A. **TITLE:** Engine and Power Transmission Service
B. COURSE NUMBER: MSPT 110  
SHORT TITLE: Powertrains

C. CREDIT HOURS: 4

D. WRITING INTENSIVE COURSE (OPTIONAL): N/A

E. LENGTH OF SEMESTER: 15 weeks

F. SEMESTER(S) OFFERED: Spring

G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:  
2 - 50 minute lecture hours per week  
2 - 2 hour working lab

H. CATALOGUE DESCRIPTION:  
This course involves the complete disassembly, inspection, repair and reassembly of modern modular constructed powertrain assemblies. The principles of operations key to high performance, compact engines/transmission assemblies are thoroughly covered.

I. PRE-REQUISITES: Motorsport Service, MSPT 101

J. GOALS (STUDENT LEARNING OUTCOMES):  
By the end of this course, the student will be able to:

1. Should have 6-7 objectives using the required texts set forth herein.
2. If this course outline is also being submitted for GER approval the learning outcomes from the requested GER must also be included in this list
3. Each measurable course objective must be mapped to the corresponding Institutional SLO and listed in the form of the table below.

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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</thead>
<tbody>
<tr>
<td>a. Perform precision measurements key to engine overhaul</td>
<td>1. Crit. Thinking</td>
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<tr>
<td></td>
<td>2. Prof. Competence</td>
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<tr>
<td>b. Identify various engine design configurations</td>
<td>1. Crit. Thinking</td>
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<tr>
<td></td>
<td>2. Prof. Competence</td>
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<tr>
<td>c. Perform dynamometer testing for torque, horsepower and</td>
<td>1. Communication</td>
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<tr>
<td>emissions concerns</td>
<td>2. Prof. Competence</td>
</tr>
<tr>
<td>d. Diagnose and repair modular constructed powertrain</td>
<td>1. Crit. Thinking</td>
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<tr>
<td>assembly problems</td>
<td>2. Prof. Competence</td>
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<tr>
<td>e. Calculate gear ratios related to modular powertrain</td>
<td>1. Crit. Thinking</td>
</tr>
<tr>
<td>assemblies</td>
<td>2. Prof. Competence</td>
</tr>
<tr>
<td>f. Practice fundamentals associated with engine blueprinting</td>
<td>1. Crit. Thinking</td>
</tr>
<tr>
<td></td>
<td>2. Prof. Competence</td>
</tr>
</tbody>
</table>

K. TEXTBOOK: Motorcycles, Fundamentals, Service, Repair  
Johns, Edmundson, Scharff
L. REFERENCES: CD Rom data, shop manuals of manufacturers, Mitchell manuals, all data, various online references

M. EQUIPMENT: Standard motorsports laboratory equipment, i.e., land and sea dynamometer/microsoft software

N. GRADING METHOD (P/F, A-F, etc.): A-F

O. MEASUREMENT CRITERIA/METHODS: Quizzes, hourly exams, homework, laboratory performance tests, class participation

P. ATTENDANCE POLICY: Students are permitted one excused absence. The missed laboratory must be made up at a later date upon the direction of the Instructor. Further absences shall, in the discretion of the Instructor, result in dismissal from the course.

Q. CONTACT INFORMATION: Instructor Mark Hill may be reached at office number 379-3899, home 388-5944, email hillm@canton.edu. Office hours are posted on the laboratory door of NS 146.

GENERAL TOPICAL OUTLINE:

1. Introduction
2. Engines
3. Valve train assemblies
4. Engine case design
5. Pistons, crankshafts and cylinders
6. Two stroke engine designs
7. Transfer and exhaust timing
8. Crank case sealing
9. Crank shaft configurations
10. Dynamometer testing
11. Power transmissions

R. DETAILED TOPICAL OUTLINE:
See Attached

S. LABORATORY OUTLINE: See Attached
XVIII. Introduction
   1. Class procedures and policies
   2. Opening discussion

XIX. Engines
   1. Four stroke engines
   2. Cam shaft arrangement

XX. Valve train assemblies
   1. Pneumatic opening
   2. Desmodromic
   3. Coil springs

XXI. Engine case design
   1. Unit construction
   2. Non-unit construction
   3. Vertical/horizontal split crank cases
   4. One-piece case (trap door case)

XXII. Pistons, crankshafts and cylinders
   1. Single cylinder engines
   2. Multi-cylinder engines
   3. Cylinder design and construction
   4. Cylinder head design
   5. Piston construction
   6. Piston ring grooves
   7. Four cycle engine bearings

XXIII. Two stroke engine designs
   1. Intake timing
   2. Piston port
   3. Reed valve
   4. Rotary valve
   5. Piston port/crank case reed

XXIV. Transfer and exhaust timing
   1. Exhaust system design
   2. Scavenging process

XXV. Crank case sealing
1. Timing side
2. Wet side
3. Pressure test
4. Vacuum test

XXVI. Crank shaft configurations
   1. Single cylinder crankshafts
   2. Twin cylinder crankshafts
   3. Multi cylinder crankshafts

XXVII. Dynamometer testing
   1. Torque
   2. Horsepower ratings
   3. Emissions testing

XXVIII. Power transmissions
   1. Gear action
   2. Primary drives
   3. Clutching
   4. Transmission/final drives
   5. Internal gear changing mechanisms
   6. Final drive systems
   7. Calculating ratios
I. Introduction
   Laboratory procedures and policies
   Basic laboratory introduction

II. Four Stroke Engines
   A. Disassembly and inspection
   B. Measurement
   C. Comparison to spec.
   D. Reassembly

III. Valve Trim Assemblies
   A. Types
   B. Maintenance
   C. Theory

IV. Two Stroke Engines
   A. Disassembly and inspection
   B. Measurement
   C. Comparison to spec.
   D. Reassembly

V. Crankshaft Rebuilding
   A. Single cylinders/multi-cylinders
   B. Crankshaft grinding

VI. Dynamometer Testing (Laboratory based)
   A. Types
   B. Torque and horsepower ratings
   C. Emissions testing