



Lillian M. Lowery, Ed.D.  
State Superintendent of Schools

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**TO:** Local Directors of Career and Technology Education

**FROM:** Katharine M. Oliver  
Assistant State Superintendent  
Career and College Readiness

**SUBJECT:** Articulation Agreement with Montgomery College  
Automotive Technician (NATEF) CIP 47.0645

**DATE:** February 28, 2013

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I am pleased to announce that the Maryland State Department of Education (MSDE) has entered into a statewide articulation agreement with the Montgomery College for the Maryland Career and Technology Education (CTE) Program of Study: Automotive Technician/National Automotive Technicians Education Foundation (NATEF) CIP 47.0645. Attached is a copy of the agreement for the Maryland CTE Program of Study (POS), **Automotive Technician (NATEF) CIP 47.0645**. This agreement provides students who successfully complete the Automotive Technician POS, and pass the NATEF industry exam, with the opportunity to earn up to seven credits toward the Automotive Technology AAS Degree at the Montgomery College-Rockville Campus.

Please note, if the school system already has an individual articulation agreement with Montgomery College for the **Automotive Technician (NATEF) CIP 47.0645** Maryland POS, this statewide agreement will replace it. If the school system has an articulation agreement in place for any other Automotive Technician program, the individual agreement will remain in effect. However, it is the goal of MSDE to have all NATEF accredited Automotive Technician Programs adopt the Maryland Program of Study CIP 47.0645.

This is a wonderful opportunity for students in the **Automotive Technician (NATEF) CIP 47.0645** program to gain advanced standing in a challenging postsecondary program. The table on page two of this memo details the number of credits that may be earned.

High School Courses Completed	Articulated Montgomery College Courses
<ul style="list-style-type: none"> <li>• Suspension and Steering (1 credit), and</li> <li>• Brakes (1 credit), and</li> <li>• Electrical/Electronic Systems (1 credit), and</li> <li>• Engine Performance (1 credit)</li> </ul> <p style="text-align: center;"><b>OR</b></p>	<p>AT 101 Introduction to Automotive Technology (3 credits)</p> <p style="text-align: center;"><b>OR</b></p>
<ul style="list-style-type: none"> <li>• Suspension and Steering (1 credit) and</li> <li>• Brakes (1 credit) and</li> <li>• Electrical/Electronic Systems (1 credit) and</li> <li>• Engine Performance (1 credit) and</li> <li>• Pass the National Automotive Student Skills Standards Assessment (NA3SA) end-of-program exam for Electrical/Electronic Systems.</li> </ul>	<p>AT 101 Introduction to Automotive Technology (3 credits)</p> <p style="text-align: center;"><b>AND</b></p> <p>AT 161 Automotive Electricity 1 (4 credits)</p>

Please review the articulation agreement and note the responsibilities of all parties involved, including the school system, the student, the Maryland State Department of Education, and Montgomery College. Questions about the articulation agreement and/or the CTE POS may be directed to the Transportation Technologies Cluster Team: Kathy McNerney, Cluster Lead at 410-767-0185, or via e-mail at [kmcnerney@msde.state.md.us](mailto:kmcnerney@msde.state.md.us), Mike Beck, CTE Program Analyst at [mbeck@msde.state.md.us](mailto:mbeck@msde.state.md.us) or 410-767-0180, Nancy Hauswald CTE Regional Coordinator at [nhauswald@msde.state.md.us](mailto:nhauswald@msde.state.md.us) or 410-767-0175.

Attachments

KMO:mb:dw

c: DeRionne P. Pollard, Ph.D  
 Debra Anderson  
 CTE Staff

January 14, 2013

Kathy McNerney  
Education Program Supervisor CTE Systems Branch Division of Career and College Readiness  
Maryland State Department of Education  
200 West Baltimore Street  
Baltimore MD 21201

Dear Ms. McNerney,

The proposed articulation agreement between Montgomery College and Maryland State Department of Education has been reviewed and approved by President Pollard and Senior Vice President Pearl. I am pleased to enclose your fully executed original copy of the agreement.

If you have any questions or concerns, please do not hesitate to contact me at (240) 567-5492 or [dean.schleicher@montgomerycollege.edu](mailto:dean.schleicher@montgomerycollege.edu).

Sincerely,



W. Dean Schleicher  
Transfer Program Assistant

Enclosure: one (1) original articulation agreement



**Program Articulation for the Career and Technology Education  
Program of Study: Automotive Technology**

**The Maryland State Department of Education and  
Montgomery College**

**INTRODUCTION:** In the past several years, technological advances have changed the processes and equipment used in a growing number of technical fields. Today's workforce is confronted with diverse and complex technical concepts and equipment and must have a broad understanding of the comprehensive principles that govern the behavior of the systems and subsystems that make up the work environment.

The College Career Pathways Program is a partnership between the Maryland State Department of Education (MSDE) and Montgomery College (MC). It is designed to provide a rigorous and relevant curriculum for students who wish to explore or prepare for technical careers in today's evolving work-world.

Administration, curriculum coordinators, and the respective faculty and staff of both institutions have examined the course competencies and content taught in the Maryland Automotive Technician CTE Program of Study (POS), CIP 47.0645. Based on this review, the following courses will constitute the MSDE/MC Automotive Technology Program Articulation. This articulation agreement will enable a student to earn up to seven credits when applying to MC's Automotive Technology Associate of Applied Science degree or certificate programs or other MC programs in which these courses can be used as electives.

<b>High School Courses Completed</b>	<b>Articulated Montgomery College Courses</b>
<ul style="list-style-type: none"> <li>• Suspension and Steering (1 credit) and</li> <li>• Brakes (1 credit) and</li> <li>• Electrical/Electronic Systems (1 credit) and</li> <li>• Engine Performance (1 credit)</li> </ul> <p align="center"><b>OR</b></p>	AT 101 Introduction to Automotive Technology (3 credits)  <p align="center"><b>OR</b></p>
<ul style="list-style-type: none"> <li>• Suspension and Steering (1 credit) and</li> <li>• Brakes (1 credit) and</li> <li>• Electrical/Electronic Systems (1 credit) and</li> <li>• Engine Performance (1 credit) and</li> <li>• Pass the National Automotive Student Skills Standards Assessment (NA3SA) end-of-program exam for Electrical/Electronic Systems.</li> </ul>	AT 101 Introduction to Automotive Technology (3 credits)  and  AT 161 Automotive Electricity 1 (4 credits)

The process for students wishing retrieve the articulated credits for MC's Automotive Technology are as follows:

- Submit an official high school transcript, attached to a completed Articulation Agreement Credit Award Form, verifying successful completion of the four courses comprising Maryland Automotive Technician CTE POS with a grade of B or better to: **Montgomery College, Transcript Evaluator, Admissions and Records Office, 51 Mannakee Street, Rockville, MD 20850**

- Enroll at Montgomery College within two years of completing the Maryland Automotive Technology CTE POS. Credit will be transferred upon admission into Montgomery College in an applicable program or program in which courses can be used as electives.

The following outlines the shared responsibilities of local school systems, students, MC and MSDE ensuring that students earn college credit for completing a Maryland Automotive Technology CTE POS, CIP 47.0645

**Maryland Local School Systems will:**

- Offer approved courses during grades nine through twelve in mathematics, science, and technology that include prerequisite skills and content for courses offered in the MC Automotive Technology curriculum degree and certificate programs covered in this agreement;
- Encourage students to pursue a challenging academic program in grades nine through twelve;
- Offer the Maryland Automotive Technology CTE POS, which is aligned to National Automotive Technicians Education Foundation (NATEF) standards, as stated in the program of study;
- Communicate details of this agreement to principals, teaching staff, guidance personnel, students, parents and/or guardians;
- Identify an Automotive Technology contact person at the local school system's central office who will communicate with MC regarding this agreement;
- Send an official high school transcript and Articulation Agreement Credit Award Form verifying successful completion of the articulated courses with a grade of "B" or better to the address on the first page of this agreement; and
- Maintain NATEF program certification.

**Students will:**

- Complete and pass the entire MD Automotive Technology program of study with a grade of "B" or better in each course, as outlined on page one of this agreement;
- Apply for admission to Montgomery College in an applicable degree or certificate program or any program in which articulated courses can be used as electives;
- Present a copy of their official NATEF/NA3SA student certification for Electrical/Electronic Systems to the Montgomery College transcript evaluator prior to August 1<sup>st</sup> of the academic year they wish to attend MC;
- Meet the admission dates and procedures that apply to all new students at MC;
- Follow the current College policies on Advanced Credit; and
- Take appropriate developmental courses as determined by the mandatory placement testing.

**Montgomery College will:**

- Arrange meetings, as requested, with faculty and students on the MD Automotive Technology school campuses to provide information and assistance in matriculating to MC;
- Supply MSDE and local schools with promotional literature that will be used to assist students with the application and/or transfer process;
- Communicate details of this agreement to the appropriate staff in admissions and counseling and to the faculty in the Automotive Department at MC;
- Award the appropriate number of technical credits, as specified in this agreement, upon review of the student's transcript and other documentation and completion of the application process;
- Notify students of credits awarded; and
- Ensure credits are recorded on the student's transcript.

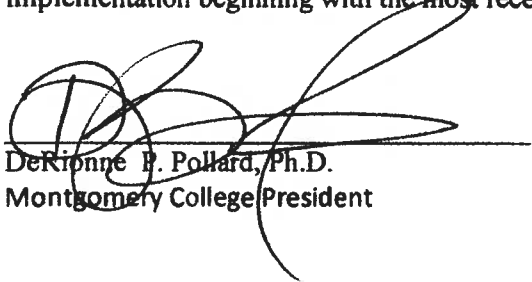
**Maryland State Department of Education will:**

- Communicate details of this agreement with local school systems via CTE Directors;
- Confirm programs participating in the articulation agreement are currently NATEF certified;
- Provide MC with a list of approved Automotive Technology programs and their feeder schools annually;
- Update the approved list biannually; and
- Provide MC with a list of CTE Directors annually.

**Montgomery College and the Maryland State Department of Education will:**

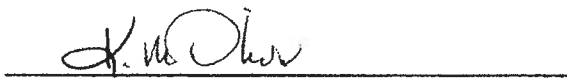
- Jointly develop promotional materials to describe the MD Automotive Technology program and articulation agreements to students, staff, faculties, parents, and the community; and
- Jointly develop and implement a procedure to monitor, evaluate, and assess the effectiveness of the program.

THIS AGREEMENT, having been formulated by the responsible faculties and administrative personnel of MC and the MSDE, and having been certified by the chief academic officers of both institutions, is herewith agreed to for implementation beginning with the most recent date inscribed below.



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DeRionne P. Pollard, Ph.D.  
Montgomery College President



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Katharine M. Oliver  
Assistant State Superintendent of Schools  
Division of Career and College Readiness  
Maryland State Department of Education

12-19-12  
\_\_\_\_\_  
Date of Signature

11/26/12  
\_\_\_\_\_  
Date of Signature

**Maryland State Department of Education  
Program of Study  
Automotive Technology Course Descriptions**

**Program Description**

The Maryland Automotive Technology CTE POS is an instructional program that incorporates the National Automotive Technicians Education Foundation (NATEF) program certification standards. The program prepares students for further education and careers in the Transportation Equipment Pathway and automotive technology. The program consists of four courses that are divided into four groups: Suspension and Steering (A-4), Brakes (A-5), Electrical/Electronic Systems (A-6), and Engine Performance (A-8).

Students participating in the Auto Technician Program will understand and be able to:

1. Develop workplace (employability) skills by demonstrating mastery of required academic and performance skills;
2. Demonstrate the ability to perform all tasks in a safe and expedient manner;
3. Demonstrate the ability to identify appropriate industry procedure/reference/estimation/training materials (both computerized and hardbound) to locate appropriate instructions and perform according to the stated guidelines;
4. Perform all diagnostic and repair tasks in accordance with manufacturer's recommended procedures;
5. Develop thinking skills by analyzing, troubleshooting and solving automotive repair problems utilizing late model vehicles and state of the art tools and equipment (A-4, A-5, A-6, A-8);
6. Utilize computerized equipment and software to collect and analyze fault codes and automotive operating and digital sending devices to isolate problem sources and perform corrective repairs (A-4, A-5, A-6, A-8);
7. Use industry standard fault locator devices in the testing and analysis of on-board computer systems, digital circuitry and other digital sending devices;
8. Troubleshoot non-code generating repair problems utilizing state-of-the-art computer software and manuals to identify the sources of and symptoms of necessary repairs; and
9. Work in teams to analyze and solve challenging simulated and real world repair problems utilizing late model vehicles and state-of-the-art diagnostic tools and equipment. Under the supervision of ASE certified technicians, students troubleshoot, solve and repair complex problems as members of teams and individually.

**Secondary Courses**

**Suspension and Steering (A-4) (1 Credit)**

**Course Description:** This course provides the student with the knowledge and skills necessary to pass the NATEF end-of-course assessment for automobile Suspension and Steering and immediately enter a career in this area and/or attend post-secondary education and/or training. Students develop diagnostic, technical, problem-solving and academic skills through classroom instruction and hands-on maintenance applications. Through theory and real-world experiences, students master the concepts and the ability to research applicable vehicle and service information, collect and analyze relevant data, troubleshoot, identify, formulate proposed solutions to problems and perform necessary automobile suspension and steering repair tasks. Students will use state-of-the-art precision steering and alignment measurement tools and equipment to gather, analyze and make necessary repairs.

Students will understand and be able to perform:

- Steering System Diagnosis and Repair
- Front Suspension Diagnosis and Repair
- Rear Suspension Diagnosis and Repair
- Related Suspension and Steering Service
- Wheel Alignment Diagnosis, Adjustment and Repair
- Wheel and Tire diagnosis and Repair

### **Brakes (A-5) (1 Credit)**

**Course Description:** This course provides the student with the knowledge and skills necessary to pass the NATEF end-of-course assessment for Automobile Brakes and immediately enter a career in this area and/or attend postsecondary education and/or training. Students develop diagnostic, technical problem solving and academic skills through classroom instruction and hands-on maintenance applications. Through theory and real-world experiences, students master the concepts and the ability to research applicable vehicle and service information, collect and analyze relevant data, troubleshoot, identify, formulate proposed solutions to problems and perform necessary automobile brake diagnosis and repair tasks. Students will use state-of-the-art precision brake measurement tools and equipment to gather, analyze, and make necessary NATEF required brake repairs tasks.

Students will understand and be able to perform:

- Hydraulic System Diagnosis and Repair
- Drum Brake Diagnosis and Repair
- Disc Brake Diagnosis and Repair
- Power Assist Units Diagnosis and Repair
- Miscellaneous Diagnosis and Repair: Wheel Bearings
- Miscellaneous Diagnosis and Repair: Parking Brakes
- Miscellaneous Diagnosis and Repair: Electrical Diagnosis and Repair of Brake Light System
- Electronic Brake, Traction and Stability Control Systems Diagnosis and Repair

### **Electrical/Electronic Systems (A-6) (2 Credits)**

**Course Description:** This course provides the student with the knowledge and skills necessary to pass the NATEF or AYES end-of-course assessment for Automobile Electrical/Electronic Systems and immediately enter a career in this area and/or attend postsecondary education and/or training. Students develop diagnostic, technical problem-solving and academic skills through classroom instruction and hands-on maintenance applications. Through theory and real-world experiences, students master the concepts and the ability to research applicable vehicle and service information, collect and analyze relevant data, troubleshoot, identify, formulate proposed solutions to problems and perform necessary automobile electrical and electronic systems repair tasks. Students will use state-of-the-art precision electronic measurement tools, fault code readers and equipment to gather, analyze and make necessary NATEF required electrical and electronic system repairs.

Students will understand and be able to perform:

- General Electrical systems Diagnosis
- Battery Diagnosis and Service
- Starting System Diagnosis and Repair
- Charging System Diagnosis and Repair
- Lighting System Diagnosis and Repair
- Gauge, Warning Devices and Driver Information Systems Diagnosis and Repair
- Horn Diagnosis and Repair
- Wiper/Washing Diagnosis and Repair
- Accessories Diagnosis and Repair

### **Engine Performance (A-8) (1 Credit)**

**Course Description:** This course provides the student with the knowledge and skills necessary to pass the NATEF end-of-course assessment for Automobile Engine Performance and immediately enter a career in this area and/or attend postsecondary education and/or training. Students develop diagnostic, technical problem-



solving and academic skills through classroom instruction and hands-on maintenance applications. Through theory and real-world experiences, students master the concepts and the ability to research applicable vehicle and service information, collect and analyze relevant data, troubleshoot, identify, formulate proposed solutions to problems and perform necessary automobile engine performance troubleshooting and repair tasks. Students will use state-of-the-art precision electronic engine performance measurement tools, fault code readers and equipment to gather, analyze, and make necessary NATEF required engine performance repairs.

Students will understand and be able to perform:

- Engine Related Service;
- General Engine Diagnosis;
- Computerized Engine Controls Diagnosis and Repair;
- Ignition system Diagnosis and Repair;
- Fuel Systems Diagnosis and Repair;
- Air Induction System Diagnosis and Repair
- Exhaust System Diagnosis and Repair
- Emission Control System Diagnosis and Repair: Positive Crankcase Ventilation System;
- Emission Control System Diagnosis and Repair; Exhaust Gas Recirculation System;
- Emission Control System Diagnosis and Repair: Secondary Air Injection (AIR) and Catalytic Converter; and
- Emission Control System Diagnosis and Repair: Evaporative Emission Controls

## Automotive Technology Articulated Credit Map

High School Program of Study				
Requirements	Grade 9	Grade 10	Grade 11	Grade 12
English - 4	English 9	English 10	English 11	English 12
Social Studies - 3	US Government	World History	US History	Economics
Mathematics - 4	Algebra 1	Geometry	Algebra II	Trigonometry or Pre-Calculus or Calculus or
Science - 3	Earth or Physical Science	Biology or	Chemistry	Physics
Physical Education - .5 Health Education - .5	Physical Education	Health		
Fine Arts - 1	Fine Arts			
Technology Education - 1	Foundations of Technology			
CTE Completer Program - 4			Two Credits: Electrical/Electronic Systems (A-6)	One Credit: Suspension and Steering (A-4); and Brakes (A-5); and Engine Performance (A-8)
Foreign Language -- 2 and/or Advanced Tech Ed - 2	Foreign Language I	Foreign Language II or →	Advanced Technology Education	Advanced Technology Education

### MC Automotive Technology (A.A.S. Degree)

**Program Requirements (credits)**

- AT 101 Introduction to Automotive Technology (3)\***  
 AT 111 Engine Repair (4)  
 AT 140 Suspension and Steering (5)  
 AT 150 Brakes (4)  
**AT 161 Automotive Electricity I (4)\***  
 AT 162 Battery/Starting/Charging (3)  
 AT 163 Chassis Circuits (4)  
 AT 180 Basic Engine Performance (4)  
 AT 200 Auto Tech Practicum (1)  
 AT 270 Automotive HVAC (4)  
 AT 282 Engine Performance II (4)  
 AT 283 Engine Performance III (4)

**General Education Requirements  
Foundation Courses**

- EN 101 Techniques of Reading and Writing I (3) \*\*  
 English foundation (3)  
 Health foundation (1)  
 Mathematics foundation (3)  
 SP 212 Effective Technical Presentations (SPCF)  
 Or  
 Speech foundation (3)

**Distribution Courses**

- Arts or humanities distribution (3)  
 Behavioral and social sciences distribution (3)  
 CH 109 A/B Chemistry and Society/Lab (NSLD)  
 Or  
 Natural sciences distribution with lab (4)

**TOTAL CREDIT HOURS 68**

\*Articulated course; \*\* EN 101, if needed for EN 102-109



Articulation Agreement Credit Award Form



College Tech Prep Program

Maryland State Department of Education Program: Automotive Technology  
Montgomery College Program: Automotive Technology, A.A.S.: 307; Automotive  
Electrical Systems Specialist Certificate: 162; Engine Performance Specialist Certificate:  
160A; Powertrain Specialist Certificate: 161A; Undercar Specialist Certificate: 163A

Maryland State Department of Education and Montgomery College have an articulation agreement for the Maryland Automotive Technology Career Technology Education Program of Study which incorporates the National Automotive Technicians Education Foundation (NATEF) program certification standards. Students may earn up to seven college credits toward their degree or certificate through the Automotive Technology career program of study if they earn a B or better in the high school portion of these. Students will receive advanced standing credit upon their full admission to the College in an applicable degree programs listed below.

Student Name: \_\_\_\_\_ Student Email: \_\_\_\_\_  
Address: \_\_\_\_\_ Home Phone: \_\_\_\_\_  
City, State, Zip: \_\_\_\_\_ Work Phone: \_\_\_\_\_  
High School Attended: \_\_\_\_\_ Date of High School Graduation: \_\_\_\_\_  
High School Official Signature and Title \_\_\_\_\_ Date: \_\_\_\_\_

Certification:

1. Students should obtain a copy of the appropriate Articulation Agreement Credit Award form from their technology teacher.
2. Students must complete the form and mark the letter grade obtained for each articulated course.
3. Students must return the completed Articulation Agreement Credit Award form to their teacher.
4. The teacher will check grades for accuracy, sign the form (High School Official Signature), and forward it to the registrar at the student's home school.

5. The registrar will attach a copy of the student's official transcript to the Articulation Agreement Credit Award form and mail it to Montgomery College, Transcript Evaluator, Admissions and Records Office, 51 Mannakee Street, Rockville, MD 20850.

High School Courses	Montgomery College Courses
Suspension and Steering (1 credit) <i>and</i> Brakes (1 credit) <i>and</i> Electrical/Electronic Systems (1 credit) <i>and</i> Engine Performance (1 credit) <b>OR</b>	AT 101 Introduction to Automotive Technology (3 credits)
Suspension and Steering (1 credit) <i>and</i> Brakes (1 credit) <i>and</i> Electrical/Electronic Systems (1 credit) <i>and</i> Engine Performance (1 credit) <i>and</i> Pass the National Automotive Student Skills Standards Assessment (NA3SA) end-of-program exam for Electrical/Electronic Systems.	AT 101 Introduction to Automotive Technology (3 credits) <i>and</i>  AT 161 Automotive Electricity 1 (4 credits)