**Sinclair Community College - Continuous Improvement Annual Update 2011-12**

**Program:** Automotive Technology

**Section I: Trend Data**

* 1. **Program Trend Data– Please include the three most recent years of data in each area so that trends may be examined.**
     1. **Course Success Rates – Please report the course success rates for:**
        + - **Highest enrollment courses:**

|  |  |  |  |
| --- | --- | --- | --- |
| Fiscal Yr | FY 2008-09 | FY 2009-10 | FY 2010-11 |
|  | Success Rate | Success Rate | Success Rate |
| Course | 77.51% | 82.68% | 79.08% |
| AUT 102 |
| AUT 108 | 81.25% | 77.16% | 72.34% |
| AUT 111 | 82.83% | 84.07% | 84.15% |
| AUT 115 | 74.59% | 75.76% | 77.48% |
| AUT 124 | 66.23% | 65.07% | 71.55% |
| AUT 125 | 75.00% | 79.66% | 78.85% |
| AUT 142 | 69.92% | 78.20% | 75.00% |
| AUT 146 | 72.44% | 83.61% | 81.54% |
| AUT 165 | 62.03% | 72.78% | 72.14% |
| AUT 210 | 83.78% | 86.86% | 81.33% |
| AUT 241 | 95.31% | 95.70% | 83.87% |
| AUT 245 | 92.54% | 93.33% | 83.95% |

* + - * + **Any courses that deviate - high and low - from the typical success rate for your department:**

The overall success rate for the department is:

|  |  |  |  |
| --- | --- | --- | --- |
| Fiscal Yr | FY 2008-09 | FY 2009-10 | FY 2010-11 |
|  | Success Rate | Success Rate | Success Rate |
| AUT | 81.47% | 83.17% | 82.01% |

Deviated lower courses

|  |  |  |  |
| --- | --- | --- | --- |
|  | FY 2008-09 | FY 2009-10 | FY 2010-11 |
| AUT 108 | 81.25% | 77.16% | 72.34% |
| AUT 124 | 66.23% | 65.07% | 71.55% |
| AUT 165 | 62.03% | 72.78% | 72.14% |

The three courses that deviated lower (2011) was (AUT 108, 124 & 165). These courses are the first ones that students would take when entering automotive program and would most likely have a higher probability of student non-success.

* + 1. **Degree and certificate completion (where applicable)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Program** | **Program Name** | **Prog. Level** | **FY 08-09** | **FY 09-10** | **FY 10-11** |
| AUT.CRT | Automotive Tech. Cert. | CRT | 60 | 64 | 59 |
| AUT.AAS | Automotive Tech. AAS | AAS | 18 | 20 | 29 |
| FMLR.STC | Ford Maintenance & Light Repair Cert | STC | 1 |  | 11 |
| AUTHO.CRT | Automotive Tech –Honda Cert | CRT |  | 7 | 10 |
| ASEP.AAS | Auto Tech – GM ASEP -AAS | AAS | 17 | 19 | 9 |
| AHPC.STC | Auto High Performance Cert. - STC | STC | 6 |  | 8 |
| AUTHA.AAS | Auto Tech – Honda PACT - AAS | AAS | 3 | 6 | 5 |
| CAP.AAS | Auto Tech –Chrysler - AAS | AAS | 11 | 5 | 4 |

* + 1. **Any additional data that illustrates what is going on in the program (examples might include course sequence completion, retention, demographic data, data on placement of graduates, graduate survey data, etc.)**

**NATEF “ Student Skills Standard Assessment” test results for capstone course (AUT 215)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ASE Areas** | **Susp & Steer**  **A4** | **Brakes**  **A5** | **Electrical**  **A6** | **Engine Perf. A8** | **Engine Repair A1** | **Auto. Trans.**  **A2** | **Manual Trans**  **A3** | **HVAC**  **A7** |
| **Related \***  **Program Outcomes** | **#2** | **#2** | **#4** | **#1 & #7** | **#3** | **#9** | **#8** | **#5** |
| **Related Program Courses** | **AUT 210** | **AUT 165** | **AUT 124 & 125** | **AUT 115 & 245** | **AUT 108** | **AUT 241** | **AUT 142** | **AUT 146** |
|  |  |  |  |  |  |  |  |  |
| 2011 Test Averages | 65% | 71% | 77% | 76% | 77% | 66% | 64% | 72% |
| 2010 Test Averages | 69% | 67% | 70% | 69% | 71% | 59% | 55% | 66% |
| 2009 Test Averages | 63% | 66% | 71% | 70% | 69% | 54% | 53% | 64% |

This data shows the average test scores results for students taking the “Student Skills Standard Assessment” tests. The tests were administered in the automotive capstone course - AUT 215 “Automotive Service Operations”. The tests are given online and are sponsored by the certifying automotive organization called “NATEF”. The National Automotive Technicians Education Foundation is our accrediting agency for our automotive department.  Our curriculum is designed to accomplish the NATEF tasks, developed by the automotive industry professionals. Therefore our program outcomes tie directly to the NATEF tasks.  The “Student Skills Standards Assessment” tests are designed to measure students' knowledge of course content and learning outcomes within an automotive training program. The tests include a combination of theory and vehicle service related questions, and are developed using the NATEF task list **(Example in Appendix “B”).** The tests provide instructors and administrators with impartial feedback on how well students are learning and comprehending the materials presented throughout the curriculum. The invaluable information provided to students and school personnel makes this test beneficial to any school. It is available to any entry-level Automobile or Collision Repair and Refinish training program regardless of ASE/NATEF certification status.

These tests are appropriate for students who have nearly completed an individual automotive training course or who are preparing to graduate from a technician-training program. Schools choose which tests in the series to administer to each student. Testing is available in both fall and spring to ensure maximum usefulness.

The results were used to determine the department’s program effectiveness in student learning and program outcomes.

**Enrollment Trend Data**

|  |  |  |  |
| --- | --- | --- | --- |
| **OBOR** | **14th** | | |
| **Fiscal Year** | **FY 2008-09** | **FY 2009-10** | **FY 2010-11** |
|  | **FTE** | **FTE** | **FTE** |
|  |  |  |  |
| AUT | 611.3 | 701.34 | 759.17 |

|  |  |  |  |
| --- | --- | --- | --- |
| **OBOR** | **30th** | | |
| **Fiscal Year** | **FY 2008-09** | **FY 2009-10** | **FY 2010-11** |
|  | **FTE** | **FTE** | **FTE** |
|  |  |  |  |
| AUT | 661.33 | 741.15 | 795.00 |

* 1. **Interpretation and Analysis of Trend Data Included in the Section Above *Suggestions of questions that might be addressed in this section:***  *What trends do you see in the above data? Are there internal or external factors that account for these trends? What are the implications for the program or department? What actions have the department taken that have influenced these trends? What strategies will the department implement as a result of this data?*

**What trends and strategies do you see for the department using the above data?**

* + - 1. In the area of enrollment, the department continues to see significant increases. The salvation of Chrysler and General Motors from bankruptcy has helped to increase the department’s enrollments. The fact that there is a strong job market for automotive technicians is boosting the enrollment growth, as well. Over the last three years, the automotive department has experience an 8%-14% growth.

The department will continue to grow their outreach to the schools and to the community at large.

The first automotive “Cruise-In” event was held in May 2011 and was helpful in recruiting. It was very successful and will be an annual event.

* + - 1. In overall graduation rates, the department has experienced steady numbers of degrees and certificates awarded. One noticeable difference is in the increasing numbers of “short-term” certificates. From 2009 to 2011 the numbers went from 3 to 19. I believe this trend is due to the desire of students to obtain a job as quickly as possible. The “short-term” certificate lends itself towards that goal.

Examination of offering additional “short-term” certificates will be explored.

* + - 1. Success rates for most courses in the department are holding steady with a 12% decrease for AUT 245 and 241. The courses are primarily taught by one instructor for each course. I have examined the class rosters for each AUT 241 and 245 course taught during 2010-11 and have found that 90% of the non-successful students either withdrew from the course or had major absenteeism or tardiness issues that lead to failing grades.

The same instructors that taught these classes for the previous two years showed “success” scores in the 90th percentiles.

How then could the scores dropped so drastically? Was it an issue of attendance policies not being emphasized? As was determined, attendance policies or enforcement was NOT the issue; there were no changes to the courses policies/enforcement over the previous years. The problem of the 12% decrease, as surmised by the department, was: either students were not prepared to take the courses, were counseled incorrectly or the possible need of a prerequisite for the AUT 241 course. The AUT 245 course already has a prerequisite in place, AUT 115.

The department will examine the need for a prerequisite for AUT 241.

While the AUT 124 success rate has been low for the department over three years, concerted past efforts in aligning the curriculum between instructors has lead to an increase for 2011. The data, presently, shows an increase of 5%-6%. (71.55%)

The overall success rate of the department is very good; presently averaging 82%.

* + - 1. The “Student Skills Standard Assessment” test data are showing steady increases in student scores for each of the automotive courses with the exception of the AUT 210 “Steering and Suspension” course which is fairly steady. The scores are directly related to program outcomes as to the effectiveness of student learning in each of the automotive courses. Sinclair student’s test scores are significantly higher than the national average for passing the tests which is 55%.

**Section II: Progress Since the Most Recent Review**

1. What was the fiscal year of the most recent Program Review for this program? (The most recent Program Review self-study can be found at <http://www.sinclair.edu/about/administrative/vpi/pdreview/> ). FY 07/08
2. Briefly summarize the goals that were listed in Section IV part E of the most recent Program Review Self-Study (this section of the Self-Study asks “What are the department’s/program’s goals and rationale for expanding and improving student learning, including new courses, programs, delivery formats and locations”)?
3. Develop and implement a Collision program and possibly a Diesel program.
4. Hybrid vehicle curriculum development and training
5. Service Learning project for the community
6. What Recommendations for Action were made by the review team to the most recent Program Review?
7. The department should review the college’s general education outcomes required for all degree programs and strengthen its inclusion of general education throughout the automotive curriculum.
   1. The department has made great strides towards implementing general education activities into each automotive course. All automotive courses have these activities in place which are part of a students’ final grade for a class. A new assessment tool has been devised using the Angel System starting in winter quarter 2012. It will house data for the purpose of analyzing program and general education outcomes.
8. Examine the department’s overall student retention and analyze where and

why students leave the program.

* 1. A RAR report has been specifically run for the automotive department during that shows the automotive department from quarter to quarter has a 15% attrition rate which is half of what the college attrition rate is for the college (30%). The automotive program maintains strong personal contact with students on a quarter by quarter basis. This helps in keeping them on track for graduation.

The department knows fairly accurately the reasons students drop the automotive classes or program – exit interviews and student surveys have been helpful in determining the reasons. The reasons vary from personal, to financial and to a realization that the field of study may not be for them. These are the most common reasons.

The department does everything it can to help them with their studies by providing tutorial help on as need basis. Instructors are constantly helping students beyond class times.

The chair constantly is dealing with financial issues that students bring to his attention. More than $30,000 per year in scholarships and financial assistance are awarded to automotive students each year. (As per Financial Aid data)

1. Increase the diversity of the department’s faculty and student population as opportunities arise.
   1. Diversity of automotive students continues to grow. We have seen a number which was 2% minority status in 2005 increase to a number of 15% this year 2011.
2. Given the department’s space limitations in the existing facility, assessment of growth goals for the future is warranted. Examine the likely job market over the next five years and determine whether enrollment growth is realistic.
   1. According to the U.S. Bureau of Labor Statistics (BLS), 2011 report, the automotive technician job market will continue to grow over the next eight years. In 2008 the number of technicians in the industry was 736,000 across the nation. BLS is saying the job market will continue to slowly grow towards a predication of 771,000 technicians working in the field by 2018. That is a 35,000 job increase. That is still a strong market for job opportunities.

With those numbers as evidence and the continual growth of student enrollment in the department, growth of all automotive programs are supported.

While the Dayton community has been suffering economically and in job losses, the GM ASEP program, which requires internships, has shown a 100% placement rate for these students in 2011.

The Honda program that does not require an internship has an 80% placement rate for those students in the program. All of this is proof of available automotive jobs.

The Chrysler CAP program has had low graduation rates over the last two years but is on track to graduate 8 students for 2011 and 13 students by 2012. This is significant improvement.

Ford has had low numbers of graduates in the past but for 2010-11 that number shot up to 11. Another 3 possible graduates could occur by December 2011.

A new classroom was added to building 20 in 2011. This will help in providing needed space to accommodate increasing student enrollment.

1. Have the goals in your self-study changed since your last Program Review Self-Study as a result of the Review Team recommendations or for any other reason?  If so, please describe the changes.
2. The collision and diesel program are not feasible at this time due to financial constraints of the college and state.

2 No changes in hybrid technology goals.

3. No changes in Service learning initiatives.

4. A new goal that we have implemented due to recommendations of the

review committee is: Reviewing each automotive course so that general

education outcomes could support and evaluated.

1. What progress has been made toward meeting any of the goals listed in the sections above (b, c, and d) in the past year?

1. No progress – deleted

1. The hybrid technology development has been progressing very well. We received an NSF grant in 2006, 2007 and again in 2009. For 2009, Sinclair received a three year NSF grant in the amount of $791,000 to continue development and training for automotive instructors across the nation on Hybrid Vehicle Technology. To date we have instituted. Four – one week college instructor workshops on hybrid vehicles and have trained over 183 instructors from Alaska across the U.S. to even Australia.

In July and August of 2012 we will be offering two, 2 day classes for vocational and high school automotive instructors. In addition, two advanced hybrid classes will be offered in August for college instructors that have attended past hybrid institutes.

With the curriculum development piece that is presently under way and these additional training classes; this will complete the grant.

This grant has advanced the departments technical offerings and put it on the cutting edge of training.

1. The department performed an official service learning project this last year performed by John Porter’s AUT 241 class. In additional to the one service learning project, two class projects were also performed by Justin Morgan and Tom Freels in their respective classes in which they helped needy individuals with car repairs.
   1. The 2005 Pacifica transmission repair service learning project involved John Porter’s AUT 241 class in the rebuilding of an automatic transmission for an out of work mother that needed transportation to carry on her daily business. The students were able to help the community and learn the subject material.
   2. Justin Morgan’s AUT 165 “Brakes System” class performed a project in which they helped a senior citizen rebuild his vehicle brake system. It was a major safety issue and needed the repairs.
   3. Tom Freel’s hybrid class (AUT 230) was involved in repairing a Honda Civic hybrid vehicle. The class diagnosed and repaired the vehicle to proper operating condition.

The department has done many such projects over the years even though they did not necessarily make it an official service learning event.

1. The department has implemented general education activities for all automotive classes in the programs. These activities encompass written and oral assignments. The outcomes are part of the student’s final grade for a class.

**Section III: Assessment of Outcomes**

The Program Outcomes for this program are listed below. **At least one-third of your program outcomes must be assessed as part of this Annual Update, and across the next three years all of these program outcomes must be assessed at least once**.

|  |  |  |  |
| --- | --- | --- | --- |
| **Automotive Technology** Program Outcomes | In which courses are these program outcomes addressed? | Which of these program outcomes were assessed during the last fiscal year? | Assessment Methods  Used |
| **1)** Engine Performance Troubleshooting, utilizing scan tool, scopes, DVOM. | AUT 245 |  |  |
| **2)** Chassis System diagnosis, Brake systems and ABS systems.  Steering systems, alignments and suspension | AUT 165 & 210 |  | * ASE End of Program Exam & Success Rate |
| **3)** Test engines for integrity, overhaul. | AUT 108 |  |  |
| **4)** Electrical System troubleshooting, schematic reading and circuit diagnosis*.* | AUT 124 & 125 | ASSESSED IN  FY 10-11 | * ASE End of Program Exam |
| **5)** Heating and air conditioning system diagnosis, system operations, and climate control systems. | AUT 146 |  | * ASE End of Program Exam & Success Rate |
| **6)** Safety Management skill development; OSHA and environmental safety skill development. | All AUT Courses, OPT 211 |  |  |
| **7)** Fuel system diagnosis, emission control system diagnosis, fuel injection and PCM related systems. | AUT 115 | ASSESSED IN  FY 10-11 | * ASE End of Program Exam |
| **8)** Manual transmission and driveline system diagnosis and repair, driveline and differentials. | AUT 142 |  |  |
| **9)** Automatic transmission systems diagnosis and repair, 4 wheel drive systems. | AUT 241 |  | * ASE End of Program Exam & Success Rate |
| **10)** Business Communication skills, computer customer operations skill development. | AUT 215 & 111, EDT 198, ENG Courses, COM 206 |  | * Performance Appraisals |
| **11)** Analytical problem-solving methods. | All AUT Courses, INT 141 |  | * Performance Appraisals |

1. For the assessment methods listed in the table above, what were the results?

The results are listed in Section 1 “Success Rates” and “Student Skills Standards Assessment”” results.

Program Outcome #2 – Data results over three years for courses AUT 165 and 210 which show continued test result increases for 165 and steady test results for 210.

**ASE “Student Skills Standards Assessment”**

AUT 165 Automotive Brake Systems - 2009-66%,

2010-67%,

2011-71%

AUT 210 Automotive Steering & Suspension- 2009-63%,

2010-69%,

2011-65%

**Success rate**

AUT 165 was 72.14%

AUT 210 was 81.33%

Program Outcome # 5 – Data results over three years for the course AUT 146 show continued test result increases.

**ASE “Student Skills Standards Assessment”**

AUT 146 Automotive Heating & Air conditioning - 2009-64%,

2010-66%,

2011-72%

**Success rate**

AUT 146 - 81.54%

Program Outcome #9 – Data results over three years for the course AUT 241 show continued test result increases.

**ASE “Student Skills Standards Assessment”**

AUT 241 Automatic Transmissions - 2009-54%,

2010-59%,

2011-66%

**Success rate**

AUT 241- 83.87%

1. Were changes planned as a result of the data? If so, what were those changes?

The program outcome success rate (72.14%) for AUT 165 is below the overall success rate of the department (82.01%) but the ASE “Student Skills Standard Assessment” test results for the course continue to go up. Changes in the curriculum are planned along with continuation of instructor performance success rate analysis **(Appendix A).** Examination in success rates for next year will be looked at to see if it goes up.

**Appendix A**, shows automotive instructors overall success rate for all the courses taught in 2010. This was an analysis done by the chair and is not part of the Dawn Portal data. This data was shared with each instructor and was used as one method for analyzing an instructor’s performance. This is only one tool in the arsenal. This analysis was used to help instructors improve student success within their courses.

The biggest change that has been implemented starting winter quarter 2012, is a new assessment tool, created by John Porter and Jared Cutler, in which the Angel system is being used to give a second instrument for examining the program outcomes. Particular emphasis will be placed on examining general education outcomes for the department using this tool.

Continued improvement in test results for two out of the three outcomes examined is an indication of positive changes within the department, specifically in curriculum and instruction.

1. How will you determine whether those changes had an impact?

We will continue to examine ASE Test results and success rates for continued growth in the department’s courses/outcomes.

The new Angel assessment tool data will be looked at for analyzing next year’s set of program outcomes, to help to determine the success of students for specific NATEF tasks and general education outcomes. ASE tests results will continue to be a key indicator of overall student success because of ASE certification method of testing for the automotive industry.

c) Starting with next year’s Annual Update, this section will ask about assessment of general education outcomes. For FY 2012-13, you will be asked how the department is assessing Oral Communication and Written Communication in your courses, and in addition you will be asked to share the results of those assessments. Please be prepared to address this in next year’s Annual Update.

d) Does your department have courses where there are common assignments or exams across all sections of the course? If so, please list those courses, and indicate whether you are currently examining results across all sections of those courses.

The automotive department is certified by the NATEF (National Automotive Training Education Foundation) organization. NATEF has a very structured set of standards that automotive training programs are required to follow. Each course is required to perform a set number of hours of training and also a list of tasks (content) that need to be covered. A sample “Task List” is shown in **(Appendix B**) for the “Heating and Air Conditioning” ASE area A7. Each course in the program has “ASE Task Lists”.

The “ASE Student Skills Standards Assessment” is the common test method for determining if the tasks are being covered and whether they are being learned by the students. The tests results are shown in Section 1 “Trend Data”. They are administered in all sections of the AUT 215 (Automotive Service Operations) capstone courses.

**Section IV: Improvement Efforts for the Fiscal Year**

1. **FY 10-11:** What other improvement efforts did the department make in FY 10-11?  How successful were these efforts?  What further efforts need to be made? If your department didn’t make improvement efforts during the fiscal year, discuss the strengths and weaknesses of the department over the last year and how the department plans to address them in the coming year.

The department implemented its first “Cruise-In” event during the month of May. The event brought in many vintage cars and over 200 people. The automotive programs and tours were emphasized. Admission’s office was involved and helped in promoting this event. It was a great success in marketing the programs and the college. It will likely continue for next year.

Instructor success rate data was compiled by the chair and shared **(Appendix A).** This was used to help examine instructor performance and continued improvements in ASE “Student Skills Standards Assessment” test results and student success.

Overall the department is doing very well and is presently at all time high student enrollment numbers.

1. **FY 11-12:** What improvement efforts does the department have planned for FY 11-12? How will you know whether you have been successful?

While assessment methods used by the department outcomes are acceptable, we feel that a more in depth analysis would be helpful. As a result of that concern, a new assessment tool was created by John Porter and Jared Cutler in which the Angel system of the college will be used to compile data to analysis the program’s NATEF tasks and general education outcomes.

The department must continue to maintain its NATEF certification which expires in August 2013. The process for recertification will need to start in 2012. This will require one individual to spearhead the effort. That person is being determined now.

Three faculty could be retiring in 2012 and 2013. Efforts are underway to train other people to become familiar with their courses and responsibilities within the department. It is also the intentions of the department to fill the positions as they become available. The program is at all time high enrollment numbers and needs full-time faculty to teach the corporate specific classes that cannot be taught by part-time faculty due to program requirements.

**APPENDIX**

**A**

**INSTRUCTOR SUCCESS RATES**

**(SAMPLING)**

**SUCCESS RATE: TF - Instructor 1**

Success rate is defined as a student that completes the course with an “A” “B” or “C”. Any student receiving an “N”, “W”, “D” or “F” are considered non-successful.

**Quarter Year Courses Success Rate (%)**

Summer 2007 115-02A 100

146-01A 86.67

Fall 2007 102-S2 100

165-S2 86.67

142-S2 78.57

Winter 2008 115-02 92.31

245-S2 100

Spring 2008 146-S2 100

210-S2 100

Summer 2008 115-02A 84.62

Fall 2008 102-S2 100

165-S2 100

142-S2 100

Winter 2009 115-02 71.43

245-S2 100

Spring 2009 210-S2 91.30

146-S2 76.47

146-01 59.09

Summer 2009 115-02A 83.30

Fall 2009 142-S2 91.67

165-S3 71.43

Winter 2010 245-S2 100

Spring 2010 146-S2 100

**Total Average Success Rate % 90.15%**

**SUCCESS RATE: JP – Instructor #2**

Success rate is defined as a student that completes the course with an “A” “B” or “C”. Any student receiving an “N”, “W”, “D” or “F” are considered non-successful.

**Quarter Year Courses Success Rate (%)**

Summer 2007 ----------

Fall 2007 241-S1 83.33

124-S2 80.00

Winter 2008 241-S4 100

241-S3 81.82

Spring 2008 241-S2 100

241-W1 50.00

Summer 2008 124-50A 57.14

Fall 2008 241-S1 91.67

241-01 92.00

Winter 2009 241-S4 100

241-S3 92.31

Spring 2009 241-S2 100

124-01 56.62

Summer 2009 124-50A 70.59

Fall 2009 241-S1 83.33

241-01 95.24

Winter 2010 241-S4 100

241-S3 91.67

Spring 2010 241-S2 100

241-50 100

**Total Average Success Rate % 86.29%**

**SUCCESS RATE: JT - Instructor #3**

Success rate is defined as a student that completes the course with an “A” “B” or “C”. Any student receiving an “N”, “W”, “D” or “F” are considered non-successful.

**Quarter Year Courses Success Rate (%)**

Summer 2007 142-01A 68.75

142-03A 93.33

Fall 2007 165-01 62.50

224-50 100

Winter 2008 245-W1 50.00

245-01 79.17

Spring 2008 245-S1 83.33

245-S3 92.31

Summer 2008 142-01A 81.82

142-03A 91.67

Fall 2008 165-01 33.33

165-50 68.42

224-50 100

Winter 2009 245-01 94.12

125-50 85.00

102-S2 100

Spring 2009 245-S1 100

245-S3 100

Summer 2009 142-01 100

Fall 2009 165-01 73.91

125-S4 75.00

Winter 2010 245-01 100

245-S4 85.71

Spring 2010 245-S1 80.00

245-S3 91.67

**Total Average Success Rate % 83.61%**

**APPENDIX**

**B**

**NATEF TASK LIST FOR**

**HEATING & AIR CONDITIONING**

**A7**

(Example)

|  |  |
| --- | --- |
| **HEATING AND AIR CONDITIONING** |  |
|  |  |
| **For every task in Heating and Air Conditioning, 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.** |  |
|  |  |
| **VII. HEATING AND AIR CONDITIONING** |  |
|  |  |
| **A. A/C System Diagnosis and Repair** |  |
|  |  |
| 1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. | P-1 |
|  |  |
| 2. Identify and interpret heating and air conditioning concern; determine necessary action. | P-1 |
|  |  |
| 3. Research applicable vehicle and service information, such as heating and air conditioning system operation, vehicle service history, service precautions, and technical service bulletins. | P-1 |
|  |  |
| 4. Locate and interpret vehicle and major component identification numbers. | P-1 |
|  |  |
| 5. Performance test A/C system; identify A/C system malfunctions. | P-1 |
|  |  |
| 6. Identify abnormal operating noises in the A/C system; determine necessary action. | P-2 |
|  |  |
| 7. Identify refrigerant type; select and connect proper gauge set; record temperature and pressure readings. | P-1 |
|  |  |
| 8. Leak test A/C system; determine necessary action. | P-1 |
|  |  |
| 9. Inspect the condition of refrigerant oil removed from the system; determine necessary action. | P-2 |
|  |  |
| 10. Determine recommended oil and oil capacity for system application. | P-1 |
|  |  |
| 11. Using scan tool, observe and record related HVAC data and trouble codes. | P-1 |
|  |  |
|  |  |
|  |  |
| **VII. HEATING AND AIR CONDITIONING** |  |
|  |  |
| **B. Refrigeration System Component Diagnosis and Repair** |  |
|  |  |
| 1. Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action. | P-2 |
|  |  |
| 2. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action. | P-1 |
|  |  |
| 3. Inspect, test, and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap and adjust as needed. | P-2 |
|  |  |
| 4. Remove, inspect, and reinstall A/C compressor and mountings; determine required oil quantity. | P-1 |
|  |  |
| 5. Identify hybrid vehicle A/C system electrical circuits, service and safety precautions. | P-3 |
|  |  |
| 6. Determine the need for an additional A/C system filter; perform necessary action. | P-3 |
|  |  |
| 7. Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action. | P-2 |
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| 8. Inspect A/C condenser for airflow restrictions; perform necessary action. | P-1 |
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| 9. Remove, inspect, and reinstall receiver/drier or accumulator/drier; determine required oil quantity. | P-1 |
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| 10. Remove, inspect, and install expansion valve or orifice (expansion) tube. | P-1 |
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| 11. Inspect evaporator housing water drain; perform necessary action. | P-2 |
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| 12. Remove, inspect, and reinstall evaporator; determine required oil quantity. | P-3 |
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| 13. Remove, inspect, and reinstall condenser; determine required oil quantity. | P-3 |
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| **VII. HEATING AND AIR CONDITIONING** |  |
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| **C. Heating, Ventilation, and Engine Cooling Systems Diagnosis and Repair** |  |
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| 1. Diagnose temperature control problems in the heater/ventilation system; determine necessary action. | P-2 |
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| 2. Perform cooling system pressure tests; check coolant condition, inspect and test radiator, cap (pressure/vacuum), coolant recovery tank, and hoses; perform necessary action. | P-1 |
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| 3. Inspect engine cooling and heater system hoses and belts; perform necessary action. | P-1 |
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| 4. Inspect, test, and replace thermostat and gasket/seal. | P-1 |
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| 5. Determine coolant condition and coolant type for vehicle application; drain and recover coolant. | P-1 |
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| 6. Flush system; refill system with recommended coolant; bleed system. | P-2 |
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| 7. Inspect and test cooling fan, fan clutch, fan shroud, and air dams; perform necessary action. | P-1 |
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| 8. Inspect and test electric cooling fan, fan control system and circuits; determine necessary action. | P-1 |
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| 9. Inspect and test heater control valve(s); perform necessary action. | P-2 |
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| 10. Remove, inspect, and reinstall heater core. | P-3 |
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| **VII. HEATING AND AIR CONDITIONING** |  |
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| **D. Operating Systems and Related Controls Diagnosis and Repair** |  |
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| 1. Diagnose malfunctions in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action. | P-2 |
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| 2. Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action. | P-1 |
|  |  |
| 3. Test and diagnose A/C compressor clutch control systems; determine necessary action. | P-1 |
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| 4. Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. | P-2 |
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| 5. Inspect and test A/C-heater control panel assembly; determine necessary action. | P-3 |
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| 6. Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action. | P-3 |
|  |  |
| 7. Inspect A/C-heater ducts, doors, hoses, cabin filters and outlets; perform necessary action. | P-2 |
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| 8. Identify the source of A/C system odors. | P-2 |
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| 9. Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action. | P-2 |
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| **VII. HEATING AND AIR CONDITIONING** |  |
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| **E. Refrigerant Recovery, Recycling, and Handling** |  |
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| 1. Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer’s standards. | P-1 |
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| 2. Identify and recover A/C system refrigerant. | P-1 |
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| 3. Recycle, label, and store refrigerant. | P-1 |
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| 4. Evacuate and charge A/C system; add refrigerant oil as required. | P-1 |