

## Course Syllabus

# POWER TRAINS & MANUAL TRANSMISSIONS

ATO 1240 .....3.5 CREDITS.....SPRING 2021

### **Instructor:**

Art Koudelka  
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### **Office Hours:**

M 7:30 - 8:00 & 12:00 - 12:30  
T 7:30 - 8:00 & 10:00 - 10:30  
W 7:30 - 8:00 & 1:00 - 2:00  
Th 9:00 - 11:00

### **Class Meets:**

T 8:00 - 9:50 (Lecture)  
T 10:30 - 1:00 (Lab 1)

### **Course Purpose:**

This course includes information relative to clutches, manual transmissions and differentials on front wheel drive and rear wheel drive vehicles. The course will study of the operation, service and rebuilding of constant mesh, fully synchronized manual transmissions and transaxles.

### **Required Texts:**

Jack Erjavec. **Manual Transmissions and Transaxles**. 6th Edition, Delmar Publishers, Inc., 2016.

### **Grading:**

Your final grade will be computed from the classroom (45%), the lab (45%) and your instructor's subjective evaluation (10%).

**Attendance and punctuality are required and will affect one's grade.**

### Cell Phones/Electronic Devices

Please be considerate of the educational process and of others. Please refrain from bringing cellular phones, electronic devices (I-pods or MP3 players) to class. If you must bring them with you, please turn them **off** during class. If you have a situation that makes these devices necessary, please let the instructor know ahead of time and place them in a **silent** mode of operation.

**Students not adhering to this policy will have points deducted or be asked to leave the classroom or lab.**

#### A. Classroom.....45%

	<u>Points</u>	<u>%</u>
1. Quizzes (4)*	150	47
2. Chapter Questions*	70	22
3. Final Exam	<u>100</u>	<u>31</u>
	320	100

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1A. There will be **four** announced quizzes. Make-up quizzes must be done within one week of your absence during the instructor's office hours. If not, zero points will be marked down for your score.

2A. Thirteen chapters will be assigned to read from your textbook. The student will be Required to write a **three page** chapter summary for each chapter.

**Homework will not be accepted late!**

All chapter summaries must be written in ink and only on one side of the paper.

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<u>Chapter</u>	<u>Topic</u>	<u>Due Date</u>
1	Manual Drive Trains and Axles	1/26/2021
3	Clutches	2/02/2021
3 (sm)	Servicing Clutches	2/09/2021
4	Manual Transmissions	2/16/2021
4 (sm)	Servicing Transmissions	2/23/2021
6	Driveshafts & U-Joints	3/02/2021
6 (sm)	Servicing Driveshafts	3/09/2021
5	Front Drive Axles	3/23/2021
5 (sm)	Servicing Front Drive Axles	3/30/2021
7	Differentials & Drive Axles	4/06/2021
7 (sm)	Servicing Differentials	4/13/2021
10	Drivetrain Electrical Systems	4/20/2021
10 (sm)	Servicing Drivetrain Elec. Systems	4/27/2021

(sm) = Shop Manual

**B. Lab.....45%**

**ATO 124 Lab Objectives**

<b><u>Objective</u></b>	<b><u>Description</u></b>	<b><u>Points</u></b>
1.	Identify Worksheet Packet	10
2.	Remove, Inspect and Replace a flywheel, pressure plate assembly, clutch disc, (release) throw-out bearing and pilot bearing/bushing.	15
3.	Bleed a hydraulic clutch system	10
4.	Inspect flywheel and ring gear for wear and cracks	5
5.	Measure flywheel runout and crankshaft endplay	10
6.	Check fluid level & condition on a manual transmission and check for leaks.	5
7.	Remove and replace a <b>RWD</b> manual transmission	15
8.	Remove and replace a <b>FWD</b> manual transaxle	20
9.	Calculate gear ratios (and speed and torque changes) on RWD and FWD manual transmissions	20
10.	Disassemble & Reassemble a <b>RWD</b> manual transmission	25
	a. clean and inspect all components	
	b. parts I.D.	
	c. diagram power flow	
	d. calculate gear ratios	
	e. measure and adjust end-play	
11.	Disassemble & Reassemble a <b>FWD</b> transaxle	25
	a. clean and inspect all components	
	b. parts I.D.	
	c. diagram power flow	
	d. calculate gear ratios	
	e. remove and replace differential assembly	
	f. measure shaft end play/preload	
12.	Inspect, remove and replace a <b>RWD</b> drive shaft	10
13.	Inspect, remove and replace a universal joint	10

## ATO 124 Lab Objectives Con't.

<u>Objective</u>	<u>Description</u>	<u>Points</u>
14.	Check driveshaft balance and phasing (measure driveshaft runout and angle).	10
15.	Remove and replace a <b>FWD</b> half shaft	10
16.	Remove and replace a FWD bearing/hub assembly	15
17.	Check and adjust differential fluid level (check for leaks and inspect housing vent)	5
18.	Drain & Refill Differential	10
19.	Remove and replace axle shafts, axle shaft seals, axle shaft bearings and retainers	15
20.	Differential pinion oil seal replacement	10
21.	Overhaul Integral Carrier style differential	25
	a. measure and adjust pinion preload	
	b. measure and adjust backlash & ring gear run-out	
	c. measure axle shaft end-play	
	d. teardown, clean & inspect all parts	
	e. measure and adjust pinion depth, pinion preload and ring gear backlash	
	f. check ring and pinion tooth contact pattern	
22.	Overhaul Removable Carrier style differential	25
	a. measure and adjust pinion preload	
	b. measure and adjust backlash & ring gear run-out	
	c. teardown, clean & inspect all parts	
	d. measure and adjust pinion depth, pinion preload, ring gear backlash and set side bearing preload.	
	e. check ring gear and pinion tooth contact pattern	
23.	Diagnose noise, slippage and chatter concerns on a limited slip differential	5
24.	Measure breakaway torque on a limited slip differential.	<u>10</u>
	<b>Total lab Points</b>	<b>320</b>

**Attendance:**

Students will be given a timecard and are **required** to clock-in prior to 10:30 a.m. (the beginning of lab) and clock-out no earlier than 1:00 p.m. (the end of lab). For each tardy arrival or early departure **10 points** will be deducted from the student's total points! If you miss more the 1/2 the minutes of a lab session, it will be considered a full unexcused absence.

**20 points** will be deducted from the student's total points for each unexcused absence!

**C. Subjective Evaluation.....10%**

1. Worth 71 points based on the following:
  - a. attendance
  - b. tardiness
  - c. work attitude
  - d. initiative
  - e. practices safety
  - f. follows directions
  - g. cleans-up shop

**Final Grade:**

	<b><u>Points</u></b>
<b>1. Classroom</b>	<b>320</b>
<b>2. Lab</b>	<b>320</b>
<b>3. Subjective Evaluation</b>	<b><u>71</u></b>
	<b>711</b>

**Grading Scale:**

A = 711 - 640 (90%)  
B = 639 - 569 (80%)  
C = 568 - 478 (70%)  
D = 477 - 426 (60%)  
F = 425 and below

**Student Withdrawal**

To withdraw from an individual course, a student can initiate a withdrawal request through WebAdvisor or through his or her instructor. In the absence of the instructor, the student should contact the Dean responsible for the course's scheduling. Your instructor also has the capability to withdraw you from a course, if you contact them in writing.

The deadline to get an automatic withdrawal-passing (WP) grade for the spring 2021 semester is, April 13, 2021. Check the college catalog on-line for details at this address: [http://catalog.ivcc.edu/studentservices/academic\\_course\\_information/](http://catalog.ivcc.edu/studentservices/academic_course_information/) Scroll down the page and locate "Withdrawal from Classes" on the left.

Students should be aware of the impact of a withdrawal on full-time status for insurance purposes and for financial aid. It is highly recommended that students meet with their instructor or with a counselor before withdrawing from a class to discuss if a withdrawal is the best course of action for that particular student.

**Financial Aid Statement:**

Withdrawal from a course can affect financial aid. Students who receive financial aid should see an advisor in the financial Aid Office before withdrawing from a course. **Contact the Financial Aid Office before you stop attending classes to learn about the consequences!**

**Disability Statement:**

You *may* be eligible for academic accommodations if you have a documented physical, sensory, mental health (anxiety, depression, bipolar disorder, AD/HD, post-traumatic stress, or others) or cognitive disability such as a learning disability. If you have a disability that limits access to the learning environment or impacts your coursework, and need more information regarding possible accommodations, please contact Tina Hardy at ([tina\\_hardy@ivcc.edu](mailto:tina_hardy@ivcc.edu), 224-0284).

**SAFETY GLASSES MUST BE WORN AT ALL TIMES WHEN IN THE AUTOMOTIVE LABORATORY. IT IS THE STUDENTS RESPONSIBILITY TO HAVE HIS/HER SAFETY GLASSES ON AT ALL TIMES. IF THE STUDENT IS NOT WEARING SAFETY GLASSES HE/SHE WILL NOT BE PERMITTED TO STAY IN THE LABORATORY. HE/SHE WILL BE MARKED ABSENT AND WILL HAVE TO MAKE UP THE LAB OBJECTIVES.**

**Important dates: (mark your calendar)**

- January 18.....College Closed (Martin Luther King, Jr. Day)
- February 15.....College Closed (All President’s Day)
- March 12.....No Classes (Development Day)
- March 15 – 20.....**College Closed** (Spring Break)
- April 2.....Registration for the Summer Semester Begins
- April 8.....Registration for the Fall Semester Begins
- April 13.....Last Day for Student Withdrawal
- May 11.....**Final Exam**