributor cap and rotor if equipped**
 - c. **Spark plug wires and spark plugs**

- 5. **FUEL SYSTEM INTRODUCTION**
 - a. **Operating principles/requirements**
 - b. **Stoichiometry**
 - c. **Fuel characteristics**

- 6. **FUEL DELIVERY SYSTEMS**
 - a. **Mechanical Systems**
 - b. **Electrical Systems**

- 7. **COMPUTERIZED ENGINE CONTROL**
 - a. **Operating principles/requirements**
 - b. **Interaction of system components**
 - c. **Electronic system service procedures**

- 8. **FUEL INJECTION SYSTEMS - ELECTRONIC**
 - a. **Theory and operating principles**
 - b. **Battery powered**
 - c. **Battery-less**
 - d. **Direct Injection**

- 9. **FUEL INJECTION SYSTEMS – MECHANICAL**
 - a. **Compact diesel engines**

Q. **LABORATORY OUTLINE:** None Yes