Internal Program Review
Self-Study Report

**Program Name**
Diesel Technology

**Credentials Offered**
Associate of Applied Science Diesel Technology: 72 semester credits

**Self-Study Completed by:**
Rick Purcell, Faculty
Derrick Hauer, Faculty

**Date Completed:**
September 30, 2014
A. Introduction
Diesel Technology prepares students to enter various segments of the diesel repair industry as an entry-level technician. This includes, but is not limited to, the agricultural, the industrial equipment, and the heavy-duty diesel truck repair industry. This program provides comprehensive training in maintenance, diagnosis, and repair of related electrical/electronic systems, mobile hydraulic systems, manual and hydraulic drive trains, brakes, air systems, diesel engines, general maintenance, alignment and undercarriages, HVAC, and transport refrigeration systems as used in equipment common to the diesel repair industry.

Potential employers include agriculture and truck dealerships, truck fleets, mining companies, construction companies, oil companies, farms and ranches, and independent truck repair shops.

B. Alignment with mission, strategic goals and core themes.

Helena College Mission
Helena College University of Montana, a comprehensive two-year college, provides access to and support of lifelong educational opportunities to our diverse community.

Diesel Technology Program Mission Statement
The Helena College UM Diesel Technology Program mission and purpose is to provide its students with educational experiences that create a framework from which they can pursue a career in the industry as well as the skills for a possible placement or continuation of their educational goals.

The Diesel Technology Program Mission aligns with the Helena College-UM Mission through the provision of access to educational opportunities throughout the College service area. The Diesel Technology Program prepares entry-level technicians diesel engine maintenance, diagnosis, and repair.

Helena College 2012-22 Strategic Goals
1. Partner for Student Success Integrate Assessment/Planning
2. Attain Excellence
3. Support the Community
4. Advance the Institution
5. Develop Resources

Diesel Technology Program Goals
1. Create a plan to integrate student acquisition of the CDL license as part of the entrance or exit requirements to the program.
2. Collaborate with business, industry, and the community as partners to provide a quality learning experience that gives graduates the best opportunity to gain employment
3. Solicit input from our constituents including, students, graduates, advisory board members, business, industry, faculty, staff, and administration concerning the operation and improvement of the program and career tracks which align with industry standards
4. Assess student and program performance through the use of outcomes assessment, Program Review and Evaluation Process, job placement rates, employer and graduate surveys
5. Increase enrollment through recruiting efforts including; business, industry, government, professional organizations, and high schools

Diesel Technology Program goals are perfectly aligned with Helena College-UM Strategic Goals and Core Themes. This alignment is illustrated in the Goals/Core Themes crosswalk below:

<table>
<thead>
<tr>
<th>Helena College Strategic Goals</th>
<th>Diesel Technology Program Goal Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner for Student Success</td>
<td>Increase enrollment through recruiting efforts including; business, industry, government, professional organizations, and high schools</td>
</tr>
<tr>
<td>Integrate Assessment &amp; Planning</td>
<td>Assess student and program performance through the use of outcomes assessment, Program Review and Evaluation Process, job placement rates, employer and graduate surveys</td>
</tr>
<tr>
<td>Attain Excellence</td>
<td>Solicit input from our constituents including, students, graduates, advisory board members, business, industry, faculty, staff, and administration concerning the operation and improvement of the program and career tracks which align with industry standards</td>
</tr>
<tr>
<td>Support the Community</td>
<td>Collaborate with business, industry, and the community as partners to provide a quality learning experience that gives graduates the best opportunity to gain employment</td>
</tr>
<tr>
<td>Advance the institution</td>
<td></td>
</tr>
<tr>
<td>Develop Resources</td>
<td>Collaborate with business, industry, and the community as partners to provide a quality learning experience that gives graduates the best opportunity to gain employment</td>
</tr>
</tbody>
</table>

Helena College-UM Core Theme Alignment with Diesel Technology Program

- **Provide Access and Support:** High quality educational activities and programs important to achieving student success
  - Premier Montana 2-year program in Diesel Technology
  - Rigorous Program of Study
  - Curriculum aligns with industry standards
  - The Helena College-UM Diesel Technology Program is one of five Associate of Applied Science Degree offerings in Diesel Technology in Montana.

- **Demonstrate Academic Excellence:** Integrity, quality and reliability in all academic and non-academic programming

- **Strengthen the Community:** Meeting regional workforce needs, strengthening employee knowledge and skills, providing a bridge to additional educational attainment, and serving as a facilitator for cultural enrichment
The Diesel Technology Program strengthens the community by preparing students to meet local, regional, state and national workforce needs.

Potential employers
The need for highly skilled diesel technicians has grown consistently and will continue to do so until through 2022. Based on this trend, it is anticipated that the need will continue to grow beyond 2022. The Montana Department of Labor reports the need for diesel technicians. Potential regional employers of program graduates includes, agriculture and truck dealerships, truck fleets, mining companies, construction companies, oil companies, farms and ranches, and independent truck repair shops.

The Career Outlook: According to the Bureau of Labor Statistics employment of diesel mechanics is expected to grow 15 percent from 2010 to 2020, about as fast as the average for all occupations.

As more freight is shipped across the country, additional diesel-powered trucks will be needed. As a result, diesel mechanics will be needed to maintain and repair the nation’s truck fleet. Demand for new workers in the freight trucking and automotive repair and maintenance industries is expected to drive overall diesel mechanic job growth.

Some older vehicles will need to be retrofitted and modernized to comply with environmental regulations, creating additional jobs for diesel mechanics.

Overall employment growth, however, may be dampened due to increasing durability of new truck and bus diesel engines. Continuing advances in repair technology, including computerized diagnostic equipment, also will result in fewer mechanics doing the same amount of work, further reducing demand for mechanics.

Job opportunities should be good for those who have completed formal postsecondary education and have strong technical skills, as employers sometimes report difficulty finding qualified workers.

Workers without formal training often require more supervision and on-the-job instruction than others—an expensive and time-consuming process for employers. Because of this, untrained candidates will face strong competition for jobs.
C. Alignment with community needs

The Diesel technology program has an advisory board which meets twice a year. The board consists of local employers as well as general managers from major truck manufacturers. These individuals are:


This board helps guide curriculum in ways such as adding a new electronics class to better prepare students for current technology. This included advice on what would be taught as well as equipment requirements. Equipment was requested through the budget process and has been implemented. The addition of a safety class to include OSHA 10. The addition of a particular transmission type that would fit the needs of industry, were also acquired through the budget process. The addition of a welding class in the program. The board also reviews and presents feedback on our gen ed requirements. These are only some recent changes, and we feel every year there should be updates to meet the ever changing industry we provide employees for.

Due to high demand for highly skilled workers in diesel repair and maintenance, Helena College-UM meets the workforce development needs of the community by training technicians for entry-level employment. The Montana Department of Labor and Industry projects continued and steady Montana employment opportunities for graduates of this program from 2012 through 2022. (extracted from http://www.ourfactsyourfuture.org/cgi/dataanalysis/occprjReport.asp?menuchoice=occprj, September 29, 2014)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Est Yr-Proj Yr</th>
<th>Estimated Employment</th>
<th>Projected Employment</th>
<th>Annual Growth Rate</th>
<th>Annual Openings due to Growth</th>
<th>Annual Openings due to Replacements</th>
<th>Total Annual Openings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus and Truck Mechanics and Diesel Engine Specialists</td>
<td>2012-2022</td>
<td>1,228</td>
<td>1,381</td>
<td>1.2</td>
<td>15</td>
<td>26</td>
<td>41</td>
</tr>
</tbody>
</table>

### Occupations by Industry and Regions in Montana

<table>
<thead>
<tr>
<th>Area</th>
<th>Industry</th>
<th>Occupation</th>
<th>Est Yr-Proj Yr</th>
<th>Estimated Employment</th>
<th>Projected Employment</th>
<th>Annual Projected Employment</th>
<th>Numeric Change</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 1</td>
<td>Transportation and Warehousing</td>
<td>Bus and Truck Mechanics and Diesel Engine Specialists</td>
<td>2012-2022</td>
<td>115</td>
<td>134</td>
<td>19</td>
<td>16.5</td>
<td></td>
</tr>
<tr>
<td>Region 2</td>
<td>Transportation and Warehousing</td>
<td>Bus and Truck Mechanics and Diesel Engine Specialists</td>
<td>2012-2022</td>
<td>93</td>
<td>109</td>
<td>16</td>
<td>17.2</td>
<td></td>
</tr>
</tbody>
</table>

Page 5 of 11
D. Student participation and success
Helena College-UM enrolls 1,627 students with a full-time equivalent of 1,066. 789 of our students are full-time (48%); 277 of our students are part-time (52%). The breakdown of General Education to Technical to Trades and non-degree seeking is:

General Education Students: 623 (38% of headcount)
Technical Students: 453 (28% of headcount)
Trades Students: 181 (11% of headcount)
Non-Degree Seeking Students: 89 (5% of headcount)

Our students enroll from Lewis & Clark County at the rate of 75%; and from adjacent counties 12% (Broadwater, Jefferson, Cascade, Powell, and Meagher). The remainder of student enrollment comes from the rest of Montana (11%) and out-of-State/Western Undergraduate (2%).

Diesel Technology Program student enrollment history 2008-2013

<table>
<thead>
<tr>
<th></th>
<th>2008-09</th>
<th>2009-10</th>
<th>2010-11</th>
<th>2011-12</th>
<th>2012-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>26</td>
<td>35</td>
<td>43</td>
<td>40</td>
<td>42</td>
</tr>
</tbody>
</table>

Diesel Technology Program Student Retention

<table>
<thead>
<tr>
<th>FY 2008/09</th>
<th>FY2009/10</th>
<th>FY2010/11</th>
<th>FY2011-12</th>
<th>FY2012-13</th>
<th>Five Year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>85%</td>
<td>89%</td>
<td>76%</td>
<td>82%</td>
<td>92%</td>
<td>85%</td>
</tr>
</tbody>
</table>

From 2008 through 2013, the Diesel Technology program capacity has been an average of 85%. With a five-year average of 12 student completers, program completion rates are at 60%.

E. Student Learning Outcomes
Upon successful completion of this program, a student will be able to:
- Demonstrate the ability to safely work in a shop environment
- Demonstrate their work ethic and professionalism
- Demonstrate their understanding of diesel systems operation and function of components
- Demonstrate the ability to properly diagnose the system and perform the proper repairs
- Demonstrate their ability to work in a live shop environment by interacting with customers, diagnosing and repairing a multitude of failures, working well with other students and properly completing work orders

Assessment of student learning outcomes occurs within individual program courses and all student learning outcomes are assessed through an end-of-program assessment.
F. Curriculum

AAS Diesel Technology

Length of Program: 4 Semesters
Type of Program: Associate of Applied Science

Note:
In order to take the first semester of Diesel Technology courses, students must prove their skills in Mathematics, Reading Comprehension, and Writing with the following:
Placement into READ070 or higher
Placement into WRIT121 or higher
Placement into M111T or higher

FIRST YEAR

Fall Semester
DST105 Shop Safety 2
DST110 Diesel Electrical and Electronics I 3
DST111 Diesel Electrical and Electronics II 2
DST142 Hydraulics 7
M111T Technical Mathematics 3
WLDG101 Welding Fundamentals for Auto Tech/Diesel 1
Total Semester Credits 18

Spring Semester
DST145 Diesel Engine Repair 6
DST240 HD Manual Drive Trains 6
DST245 HD Hydraulic Drive Trains 4
WRIT121T Introduction to Technical Writing 3
Total Semester Credits 19

SECOND YEAR

Fall Semester
DST200 Diesel Engine Performance 8
DST210 Diesel Maintenance Practices 3
DST255 HD Brakes and Undercarriage 7
Total Semester Credits 18

Spring Semester
DST130 Heating and Air Conditioning 7
DST265 Applied Lab Experience 8
HR100T Human Relations 2
Total Semester Credits 17
TOTAL CREDITS 72
G. Faculty Profiles

Helena College UM employs two full-time diesel technology instructors.

Purcell, Rick
Diesel Technology
A.O.S., Universal Technical Institute
at Helena College since fall 2008

Hauer, Derrick
Diesel Technology
C.A.S., Helena College
at Helena College since Fall 2014

H. Fiscal and Physical Resources

College current fund support of the diesel technology program has been stable over the past five years. Infusions of budgetary support for Diesel Technology Program occurred when equipment maintenance and repair and purchase of new equipment was required.

<table>
<thead>
<tr>
<th></th>
<th>FY2010/11</th>
<th>FY2011-12</th>
<th>FY2012-13</th>
<th>FY2013-14</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33,055.00</td>
<td>40,477.00</td>
<td>49,592.00</td>
<td>37,305.00</td>
</tr>
</tbody>
</table>

The Diesel Technology Program was awarded funding through a US Department of Labor TAACCCT Grant in July 2013. Over $1M has been allocated as an infusion of funding going toward the purchase of state of the art capital equipment, support of student success initiatives, curriculum development, purchase of learning simulators, certification systems, and one additional faculty position. The grant deliverables include collaboration with Montana State University-Northern to develop recognizable, stackable credentials delivered through hybrid learning—a combination of online and face-to-face instruction.

I. Recommendations and Preliminary Implementation Plan

1. Using industry standards, i.e. NATEF, and advisory committee input, update curriculum and skill development to include development of Commercial Driver’s License as part of, or prerequisite to the program.

2. Integrate student acquisition of industry-recognized credentials into the curriculum.

3. Increase instructor professional development through attendance at national educators’ conferences and institutes.

4. Build career awareness by partnering with industry partners, secondary schools and US Department of Labor Job Service.

J. Program Review Data Summary

See Program Review Data Summary in Section K.
K. Appendix (Additional data or exhibits)
Program Review Data Summary
## Program Review Data Summary

### Alignment with Community Needs (AAS/CAS Only)

<table>
<thead>
<tr>
<th>Data Definition</th>
<th>Current MT</th>
<th>Projected MT</th>
<th>Current U.S.</th>
<th>Projected U.S.</th>
<th>Program Notes</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Provide percent change in job openings for related occupations for Montana and the U.S.</td>
<td>+10%</td>
<td>+15%</td>
<td></td>
<td></td>
<td>See links for specific employ/wage data</td>
<td>CareerOneStop/US Dept of Labor</td>
</tr>
<tr>
<td>C. Provide the median hourly wage or annual salary for related occupations</td>
<td>$17.86 hourly</td>
<td>$20.35 hourly</td>
<td></td>
<td></td>
<td>Wage information as of 2012</td>
<td>CareerOneStop/US Dept of Labor</td>
</tr>
</tbody>
</table>

### Student Participation and Success

<table>
<thead>
<tr>
<th>Data Definition</th>
<th>Year 1 08/09</th>
<th>Year 2 09/10</th>
<th>Year 3 10/11</th>
<th>Year 4 11/12</th>
<th>Year 5 12/13</th>
<th>5 Year Ave</th>
<th>Program Notes</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Provide program capacity (headcount)</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>1st and 2nd Year</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>B. Provide 5 years of enrollment (unduplicated headcount)</td>
<td>26</td>
<td>35</td>
<td>43</td>
<td>40</td>
<td>42</td>
<td>37</td>
<td></td>
<td>Institutional Research</td>
</tr>
<tr>
<td>C. Provide 5 years of enrollment (FTE)</td>
<td>19</td>
<td>28</td>
<td>38</td>
<td>34</td>
<td>34</td>
<td>31</td>
<td>Total spring Deed course credits/15</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>D. Annual percentage of program capacity</td>
<td>65%</td>
<td>87%</td>
<td>107%</td>
<td>100%</td>
<td>105%</td>
<td>93%</td>
<td>Enrollment/Program Capacity</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>E. Provide 5 years of retention rates for part-time students</td>
<td>N/A</td>
<td>85%</td>
<td>89%</td>
<td>76%</td>
<td>82%</td>
<td>92%</td>
<td>Enter returning students</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>F. Provide 5 years of retention rates for part-time students</td>
<td>N/A</td>
<td>50%</td>
<td>66%</td>
<td>37%</td>
<td></td>
<td></td>
<td>the following fall semester</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>G. Provide 5 years of successful program course completion rates.</td>
<td>100%/96%</td>
<td>96%/97%</td>
<td>97%/97%</td>
<td>97%/97%</td>
<td>99%/100%</td>
<td>98%/97%</td>
<td>Pass or C- or better each term</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>H. Provide 5 years of graduation rates for full-time students</td>
<td>65% Fall 06</td>
<td>75% Fall 07</td>
<td>77% Fall 08</td>
<td>65% Fall 09</td>
<td>53% Fall 10</td>
<td>46%</td>
<td>% entering students graduating with 3 years</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>I. Provide 5 years of graduation rates for part-time students</td>
<td>N/A Fall 06</td>
<td>N/A Fall 07</td>
<td>N/A Fall 08</td>
<td>0% Fall 09</td>
<td>33% Fall 10</td>
<td>5%</td>
<td>% entering students graduating with 3 years</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>J. Provide 5 years of annual degree &amp; certificate completions</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>12</td>
<td></td>
<td>Institutional Research</td>
</tr>
<tr>
<td>K. Provide 5 years of degree production rates – proportion of degrees/certificates granted per 100 FTE enrollment</td>
<td>58</td>
<td>39</td>
<td>31</td>
<td>38</td>
<td>41</td>
<td>41</td>
<td># of completers per 100 FTE enrollment</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>L. Provide 5 years of pass rates on occupation/industry specific licensing or certification exams (as applicable)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td>Program Records</td>
</tr>
<tr>
<td>M. For applied programs with program admission provide five years of student application totals</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>Program Records</td>
</tr>
<tr>
<td>N. For applied programs with program admission provide five years of students accepted totals</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>Program Records</td>
</tr>
</tbody>
</table>

### Fiscal and Physical Resources

<table>
<thead>
<tr>
<th>Data Definition</th>
<th>Year 1 08/09</th>
<th>Year 2 09/10</th>
<th>Year 3 10/11</th>
<th>Year 4 11/12</th>
<th>Year 5 12/13</th>
<th>5 Year Ave</th>
<th>Program Notes</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Provide 5 years of instructional cost/student (FTE)</td>
<td>$7,556</td>
<td>$6,328</td>
<td>$5,369</td>
<td>$5,484</td>
<td>$6,029</td>
<td>$6,153</td>
<td>HR + Operating/FTE</td>
<td>Institutional Research/Finance</td>
</tr>
<tr>
<td>B. Provide 5 years institutional expenditure/student (FTE)</td>
<td>$7,367</td>
<td>$6,872</td>
<td>$6,024</td>
<td>$6,328</td>
<td>$7,473</td>
<td>$6,813</td>
<td>Total Budget/FTE</td>
<td>MUS-OCHCE</td>
</tr>
<tr>
<td>C. Provide 5 years of instructional cost/completion</td>
<td>$13,051</td>
<td>$16,108</td>
<td>$17,004</td>
<td>$18,959</td>
<td>$14,641</td>
<td>$15,953</td>
<td>HR+Operating/Pr Compl</td>
<td>Institutional Research</td>
</tr>
<tr>
<td>D. Provide 5 years institutional expenditure/completion</td>
<td>$34,392</td>
<td>$34,209</td>
<td>$33,220</td>
<td>$29,193</td>
<td>$34,780</td>
<td>$33,159</td>
<td>Total Budget/Inst Compl</td>
<td>MUS-OCHCE</td>
</tr>
<tr>
<td>E. Provide 5 years of student program fees-fund balance(s)</td>
<td>$1,540</td>
<td>$2,273</td>
<td>$2,740</td>
<td>$2,735</td>
<td>$2,335</td>
<td>$2,335</td>
<td>Fees (H60280)</td>
<td>Finance/Program Records</td>
</tr>
<tr>
<td>F. Provide 5 years of student program fees-student costs</td>
<td>$0</td>
<td>$1,519</td>
<td>$0</td>
<td>$3,000</td>
<td>$3,511</td>
<td>$1,606</td>
<td>Fees (H60280)</td>
<td>Finance/Program Records</td>
</tr>
</tbody>
</table>