



South Portland, Maine 04106

Title: **Electricity & Electronics 1**

Catalog Number: **AUTO-155**

Credit Hours: **4**

Lecture (or Lab): **2 hours lecture / 2 hours lab**

Instructor: **Joseph Moore**

Total Contact Hours: **30 / 60**

Office: **207-741-5859**

E-mail: **jmoore2@smccme.edu**

Course Syllabus

Course Description

This course will introduce the fundamentals of electrical/electronics theory. Students will learn the fundamentals of electricity including the study of voltage, amperage, resistance, wattage and Ohm's Law. Students will understand the fundamentals of an electrical circuit, common failures and diagnostic procedures, as well as how to determine the appropriate corrective actions while utilizing a digital volt ohm meter. Additionally, students will learn the basics of starting and charging systems as well as how utilize a wiring diagram. Students will utilize blackboard online learning as well as Electude online learning in addition to the course textbook. Course assignments from textbook will be available to the student on Blackboard. Any issues with Blackboard online learning system should be brought to the attention of Michael Hart at mhart2@smccme.edu

Corequisite: AUTO-105 or HEOP-100

Course Objectives

After completing this course, the student will be familiar with all tasks listed below. He or she must perform all high priority tasks to manufacturer's specifications and document the completion of each task.

NATEF TASKS FOR THIS COURSE:

VI. ELECTRICAL/ELECTRONIC SYSTEMS

For every task in Electrical/Electronic Systems, the following safety requirement must be strictly enforced:

Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

A. General

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.

P-1

2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).

P-1

3. Use wiring diagrams to trace electrical/electronic circuits.

P-1

4. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.

P-1

5. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.

P-2

6. Check operation of electrical circuits with a test light.

P-2

7. Check operation of electrical circuits with fused jumper wires.

P-2

8. Measure key-off battery drain (parasitic draw).

P-1

9. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.

P-1

10. Perform solder repair of electrical wiring.

P-1

11. Replace electrical connectors and terminal ends.

P-1

VI. ELECTRICAL/ELECTRONIC SYSTEMS

B. Battery Service

1. Perform battery state-of-charge test; determine necessary action.

P-1

2. Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.

P-1

3. Maintain or restore electronic memory functions.

P-1

4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.

P-1

5. Perform slow/fast battery charge according to manufacturer's recommendations.

P-1

6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.

P-1

7. Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions.

P-3

8. Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.

P-1

9. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.

P-3

VI. ELECTRICAL/ELECTRONIC SYSTEMS

C. Starting System

1. Perform starter current draw test; determine necessary action.

P-1

2. Perform starter circuit voltage drop tests; determine necessary action.

P-1

3. Inspect and test starter relays and solenoids; determine necessary action.

P-2

4. Remove and install starter in a vehicle.

P-1

5. Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action.

P-2

VI. ELECTRICAL/ELECTRONIC SYSTEMS

D. Charging System

1. Perform charging system output test; determine necessary action.

P-1

2. Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.

P-1

3. Remove, inspect, and re-install generator (alternator).

P-2

4. Perform charging circuit voltage drop tests; determine necessary action.

P-1

VI. ELECTRICAL/ELECTRONIC SYSTEMS

E. Lighting Systems

1. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.

P-1

2. Aim headlights.

P-2

3. Identify system voltage and safety precautions associated with high-intensity discharge headlights.

P-2

VI. ELECTRICAL/ELECTRONIC SYSTEMS

F. Accessories

1. Disable and enable airbag system for vehicle service; verify indicator lamp operation.

P-1

2. Remove and reinstall door panel.

P-1

3. Describe the operation of keyless entry/remote-start systems.

P-3

4. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.

P-1

5. Verify windshield wiper and washer operation; replace wiper blades.

P-1

Topical Outline of Instruction

Electrical Theories

Conductors, Semi Conductors and Insulators

A/C, DC Current

Ohm's Law

Series, Parallel, and Series Parallel Circuits

Fundamentals of Magnetism

Electrical Measuring Devices

Circuit Construction

Wiring Diagrams

Circuit Diagnosis and Repair

Course Requirements

- Students will develop a three-ring binder or portfolio of all hand outs, quizzes and tests.
- Students will successfully complete homework, quizzes and tests.
- Students will successfully complete shop projects as assigned and approved by instructor and maintain documentation of completion.

Student Evaluation and Grading

- 10%: Attendance and Participation
- 10%: Homework
- 20%: Quizzes
- 30%: Tests
- 30%: Practice of Safety and Shop Participation and Portfolio

Attendance Policy

Students will be dropped a letter grade from their final grade for 10% of total hours. Students will be dropped an additional letter grade at 13%. (For example: Received A for class but 10% absences now translates to a B for the final grade. 13% absence would translate to a C.) Students missing 15 % of the total hours for the course, tardy or absent will result in an administrative failure (AF) for the class. For this course meeting 3 hours per day twice a week, means 15% is 13.5 hours. Tardies will count as .5 hours no matter time missed unless greater than .5 hours which then will be counted as time missed. Tardies are considered not seated at the time of the start of class. Tardies will add up. Students will be removed with an AF if three consecutive absences.

Example A final grade

10%	9 hours	B final grade
13%	11.7 hours	C final grade
15%	13.5 hours	AF

Late Work

Late work will not be accepted. If work is not turned in by the day of the week it was due it will be counted as a zero, no exceptions. Students can always email or digital drop box the assignment to the instructor if they will miss the course.

Text, Tools and/or Supplies

- Digital Volt, Ohm Meter (SNAP ON 504 only)
- Automotive Technology: Principles, Diagnosis, and Service, 4th Edition by James Halderman (ISBN 9780132811057) (student must purchase)
- Electude Argo E Learning Software subscription (student must purchase, college bookstore)
- Blackboard online for tests and quizzes
- Personal protective equipment must be worn at all times in lab. Leather, steel-toe work boots; clear safety glasses with side shields; and work clothes are required for this course.
- Students must use their tool tags when they remove tools from the tool room.

Please note: The following items are required to participate in lab:

1. Leather steel-toe work boots
2. Clear safety glasses with side shields (or if prescription glasses clip on side shield must be purchased- available in college bookstore)
3. Tool tags
4. Department uniform
5. SNAP ON DVOM (504 model only)

If a student does not bring or use the items on the above list, the following consequences will result:

- The student can not participate in lab.
- The student will be marked absent.
- The attendance grade will reflect the absence.
- The hours missed will figure into a student's Administrative Failure for 15% absence.
- The student will earn a grade of 0 for the assignments during that lab session.

Office Hours

Appointments can be made to accommodate student needs. Please call or email for an appointment.

Learning Outcomes

1. When necessary, utilize information-literacy skills, including evaluation of information from a variety of media and proper MLA and/or APA documentation.
2. Use critical thinking and listening skills in written and oral communication as a tool for learning.
3. Read and demonstrate understanding of complex ideas by identifying key concepts.
4. Apply theory to practice using problem solving techniques and data analysis.
5. Solve problems using algebraic techniques.
6. Interpret information presented in charts and graphs or illustrate a scenario using graphic techniques.
7. Utilize quantitative methods to solve and/or assess complex problems to support decision making, forecasting, and recommendations.
8. Participate in a direct experience of scientific inquiry of the natural world using the scientific method.
9. Find and evaluate credible sources of scientific information using a variety of media to support a research need.
10. Demonstrate the capacity to make informed and ethical judgments about the impact of science and technology on the self, the environment, and the practice of sustainability.

End-of-Course Evaluation

In order to gain access to final course grades, students must complete evaluations for each course attended at SMCC. Evaluations are submitted online and can be accessed through the student portal site. Students can access the course evaluation report beginning two weeks before the end of classes. The deadline for submission of evaluations occurs 24 hours after the last day of classes each semester. Instructors will announce when the online course evaluation is available.

1. ADA (Americans with Disabilities Act):

Southern Maine Community College is an equal opportunity/affirmative action institution and employer. For more information, please call 207-741-5798. If you have a disabling condition and wish to request accommodations in order to have reasonable access to the programs and services offered by SMCC, you must register with the Disability Services Coordinator, Sandra Lynham, who can be reached at 741-5923. Further information about services for students with disabilities and the accommodation process is available upon request at this number. Course policies about online testing are modified to suit each individual's accommodations.

2. Student printing policy (new):

This policy identifies the cost per page for black and white as well as color printing in varying page sizes. Specifics of the policy are outlined below:

Per Page Costs

Each semester students receive a \$20 printing credit. The balance resets at the end of the semester and any remaining credits are removed. The cost varies depending upon page size and whether printing is done in black and white or color.

- a. There is a \$0.10 per page fee for standard 8.5” by 11” black and white documents.
- b. The reverse sides of duplex (double-sided) documents are free.
- c. There is a \$.50 per page fee for standard 8.5” by 11” color documents.
- d. There is a \$.20 per page fee for 8.5” by 14” (legal) or 11” by 17” (tabloid) black and white documents.
- e. There is a \$1.00 per page fee for 8.5” by 14” (legal) or 11” by 17” (tabloid) color documents.

Duplex charges (printing on both sides of a page) work in the following fashion: One page is \$0.10, two pages are \$0.10, three pages are \$0.20, and four pages are \$0.20, etc. The flipsides are free, but another sheet of paper is \$0.10. Please be aware that a document with any color at all (when printed to a color printer) will by default be printed in color. You are responsible for setting the print job to print black and white if you do not need color. For directions, please go to the IT Help tab in My SMCC.

How does it work?

The College's pay-for-print system monitors printing on all printers (including those in general access labs, library printers, the Academic Achievement Center, Noisy Lounge and technology labs). Students can check the number of pages they have printed by using the Printing Balance tool available on SMCC computers (located in the lower right corner of the screen, near the clock). Departments with work study students who need to print documents for the department should contact the HelpDesk at 741-5696 to have a special account set up.

Refunds

Print jobs are eligible for a refund in the event of mechanical or electronic error on the part of the printer, print server, or software used to submit the job. Jobs are not eligible for a refund in cases where the job was not set up correctly, was submitted multiple times, or the student is not satisfied with the result. To request a refund, please bring the offending print to the IT Department in the basement of the Ross Technology Center. Refunds will be granted in the form of a credit to the student's account.

Why is SMCC charging for printing?

The pay-for-print system is an effort to control escalating printing costs. Charging for printing helps offset the increasing cost of supplies and encourages students to conserve resources. To find ways to reduce your printing charges, please go to the IT Help tab on My SMCC. If you have questions about the pay-for-printing policy or your printing charges, please contact the HelpDesk at 741-5696 or send an email to helpdesk@smccme.edu.

Be sure to log OUT of the system when you've finished your printing, to prevent unauthorized access to your account.

Add-Drop Policy

Students who drop a course during the one-week "add/drop" period in the fall and spring semesters and the first three days of summer sessions receive a 100% refund of the tuition and associated fees for that course. Please

note any course that meets for less than the traditional semester length, i.e., 15 weeks, has a pro-rated add/drop period. There is no refund for non-attendance.

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Withdrawal Policy

A student may withdraw from a course only during the semester in which s/he is registered for that course. The withdrawal period is the second through twelfth week of the fall and spring semesters and the second through ninth week of twelve-week summer courses. This period is pro-rated for shorter-length courses. To withdraw from a course, a student must complete and submit the appropriate course withdrawal form, available at the Enrollment Service Center (no phone calls, please). The designation “W” will appear on the transcript after a student has officially withdrawn. A course withdrawal is an uncompleted course and may adversely affect financial aid eligibility. Failure to attend or ceasing to attend class does not constitute withdrawal from the course. There is no refund associated with a withdrawal.

Plagiarism Statement

Adherence to ethical academic standards is obligatory. Cheating is a serious offense, whether it consists of taking credit for work done by another person or doing work for which another person will receive credit. Taking and using the ideas or writings of another person without clearly and fully crediting the source is plagiarism and violates the academic code as well as the Student Code of Conduct. If it is suspected that a student in any course in which s/he is enrolled has knowingly committed such a violation, the faculty member should refer the matter to the College’s Disciplinary Officer and appropriate action will be taken under the Student Code of Conduct. Sanctions may include suspension from the course and a failing grade in the course. Students have the right to appeal these actions to the Disciplinary Committee under the terms outlined in the Student Code of Conduct.