

Diesel Engine performance efficiency and ecology

Spring term 2022

The class formerly known as Tune-up

Seven-steps troubleshooting

Step one: identify the problem.

Step two: establish a theory of probable cause.

Step three: test the theory of probable cause.

Step four: establish a plan of action and identify potential effects.

Step five: implement the plan or escalate

Step six: verify full system functionality.

Step seven: document findings, actions, and outcomes.

You are building your future Today at LBCC..
Your work history starts here.

Instructor: Dan McIntosh

Schedule Monday through Thursday 07:00-10:50

Course Description: This course studies diesel engine adjustments and troubleshooting techniques to achieve optimum engine performance and efficiency . This class will include mechanical / electronically managed engines. It will cover diagnostics and troubleshooting, load testing and run in procedures using a dynamometer

Course outcomes. Students will be able to after taking this class.

1. Repair diesel engines and related equipment safely
2. Maintain Diesel and high compression gas engine management systems
3. Troubleshoot Diesel and high compression gas engine management systems
4. Repair Diesel and high compression gas engine management systems
5. Demonstrate technical write-up skills

REQUIRED TEXT : CDX Medium heavy vehicle systems / CDX Engines textbook

Masks Required Statewide

~~Masks, face coverings or face shields are currently required statewide for **offices and indoor public spaces** (for example, grocery stores, pharmacies, public transit, personal services providers, restaurants, bars, retail stores, and more). Masks, face coverings or face shields are required in **outdoor public spaces** when physical distancing of at least 6 feet is not possible.~~

~~**Children age 5 and up** are required to wear a face covering. **People with a disability or medical condition** may request accommodation from the business if they cannot wear one.~~

As of the start of Spring term 2022 Physical distancing is still observed wherever possible.

Required student materials: Tablet or laptop able to run CDX
(phones are not acceptable)

OSHA approved ear muff style hearing protection.

If you are having difficulty with any of the concepts, procedures or presentation of this course, do not hesitate to talk to me. My door is always open to talk to or to help students. Due to the fact that we are all here to learn a trade and go get a job to support ourselves when we are done, what you learn now becomes very important! I have never heard someone say "I wished I had learned less in school"

MY EXPECTATIONS OF YOU: the student

To attend class To be one time to class
To take notes in class To ask questions in class
Read the textbook To do class assignments in typewritten form
To participate in as many lab exercises as possible
To stay until class is over To attend field trips
To be in uniform and work attire for lab including ppe
To come to me and talk if you are having a problem with the class or me, the instructor.

What you the student can expect of me the instructor

To create a learning atmosphere To be willing to talk through questions

To only give accurate information.

To be told if something said in lectures is speculation or opinion

To give failing grades for failing performance

Campus Resources

The learning center is an excellent resource for improving your skills as a learner and is a good place to study and do homework. The helpful staff can help with any course you are taking at LBCC.

Students with disabilities:

If there are students with disabilities our campus has many services available to those that might need help.

I will be happy to contact them on your behalf if so asked. Sign language and English speaking interpreters are available upon request with a documented disability The phone number Disability Services is 917-4683

The Heavy Equipment/Diesel Department Absences Policy

Absences Policy: Three undocumented class absences during the 11 week term shall result in an automatic course grade of "F" for material nonparticipation.

Only absences covered through the Center for Accessibility Resources documentation, or DOCUMENTED emergency absences (for yourself only) will be excused. Job conflicts, oversleeping, car trouble, travel delays, traffic jams, and other such minor life events are not considered emergencies.

Documentation must be physically handed to the instructor within five (5) business days (Monday through Friday) of the absence for it to be excused.

For further information see also:

[7000 Series Administrative Rules - Student Affairs](#)

Course Requirements:

A: All written work will archive a value of at least 70% of maximum (ie. Tests, lab sheets and weekly assignments.)

B: Completed work shall be clean, neat and legible as well as organized.

C: A craftsmanship attitude shall be developed to include the following:

D. Safety Requirements will be observed as follows:

- 1: Eye protection will be worn during all shop exercises.
2. Care, maintenance, selection and use of tools and equipment.
3. Observance of general and specific safety requirements.
4. Observance of good housekeeping criteria of an individual and general shop nature
5. Proficiency in working with shop manuals as well as online resources and parts ordering.

This course is designed to develop skills and knowledge of the correct methods of testing, repair or checking each of the following running variables for the correct operation, tolerance, wear factor and cleaning:

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|--------------------------------------|--|
| A: Injector timing | I: Pump timing |
| B: Ultra high pressure injection sys | J: Governor Adjustments |
| C: Boost / Wst gates and vg turbos | K: Data transfer |
| D: Pizo Injectors | L: Compression testing |
| E: Injector function | M: Horsepower/vibration |
| F: High pressure Common rail | N: Electronic diesel timing |
| G: Engine Running events | O: Engine breaks |
| H: Electronic unit injectors | P: Electronic problem solving |
| Q: Emissions control strategies | R: Catalytic reduction |
| S: Alternate fuels and the future | T:Metals,failure analysis and machine pivots |
| U:Exhaust catalyst DEF | |

This class also stresses the development of skills and knowledge required to perform the following operations at the proficiency of trade level standard. The student will acquire these proficiencies while using correct engine machine shop operations and manufacturer's specifications to do these hands on tasks:

Grading will be as follows:

Lab Projects / Work Habits 40%

Homework and research papers 40%

Mid term exam Final exam 20%

Compulsory statements for disabilities and Diversity.

LBCC has many **Learning Resources** designed to help you succeed.

The [Learning Center](#) can help you improve your lifelong learning skills and is a great place to study. They have computers, tutoring services, study skill resources, and a very helpful staff.

Counselors are available in the counseling center. There are many ways they can help you succeed as an LBCC student.

Many learning activities in this class require a computer with a high speed internet connection. [Computer Labs](#) are available on this campus, in Corvallis, Lebanon and Sweet Home.

[Student Success Resource Guide -- Virtual Version](#)

https://docs.google.com/document/d/1cgNhy-Rd35zVZf9J_1gwH-8_XgUjmgVRXZRMVux-oM/edit#

<https://www.linnbenton.edu/current-students/student-support/center-for-accessibility-resources/>

Request for Special Needs or Accommodations 1-03-2020

Students who may need accommodations due to documented disabilities, who have medical information which the instructor should know, or who need special arrangements in an emergency should speak with their instructor during the first week of class. If you believe you may need accommodations but are not yet registered with the Center for Accessibility Resources (CFAR), please visit the [CFAR Website](#) for steps on how to apply for services or call (541) 917-4789.

LBCC Comprehensive Statement of Nondiscrimination

LBCC prohibits unlawful discrimination based on race, color, religion, ethnicity, use of native language, national origin, sex, sexual orientation, gender, gender identity, marital status, disability, veteran status, age, or any other status protected under applicable federal, state, or local laws. For further information see Board Policy P1015 in our [Board Policies and Administrative Rules](#). Title II, IX, & Section 504: Scott Rolen, CC-108, 541-917-4425; Lynne Cox, T-107B, 541-917-4806, LBCC, Albany, Oregon. To report: linnbenton-advocate.symplicity.com/public_report

Course outcomes

Notice to Construction and forestry students:

All JDU classes must be completed by graduation.

Diesel engine performance, efficacy and ecology

Weekly plan.

Week 1

Electricity review

Atoms, static, magnets, conductors, circuits relays

CDX text

Self-induction, Mutual induction, relays Diodes, rectifiers transistors

Lab: finish up engines and live run

Week 2

Engine mechanical tune-up

- Mechanical management and governing
- Mechanical pump Timing
- Gauges measurement and conversion
- Timing diagrams
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Lab: finish up engines and live run

Week 3

Electronic engine control (Shop engines)

Computers, Sensors, memory, IO

EUP, EUI, HUIE systems

EPA Regs history

LAB: Begin lab assignments

Week 4

High Pressure Common Rail

- Deere
- HP Delphi HP Nippon
- Paccar

LAB: Continue lab assignments

Week 5

Intro to emission, emissions strategies and emissions devices

- EGR VGT
- Cooled EGR
- **LAB: Continue lab assignments**

Week 6

(after treatment trucks with multiplexing)

- Particulate filters
- Selective reduction catalyst
- DEF systems

LAB: Continue lab assignments

Week 7

- Preventative maintenance
- Fluid analysis
- Alternate fuels

LAB: Continue lab assignments

Week 8

- Metal manufacture and failures
- Failure analyses

LAB: Continue lab assignments

Week 9

- Machine pivot points and line boring
- Repair welding

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LAB: Continue lab assignments

Week 10

Projects/Review

Week 11 finals

I have read and acknowledged the content of this class syllabus and agree to comply with the rules therein by signing this paper .

_____ Date _____