SAN JUAN COLLEGE
Success Matters

# DISL 131-DRIVABILITY AND EMISSIONS 5 CREDITS

# SYLLABUS

## CATALOG DESCRIPTION

On and off-highway electronic management and emissions systems. Will incorporate the use of electronic service tools, software programs, on-board diagnostics, multiplexing, and diesel emission after treatment. Safety will be strictly enforced. A grade of "C" or better must be earned to receive credit for this course

Prerequisites: DISL 115

Semester Offered: Spring

### *Common Student Learning Outcomes*

*Upon successful completion of San Juan College programs and degrees, the student will demonstrate competency in…*

BROAD AND SPECIALIZED LEARNING
Students will actively and independently acquire, apply, and adapt skills and knowledge with an awareness of global contexts.

CRITICAL THINKING
Students will think analytically and creatively to explore ideas, make connections, draw conclusions and solve problems.

CULTURAL AND CIVIC ENGAGEMENT
Students will act purposefully, reflectively, and ethically in diverse and complex environments.

EFFECTIVE COMMUNICATION
Students will exchange ideas and information with clarity in multiple contexts.

INFORMATION LITERACY
Students will be able to recognize when information is needed and have the ability to locate, evaluate, and use it effectively.

INTEGRATING TECHNOLOGIES
Students will demonstrate fluency in the application and use of technologies in multiple contexts.

*Student work from this class may be randomly selected and used anonymously for assessment of course, program, and/or institutional learning outcomes. For more information, please refer to the Dean of the appropriate School.*

## Course Learning Outcomes

1. To provide student with techniques and diagnostic procedures to perform a complete engine performance and drivability evaluation, record discrepancies noted, and perform minor adjustments and repairs. The student will also be capable of performing various diagnostic tests utilizing specialized test equipment to determine additional required repairs.
2. Provide an entry level understanding of the operation, maintenance, and diagnosis of failures of modern diesel emission reduction technology.

## Specific Learning Objectives

Upon successful completion of the course, the student will be able to…

1. Explain the operating principles of basic electronic components.
2. Describe the operating principles of electronic engine control system including the role of inputs, control, and outputs.
3. Describe the basic operation of engine control computers including A/D converters, ROM, RAM, PROM, EPROM, EEPROM, and FEPROM memory, interfaces and clock chips.
4. Explain how on-board engine computers communicate with other control modules, personal computers, and service tools.
5. Define what a software program is, what it does, give an example of program used by service technicians, and fleet managers.
6. Describe the basic steps used when troubleshooting engines equipped with electronic controls.
7. Compile step by step sequential troubleshooting practices.
8. Given a list of common electronic engine system malfunctions, match them to the most common causes.
9. Given an engine, choose the right electronic service tool and diagnose an electronic fault code.
10. Identify the compounds and gases found in exhausted engine end gases and contrast those that are classified as noxious.
11. Summarize the EPA and CARB emission tests required for diesel engine certification.
12. Explain the operating principles of oxidation, catalytic converters, reduction catalytic converters, and diesel particulate filters.
13. Describe the effects that fuel injection timing can have on a diesel engine and exhaust emissions.
14. Discriminate between the operating principles of passive regeneration and active regeneration in diesel emission systems.
15. Analyze vehicle/equipment emission components using OEM engine service tools.
16. Outline troubleshooting and replacement procedures for diesel particulate filters and diesel oxidation catalysts.
17. Given a truck with multiple networked electronic systems, access a message identifier on its chassis data bus.
18. Given an electronically controlled component, demonstrate the procedure required to access a failure mode identifier (FMI) using electronic service tools.
19. Describe the principles of operation of thermistors, variable capacitance sensors, hall-effect sensors, potentiometers, induction pulse generators, and piezoresistive sensors.
20. Break down the stages of a computer processing cycle.
21. Describe how an ECM processes inputs and uses programmed data to generate outputs.
22. Differentiate current electronic engine management systems by manufacturer.
23. Distinguish between customer and proprietary parameters.
24. Carry out the processes used to reprogram an electronic engine ECM with proprietary data.