DTEC 105
Powertrains I

Lecture: Mr. Cross
Lab: Mr. Davis

Credits: 4 credit hours
Lecture:
  Tues    11:00-11:50    Crawford 103
  Wed/Fri 12:00-12:50    Charlton 125

Lab:
  Lab 01  Wed 10:00-11:50    Marshall 117
  Lab 02  Wed 1:00-2:50      Marshall 117
  Lab 03  Wed 3:00-4:50      Marshall 117

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Course Description:
This course will cover the operation, diagnosis, and repair of power transmission components on heavy equipment and over-the-road tractors. Topics addressed will include: clutches, standard transmissions, torque converters, powershift transmissions, drive shafts, differentials and final drives.

Course Objectives:
Competencies to be developed:
1. To understand the functioning of clutches as well as to be able to identify clutch components and to troubleshoot problems with clutch systems. Additionally, students will install a clutch on a stationary engine.
2. Students will learn how to disassemble and assemble a manual transmission working in small groups. A presentation of the transmission’s function, distinct features as well as failure analysis if appropriate will also be part of the project.
3. To develop an understanding of the functioning of how Power Shift transmissions work and the testing procedures required.
4. To comprehend the workings of driveshafts and universal joints as well as differentials, rear axles and final drives.
5. To gain an understanding of modern systems and the heavy equipment industry through visits to area service providers.

Course Materials:
2. Course handouts given in class and/or available at the instructor’s web page.
**Student Responsibilities:**
1. To read the course syllabus and to ask questions if the material is unclear.
2. To attend all classes and labs
3. To attend scheduled lab unless previous arrangements are made with the instructor.
4. To make up any and all class work covered during their absence.
5. To complete on time all work including reading, homework, lab write-ups and the term project. Student’s work will show careful, neat, complete and individual effort.

**Lab:**
1. A lab write-up will be due after each lab. The lab is due at the beginning of the following week’s lab.
2. Students are required to attend their scheduled lab unless previous arrangements have been made. Due to the fact that labs are balanced, every effort should be made to attend the scheduled lab.
3. Safety is the most important aspect of the lab work. If a student performs in an unsafe manner, he will first receive a verbal warning. The second instance the student will receive a written warning and the third instance will mean removal from the lab and course.

**Attendance Policy:**
- All attendance policies as listed below from the Student Handbook will be followed.
- If a student doesn’t attend a class, then he/she cannot participate.
- The missing of four classes will likely lead to removal from the class.

**Excerpts from the student handbook regarding attendance:**
  a. Students are expected to attend all scheduled classes and laboratories. However, special circumstances such as illness, religious holidays, travel difficulties, family emergencies and participation in college sponsored events may make certain absences unavoidable. In such instances, students should notify instructors of these special circumstances.
  b. Although regular class attendance will not guarantee passing grades, irregular attendance will usually have an adverse effect upon them. Because final student evaluation is based upon measurable academic achievement, however, instructors will not lower final grades solely on the basis of attendance.

**Testing Accommodations:**
If you wish to use test accommodations for an exam or need extra help to be successful in the course please speak with me.
Plagiarism:

- The Student Handbook’s policy on plagiarism will be strictly followed. Students that plagiarize can receive an F for the entire course.

**The Code of Academic Honesty from the Student Handbook**

Academic honesty promotes continued academic and occupational success. Maintenance of academic honesty and quality education is the responsibility of both faculty and students. Any written assignment (including all electronic media) submitted by a student must be original authorship. Representation of another’s work as his/her own shall constitute plagiarism. Any charge of plagiarism must be substantiated by a direct correlation in wording and organization between the original and plagiarized copy. Any examinations must be taken according to prescribed procedure, as determined by the faculty member in charge. Any form of unauthorized written material used by a student or evident on his/her person during or directly following an examination shall be deemed a violation of academic honesty. Unauthorized correspondence between students during any examination or preparation of submitted work, which cannot be substantiated by physical proof or eye witness verification, shall be considered an infraction of the code and shall subject involved parties to corrective procedures.

**Grading:**

- 10% Participation
- 35% Lab work
- 35% Homework, Quizzes, Tests and the Final Exam
- 20% Manual Transmission Project

**Course Topics:**

1. **Clutches:**
   - Overview and terms
   - Dry
     - Push-type
     - Pull-type
     - Single & double disk
   - Wet
     - Single plate
     - Multiple plate
   - Troubleshooting & failure analysis

2. **Gear Ratio, Speed and Torque Calculations**

3. **Standard Transmissions:**
   - Single Countershaft Theory of Operation
   - Double Countershaft Theory of Operation
     - Main Box
     - Auxiliary Box
     - Auxiliary Box Air Control

4. **Torque Converters**
   - Theory of Operation

**Reading Assignment**

- Chapter 14
- Chapter 15 & 16
- Chapter 17
5. **Planetary Gearing Principles**  
   - Components  
   - Theory of Operation  
   - Planetary Gear Ratio Calculation  

6. **Planetary Power Shift Transmissions**: Chapter 18 & 19  
   - Powerflow  
   - Hydraulic control  
   - Diagnostics  

7. **Electronically Automated Standard Transmissions**: Chapter 20  
   - Theory of Operation  
   - Diagnostics  

8. **Driveshafts and Universal Joints**: Chapter 22  
9. **Rear Axles**: Chapter 23  
   - Semi-floating  
   - Full-floating  

10. **Differentials**: Chapter 24  
    - Operation  
    - Limited Slip  
    - Locking  

11. **Final Drives**: T.B.A.  
    - Inboard  
    - Outboard  
    - Bull gear  
    - Planetary  

**Labs:**  
- Lab Safety and Overview  
- Clutch Lab I  
- Clutch Lab II  
- Transmission Project  
- Differential/Rear Axle Lab  
- Powershift Lab  
- Autoshift Lab  
- Electronic Transmission Testing Lab