

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



MASTER SYLLABUS

**COURSE NUMBER – COURSE NAME
MSPT 120 - Frame and Suspension Systems**

Created by: Mark R. Hill

Updated by: Christopher Mayville

Canino School of Engineering Technology

Department: Mechanical & Energy Technologies

Semester/Year: Fall 2018

- 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:

<u>Course Student Learning Outcome</u> <u>[SLO]</u>	<u>Program Student Learning Outcome</u> <u>[PSLO]</u>	<u>GER</u> <i>[If Applicable]</i>	<u>ISLO & SUBSETS</u>	
a. Perform precision measurements key to frame and suspension set-up	MSPT SO 4		ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
b. Identify various frame and suspension design configurations common to motorsports			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
c. Diagnose and repair frame and suspension system problems			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
d. Calculate steering geometry and rake and trail concerns affecting vehicle handling			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
e. Identify braking systems unique to light-weight motorsports vehicles			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
f. Perform gas shock rebuilding specific to rider weight and riding style	MSPT SO 4		ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

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 checked="" 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:**

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

Bombardier Recreational Product's Guide to Service Fundamentals and Principles, Bombardier Recreational Products, 2003

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**