Syllabus - AUTO 123 Section(s) 01 Brakes/Powertrain

Instructor's Name
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Automotive Technology Instructor

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Credit Hours for Course
5

Course Description
This course will teach students the principles of hydraulic brakes and friction, as well as the operation and construction of drum and disc brake systems. Students will also learn the operation, construction and repair of clutch systems, drivelines, and constant velocity joints.

Required Materials
Chapters 4-6, 12, 57-60, 69, 70, 75-79

Method of Course Delivery
Classroom instruction and demonstration.

Assessments
Achievement of these outcomes will be measured by the use of graded homework assignments, quizzes, and tests in the proportions outlined below:

60% derived from overall major test average
20% derived from overall quiz average
20% derived from overall assignment average
The final grade is further subject to adjustment from lack of attendance as outlined in the Attendance Policy listed below.

Course Schedule
Meets from 8:00 a.m. to 9:50 a.m., 5 days per week, for 8 weeks.

Course Outline
Fundamentals of Brake Systems
Automotive brake systems
mechanical brake systems
modern brake systems overview
Hydraulics and the principles of braking
hydraulic principles
braking principles
Pedals, fluid, and master cylinders
pedal physics
brake fluid properties and designations
bleeding procedures
  pressure
  vacuum
  manual or pedal
  gravity
  bleeding sequence
master cylinders
  tandems
  design and operating principles
  reservoirs
Master cylinder service
Valves, switches, lamps, and brake lines
  pressure differential switches
  proportioning valves
  height sensing proportioning valves
  metering valves
  combination valves
  warning switches and lamps
  hydraulic hoses and lines
Asbestos
  safety hazard
  asbestos collection methods
Drum brakes
  design
  basic operation
  self-energization
  servo and non-servo designs
  drum brake components
    drums
    wheel cylinders
    shoes and linings
    adjustment mechanisms
  reconditioning drums
  drum brake service procedures
  wheel cylinder service procedures
  safety considerations
Disc brakes
  design and operation
  calipers
  seal design
  caliper designs
  discs or rotors
  pads and linings
  noises
  reconditioning discs or rotors
  disc brake service procedures
  caliper service procedures
  safety
Power assist units
vacuum power assist
pressure differential
vacuum booster operation
reaction force
hydraulic power assist
servicing procedures
safety considerations
Parking brakes
components
actuating components
switches
linkages
drum and disc applications
service procedures
Brake system diagnosis and troubleshooting
noises
pulsation
pulling/ grabbing
fade
pedal feel
Antilock brake overview
Clutch Fundamentals
Clutch theory
Components
linkages
pressure plates
discs
flywheels
bearings
Adjustments
Removal and installation procedures
Noise diagnosis
Safety
Front and Rear Drive Lines and Front Drive Axles
U-joints
CV joints
Driveline angles and timing
Driveline balance
Maintenance
Noise diagnosis
Safety
Wheel Bearings
Bearing types
Adjustments
Removal and installation procedures
Parts ordering
Safety
Axle and Wheel Seals
Seal types
Removal and installation procedures
Ordering
Safety
Light Duty Rear Axle Assemblies
Rear Axle Configurations
  full floating
  semi floating
  flange type
  c-lock type
Adjustment
Replacement procedures

**Grading Policy**

Testing and grading is done at North Idaho College for the purpose of measuring the student’s progress through-out the course of study. If you're not learning, then both you and the instructor need to know that.

**IN THE CLASSROOM**

You will receive a separate grade for each course you registered for.
Students seeking a Certificate of Completion or an AAS Degree must earn an overall grade point average of at least a 2.00 (C) in all courses required in the program.
A grade of "C-" or better is also required for each specific course listed within the program outline.
Theory grades may be based on a combination of one or more of the following:
Objective tests, quizzes, study guides, chapter review questions, possible reports, and attendance.
Each test must be passed with a grade of 65 or better to pass each course.
You will only be allowed to retake 1 failed test per course.

**IN THE LAB**

Lab grades will be based on one or more of the following:
Successful completion of assigned projects
Grades given on live work projects
Safety and shop practices
Performance tests
Attendance

**GRADING SCALE FOR THEORY AND LAB**

A = 96-100
A- = 93-95
B+ = 90-92
B = 86-89
B- = 83-85
C+ = 80-82  
C = 76-79  
C- = 73-75  
D+ = 70-72  
D = 67-69  
D- = 65-66  
F = < 64

**Attendance Procedure**

Attendance is mandatory and directly affects your grade for each course.

**Definition: TARDY**  
The student has arrived in the class or lab room after instructor has started the class session.  
2 Tardies = 1 Absence

**Definition: ABSENCE**  
The student is not present in the class or lab room for any reason, except for school authorized events.  
Students arriving in class/lab 15 minutes or more minutes late are considered to be absent.

**Definition: PROBATION**  
A formal written statement informing the student of their below standard level of performance, possible consequences, and what they need to do to correct it.  
You will be placed on probation if your cumulative grade average drops below a "C-" (1.75)

Absences cannot normally be made up, except in certain lab situations with instructor permission and proper supervision. Extended illness or emergency situations will be dealt with on an individual basis, with the school counselor being involved if necessary.

You will be allowed to miss 1 (one) day of class for each credit of a course you are enrolled in. Each additional absence will take 5 points off of your final course grade average.

**EXAMPLE:**  
AUTO 126 is a 3 credit course. You may miss 3 days without penalty. If you missed 6 days, (3 penalty days), 15 points will be taken off of your final course grade for AUTO 126. If you had earned an 86, a "B", 15 points off would reduce your average to a 71, a “D+”.

**Program Expected Outcomes**

AAS Degree

Understand and explain proper safety procedures in regards to overall shop safety practices with emphasis on maintenance/repair of automotive systems.

Effectively troubleshoot and repair the following automotive systems required for NATEF program certification:

Engines  
Automatic transmissions and transaxles  
Manual drive train and axles
Suspension and steering
Brakes
Electrical/Electronic systems
Heating and air conditioning
Engine performance

Demonstrate basic computation and communications skills in performing both technical and
general functions required of an automotive technician.

2-year Certificate

Understand and explain proper safety procedures in regards to overall shop safety practices
with emphasis on maintenance/repair of automotive systems.

Effectively troubleshoot and repair the following automotive systems required for NATEF
program certification:

Engines
Automatic transmissions and transaxles
Manual drive train and axles
Suspension and steering
Brakes
Electrical/Electronic systems
Heating and air conditioning
Engine performance

Understand the importance of good work habits, communications practices and computation
skills as they relate to the automotive industry.

General Education Abilities

Do you know for sure where you will be 10 years from now? Neither do we! We do know that
the average person changes major job roles 5 to 7 times in their working career. Most of us in
the Applied Tech areas, who are now teaching, started out as technicians. We had no idea we
would some day be teaching.

You need to be prepared for the changes that will surely come in your work career. Those
changes will require new abilities, and a broader perspective of your role in the work place.
To that end, North Idaho College feels a responsibility to help you grow technically, socially, and
culturally. During your time here we want you to be exposed to all or some of the following
abilities.

YOUR EXPOSURE WITHIN THE AUTOMOTIVE TECHNOLOGY PROGRAM, TO THE GENERAL
EDUCATION ABILITIES

Demonstrates the ability to recognize the elements of design, the unifying element, the
context, the purpose, and the effect of artistic creations.
You will discuss in class the various considerations involved in the design of the automotive body
and chassis. Especially with regard to how that design impacts visual effect, sales, mechanical
functionality, and the cost of the vehicle.
Demonstrates the ability to recognize, send, and respond to communications for varied audiences and purposes.
You will be required to write on automotive work orders what you have found with regard to the customer complaints, the problems found, and the repairs done. You will also learn to prepare resumes, cover letters, and general job application materials.

Demonstrates the ability to analyze and evaluate information and arguments, construct a well-supported argument, solve problems in multiple contexts individually and collaboratively.
You will be required to answer questions in class regarding the theory of operation of various automotive systems, the types of failures that can occur, and the symptoms that arise from those failures. You will also have to determine what the best way to repair the vehicle is; balancing the nature of the repair and the ability of the customer to pay.

Demonstrates the ability to recognize key ideas, achievements, issues, diverse cultural views and events, on local, national, and global levels.
You will discuss in class the major laws and events in automotive history and the impact those laws have had on the cost of vehicles, their design, and the overall effect on customer safety and health. You will also be required to discuss the various aspects of working with other employees of diverse cultural backgrounds, genders, and nationalities.

Demonstrates the ability to access information for a given need, and to utilize a set of integrated research skills.
Throughout the program you will be using factory and after market technical manuals, as well as computerized information retrieval systems, to access information related to the repair and maintenance of automotive systems.

Demonstrates the ability to apply mathematical and scientific reasoning to investigate and to solve problems.
You will continually be required to demonstrate your ability to test, measure and evaluate the condition of automotive components and systems.

Demonstrates awareness of the relationships that exist between the individual and social groups and/or private/public institutions, the nature and ethics of these relationships, and the responsibilities and consequences that result from changes in these relationships.
You will be required to discuss and write about the relationships between you and other employees on the job, as well as be able to discuss your part in the overall operation of an automotive repair business. Issues of safety, honesty, and appropriate work ethics will be a part of those discussions.

Demonstrates the ability to apply what one knows, believes, and understands toward developing an empathetic and analytical understanding of others’ value perspectives.
You will be required to consider and discuss your work as an automotive technician from the perspective of a shop owner, as well as from the perspective of customers. You will become aware of their fears, perspectives and expectations.

Learning Outcomes
Upon completion of this course, students will be able to inspect, diagnose, and repair basic brake,
clutch and power train systems.

Student Responsibilities
http://www.nic.edu/handbook2007.pdf#page=34

Center for Educational Access/Disability Support Services

Course Withdrawal Information
http://www.nic.edu/catalog/2008-09/academic+registration.pdf

Non-payment Information
www.nic.edu/costs

Course Incomplete Information
www.nic.edu/catalog/2008-09/academic+registration.pdf#page=3

Final Exam Schedule
http://www.nic.edu/Websites/index.asp?dpt=49&pageID=1311