

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Automotive Technology 144 – Noise, Vibration, and Harshness

.5 hours lecture, .5 unit

Catalog Description

This course includes a detailed study of modern Noise, Vibration, and Harshness (NVH) systems and service procedures. This course includes inspection, adjustment, and repair procedures for NVH systems, including methods of diagnosing and repairing various mechanical, electronic, and hydraulic components using specified tools and procedures. This course is complemented by 144L NVH Lab, 144T NVH Assessment Test Out, and Work Experience where students will perform specific ASE competencies related to NVH diagnosis and repair.

Prerequisite

None

Course Content

- 1) Lecture:
 - a. Introduction and safety
 - b. Equipment operation
 - c. Basic sound theory
 - d. Basic laws of physics as related to automotive rotational systems
 - e. Noise frequency system theory of operation
 - f. Theory and operation of the electronic measurements of sound
 - g. Interrelationship of NVH theory and design as it relates to other vehicle systems noise transfer
 - h. Vehicle systems design effects on NVH performance
 - i. Vehicle Communication Measurements Module (VCMM)
 - j. Frequency calculations based on ratios

Course Objectives

Students will be able to:

- 1) Demonstrate standardized safety and hazardous waste handling practices.
- 2) Successfully navigate manufacturer specific repair information for specific NVH repairs.
- 3) Demonstrate how to perform a driveshaft balance using the VMS Vibration Analyzer.
- 4) Perform vibration diagnostics using the VMS Vibration Analyzer.
- 5) Diagnose various vibration concerns on FWD and RWD vehicles.
- 6) Determine pulley ratios and calculate firing frequencies.
- 7) Measure tires using a tire frequency chart to calculate tire and driveline vibrations.
- 8) Demonstrate proper use and diagnosis of concerns using the ChassisEAR tool.
- 9) Diagnose engine speed vibrations

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration using distance education technologies, performance projects where a student is required to submit assigned artifact examples of specific ASE competencies.

- 1) Quizzes, written exams, and hands-on performance exam that measure students' ability to safely identify necessary action or repair using distance education methodologies.

- 2) Practical exercises that measure students' progress toward mastering tasks related to diagnosis, replacement, repair, testing, of NVH systems and components.
- 3) Required skills-based summative assessment that measures students' ability to successfully complete the necessary ASE tasks related to diagnosis, replacement, repair, and testing of NVH controls, by completing specific tasks in the student's portfolio.
- 4) Students must complete all of the required web based training modules.

Special Materials Required of Student

- 1) Approved safety glasses
- 2) Must have access to high speed internet
- 3) A signed Ford dealership sponsoring agreement form
- 4) A computer or tablet with a large screen size
- 5) Safe clothing - uniform as required by dealership

Minimum Instructional Facilities

- 1) Auto tech lab (20 bays)
- 2) Various training vehicles
- 3) Smart classroom
- 4) Distance education technologies

Method of Instruction

- 1) Lecture and demonstration are both synchronous and asynchronous. Students are required to attend all lectures and participate with the instructor and other students during live lectures. Students will have access to recorded lectures.
- 2) Individual assistance by file sharing, computer sharing, live demonstration of project based methods for diagnosing and repairing vehicles.
- 3) Discussion boards will be used to assign weekly reflections and posting of student assignments.
- 4) Classroom management system exercises will be broadcast as group assignments.

Out-of-Class Assignments

- 1) **Reading:** assigned course materials, manuals, content on websites, and more.
- 2) **Writing:** assignments where students describe the required tasks related to diagnosis, replacement, repair, and testing of NVH systems, components, and controls, and more.
- 3) **Other:** web-based training modules (pass online pretests prior to laboratory "Test Out"), portfolio performance projects related to NVH systems, components, and controls, and more.

Texts and References

- 1) Required (representative examples):
 - a. Student workbooks – will be provided electronically.
 - b. Required: VanGelder, Kirk. Fundamentals of Automotive Technology. Jones and Bartlett Learning, 2023.
 - c. Web Based Training Modules will be provided electronically.
 - d. Workshop Manuals will be provided electronically.
- 2) Supplemental: None

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Accurately describe various Noise, Vibration, and Harshness system conditions.
- 2) Identify Noise, Vibration, and Harshness problems by navigating the workshop manual based on symptoms or codes.
- 3) Communicate effectively and professionally in a diverse setting that includes prospective colleagues, clients, and supervisors.
- 4) Comply with environmental health and safety regulations at the state and federal levels.