A. **TITLE:** Frame and Suspension Systems

B. **COURSE NUMBER:** MSPT 120

C. **CREDIT HOURS:** 3 credit hour(s) per week for 15 weeks
   - ☒ One hour (50 minutes) of lecture per week Twice
   - ☒ Two to three hours of lab or clinical per week Once
   - ☐ 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:**
   This course covers the theory, diagnostic and service procedures used in suspension and frame systems unique to the powersports industry. Braking and suspension concerns are integrated into frame design theory.

H. **PRE-REQUISITES:** None ☐ Yes ☒ If yes, list below:
   MSPT 101-Powersports Service, or with permission of instructor

   **CO-REQUISITES:** None ☒ Yes ☐ If yes, list below:
I. **STUDENT LEARNING OUTCOMES:** *(see key below)*

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

<table>
<thead>
<tr>
<th>Course Student Learning Outcome</th>
<th>Program Student Learning Outcome</th>
<th>GER [If Applicable]</th>
<th>ISLO &amp; SUBSETS</th>
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<tr>
<td>a. Perform precision measurements key to frame and suspension set-up</td>
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<td>b. Identify various frame and suspension design configurations common to motorsports</td>
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<td>c. Diagnose and repair frame and suspension system problems</td>
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<td>d. Calculate steering geometry and rake and trail concerns affecting vehicle handling</td>
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<td>e. Identify braking systems unique to lightweight motorsports vehicles</td>
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<td>f. Perform gas shock rebuilding specific to rider weight and riding style</td>
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<td>Communication Skills: Oral [O], Written [W]</td>
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<td>Critical Thinking: Critical Analysis [CA], Inquiry &amp; Analysis [IA], Problem Solving [PS]</td>
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<td>3</td>
<td>Foundational Skills: Information Management [IM], Quantitative Lit./Reasoning [QTR]</td>
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<td>Social Responsibility: Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]</td>
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<td>5</td>
<td>Industry, Professional, Discipline Specific Knowledge and Skills</td>
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*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:

☑ Classroom/Lab
☐ Internship
☐ Clinical Placement
☐ Practicum
☐ Service Learning
☐ Community Service

☐ Civic Engagement
☐ Creative Works/Senior Project
☐ Research
☐ Entrepreneurship
  (program, class, project)

K. **TEXTS:**

Race Tech’s Motorcycle Suspension Bible, by Paul Thede and Lee Parks, Illustrations by Alan Lapp, Motorbooks, 2010


L. **REFERENCES:**

Manufacturer shop manuals

M. **EQUIPMENT:** None ☐ Needed: Standard powersports laboratory equipment

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

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

Quizzes, homework, exams, laboratory activities, laboratory participation

P. **DETAILED COURSE OUTLINE:**

I. Introduction
  1. Class procedures and policies
  2. Opening discussion

II. Frame construction
  1. Cradle frame
  2. Back bone frame
  3. Diamond frame
  4. Delta box frame
  5. Pentagonal frame
  6. Stamped steel frames

III. Frame inspection
  1. New York State DOT compliance
  2. Federal Motor Vehicle Safety Standards
IV Front suspension systems
1. Telescopic front forks
2. Pivoting link forks
3. Leading link forks
4. Single sided front swing arm designs
7. Servicing front suspension systems

VII Front steering geometry
1. Rake
2. Trail
3. Steering dampeners

VIII Rear suspension systems
1. Shock absorbers
2. Swing arm
3. Single sided swing arm
4. Linkless swing arm design
5. Linked swing arms (mono-shock)

IX Frame and suspension inspection
1. Front suspension inspection summary
2. Mid-frame inspection summary
3. Rear suspension inspection
4. ATV four-wheel alignment

X Snowmobile suspension designs
1. Bogie suspension systems
2. Slide suspension systems
3. Track alignment concerns
4. Track cleat replacement
5. Track replacement

XI Brake systems
1. Brake design
2. Brake inspection, maintenance and repair
3. Unified brake controls
4. Linked braking systems (LBS)
5. Anti-lock braking systems (ABS)
6. Trouble shooting motorcycle and snowmobile brake system concerns

Q. LABORATORY OUTLINE:  None ☐ Yes ☒

I. Introduction
1 Laboratory procedures and policies
2 Basic laboratory introduction

II. Introduction to Frame Construction
1 Styles and designs
2 Role of Technicians
3 Minor maintenance
III. Frame Inspection
1. New York State DOT compliance
2. Federal Motor Vehicle Safety Standards

IV. Front Suspension Systems
1. Types
2. Conventional fork
3. Single-sided front fork

V. Steering Geometry
1. Rake/trail
2. Dampeners

VI. Rear Suspensions
1. Types
2. Maintenance
3. Theory

VII. Snowmobile Suspension Systems
1. Track replacement
2. Cleat replacement
3. Alignment procedures