



**Internal Program Review  
Self-Study Report**

**Program Name**

Aviation Maintenance

**Credentials Offered**

Aviation Maintenance Technology (AVMT) Associate of Applied Science Degree - 80 credits

**Self-Study Completed by:**

Karl Kruger, Faculty  
Tod Dumas, Faculty

**Date Completed:**

September 2014

### **A. Introduction**

The collective public has very high expectations when it comes to the safety of aircraft flying overhead and the Federal Aviation Administration has charged Helena College-UM with providing quality meaningful instruction to prospective Aviation Maintenance Technicians to meet that challenge. Students are trained above and beyond the standards outlined in Federal Aviation Administration (FAA) Title 14 Code of Federal Regulations: 14 CFR 147 (FAR Part 147) and the guidelines set forth in the program approved curriculum. Upon completion of 1900 hours of course work, students will be prepared to take three written exams and sit with a Designated Maintenance Examiner qualified by the FAA to be given three Oral and Practical Exams.

Upon completion of the required FAA tests, a student will be certificated by the FAA as a mechanic with either or both an airframe and powerplant rating. With additional general coursework through Helena College-UM, students are awarded an Associate of Applied Sciences Degree in Aviation Maintenance Technology.

### **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

The Aviation Maintenance Technology Program Mission aligns with the Helena College-UM Mission through the provision of access to educational opportunities in the College service area. The Aviation Maintenance Technology program prepares entry-level technicians who are trained in the fundamentals of aircraft maintenance with respect to general aviation and the light utility helicopter industry. With this training, a technician will be prepared for employment in many different occupations in the aviation industry including: Fixed Base Operations, Repair Stations, Commuter Airlines, Air Cargo, Aircraft Restoration, Flight Schools and Aerial Fire Fighting, to name a few.

#### 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

#### Aviation Maintenance Technology Goals

1. Provide students with the necessary experiences to become employable in the aviation maintenance industry at an entry level.
2. Provide students with the necessary lab activities according to CFR Part 147 standards to prepare students to sit for the Federal Aviation Administration AVMT certification exams.
3. Strive to instill in students a professional work ethic.
4. Provide students the knowledge of workplace hazards so students will be able to work safely in the aviation industry.

#### Helena College Core Themes

- Provide Access and Support: high quality educational activities and programs important to achieving student success
- 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

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

Helena College-UM Core Theme Alignment with Aviation Maintenance Technology

- Provide Access and Support: high quality educational activities and programs important to achieving student success
  - Sole Montana 2-year program in Aviation Maintenance Technology
  - Rigorous Program of Study
  - FAA-Approved Aviation Maintenance Program
- Demonstrate Academic Excellence: integrity, quality and reliability in all academic and non-academic programming
  - The collective public has very high expectations when it comes to the safety of aircraft flying overhead and the Federal Aviation Administration has charged Helena College-UM with providing quality meaningful instruction to prospective Aviation Maintenance Technicians to meet that challenge.
- 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 Aviation Maintenance Technology program strengthens the community by preparing students to meet local, regional, state and national workforce needs. The Helena College-UM Aviation Maintenance Technology program is the only program in Montana.

Helena College Strategic Goals	Aviation Maintenance Technology Goal Alignment
1. Partner for Student Success	1. Provide students with the necessary experiences to become employable in the aviation maintenance industry at an entry level. 2. Provide students the knowledge of workplace hazards so students will be able to work safely in the aviation industry.
3. Integrate Assessment & Planning	
4. Attain Excellence	2. Provide students with the necessary lab activities according to CFR Part 147 standards to prepare students to sit for the Federal Aviation Administration AVMT certification exams.
3. Support the Community	
5. Develop Resources	

**C. Alignment with Community Needs**

Aviation maintenance facilities in the state of Montana hire our graduates. Students enroll and complete the program are hired by aviation maintenance facilities and, due to the mechanical requirements of this program, students transfer from the 2-year to 4-year programs, particularly into engineering.

Students matriculating from the Aviation Maintenance Technology program leave with a diverse skill sets working with wood structures, metal fabrication, composites, aircraft inspection, and engine repair. Students acquire thorough attention to detail and strong, positive work ethic. Students, a majority of which are Montana natives complete the program to enter the Montana workforce.

**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%).

Aviation student Fall Enrollment History 2002-2013:

Helena College	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Summary												
Aviation Maintenance Tech	28	22	13	16	19	19	32	25	28	30	32	20

Helena College Student Retention: Aviation Maintenance Technology

Summary	Fall 2007 to Spring 2008	Fall 2007 to Fall 2008	Fall 2008 to Spring 2009	Fall 2008 to Fall 2009	Fall 2009 to Spring 2010	Fall 2009 to Fall 2010	Fall 2010 to Spring 2011	Fall 2010 to Fall 2011	Fall 2011 to Spring 2012	Fall 2011 to Fall 2012	Fall 2012 to Spring 2013	Fall 2012 to Fall 2013
Aviation Mntnce Tech	71.4%	71.4%	80.9%	66.7%	88.9%	77.8%	76.9%	76.9%	85.7%	78.6%	88.2%	70.6%

**E. Student Learning Outcomes**

Students successfully completing the Aviation Maintenance Technology program will be able to:

1. Read and interpret Federal Aviation Regulations, aircraft service manuals, directives and bulletins to properly complete aircraft maintenance and repairs.
2. Prepare logbook entries and properly document the repairs completed on an aircraft.
3. Complete proper jacking procedures, ground handling and servicing on aircraft.
4. Prepare weight and balance computations and properly prepare the required documentation.
5. Evaluate sheet metal, composite structure, fabric covering and structural damage in order to prepare and complete the necessary repairs in accordance with approved procedures.
6. Complete repair and maintenance on various airframe components and systems.
7. Complete repair and maintenance on aircraft reciprocating and turbine engines.
8. Return an aircraft to service after maintenance and repair.
9. Inspect, remove and install non-repairable items such as propellers and aircraft accessories and instruments.



**F. Curriculum and Instruction (Academic Programs Only)**

In addition to the career technical content, all Associate of Applied Science Degrees require a body of general education including computation, communication, and human relations.

**G. Faculty/Staff Profile**

Helena College-UM has two full-time faculty assigned to the Associate of Applied Science Degree in Aviation Maintenance Technology Program.

Karl Kruger was hired at Helena College in the fall of 2007. He earned his Associate of Applied Science degree in Communications technology from Nashville State Technical College. He holds a mechanics certificate with airframe and powerplant ratings and airframe and powerplant inspection authorization. As a certificated private pilot with multi-engine rating, and high performance endorsement, he brings a superior level of expertise and knowledge to the curriculum and all practical applications. Karl is a member of the Experimental Aircraft Association, and as a technical counselor he is called upon by experimental aircraft builders for troubleshooting and problem-solving. He is currently serving as Vice President of Chapter 344 of the Association. Karl is a member of the Montana Air National Guard, currently serving as a F15 crew chief. His 26 years of knowledge and experience in the realms of military and private-sector aviation serves students and the College.

Tod Dumas was hired at Helena College-UM in the fall of 2008. He completed the Helena College-UM Aviation Maintenance Technology program. Tod holds a mechanics certificate with airframe and powerplant ratings. He has over twenty years industry experience; 15 years in supervisory roles including Helena College graduates.; 7 years as Director of Maintenance and Chief Inspector for Part 135(on demand carrier service) and 145 (repair station) ( Repair Station). Tod is a member of the Experimental Aircraft Association.

**H. Fiscal and Physical Resources**

**Budget:**

Infusions of budgetary support for Aviation Maintenance Technology occurred when equipment maintenance and repair and purchase of new equipment was required.

FY 2009	FY2010	FY2011	FY2012	FY2013	FY2014
83,774.00	18,929.00	102,170	45,537	29,950	31,100

**Lab space and classroom space:**

9, 000 sq feet teaching laboratory  
 2 dedicated classrooms for lecture. 2 computers are installed in the labs for student research, reference and use of online maintenance manuals is required.

**Equipment used for instruction:**

- 2 twin engine airplanes
- 5 single engine aircraft
- 1 jet airplane
- 2 helicopters
- 6 turbine engine trainers
- 15 reciprocating engines
- Access to one Boeing 727
- 1 Lathe for engine repair
- Pin hones
- Newly acquired and installed paint booth
- Valve seat and grinding tools
- Composite repairs tools

### **I. Recommendations and Preliminary Implementation Plan**

Since the addition of this program to the College slate of career technical programs, an increasing need for additional physical space to house and store the requisite instructional equipment is evident. Ideally, the instructional and laboratory space needed is nearly 150,000 sq ft—sufficient to park and house all aircraft, including the size of the jetliner.

Recently a light sport category of aircraft has been added by the FAA to meet changing public need. These aircraft have new maintenance rules to meet the needs of this new category of aircraft. There is a need for trained mechanics to accomplish maintenance under these new rules. Addition of specialized training for these aircraft will fill the gap needed locally and nationally.

Unmanned aerial vehicles (UAV) have become a fast growing sector of the aviation community. These aircraft need highly trained mechanics to perform the maintenance tasks needed for safe operation. Addition of specialized classes specific to the UAV maintenance requirements will fill a need in the growing market.

It is imperative career technical programs have equipment for training which is model, relevant and currently used in aviation maintenance facilities where students are employed. The addition of aircraft is essential to the viability of the program.

- Two additional twin-engine, and 3 single-engine aircraft
- Additional helicopters
- Three light sport aircraft to add light sport rating to the curriculum
- Unmanned aerial vehicles to add this aspect of aircraft maintenance to the curriculum

In order to enhance state-of-the art instruction and grow the program, at least one additional full-time faculty position would be required.

### **J. Program Review Data Summary**

The College has been able to maintain a stable budget for program sustainability, identifying and allocating resources when additional aircraft, equipment and space were required for program improvement.

Program enrollment and program completion have been relatively stable over this review period. Retention from fall to fall is 78%--is higher than average Helena College general student retention (77%) and higher than Helena College Trades Program student retention (68%).

### **K. Appendix (Additional data or exhibits)**

Helena College-UM 2014-15 Catalog pages  
Faculty Position Description

## Aviation Maintenance Technology

### Aviation Maintenance Technology

The Aviation Maintenance Technology program provides students with the basic skills common to all mechanics as well as the specialized requirements unique to aircraft maintenance. A partial listing of the special skills a student will learn can be found in the course curriculum printed below.

Satisfactory completion of the program prepares and qualifies students for the Federal Aviation Administration's tests to obtain an Airframe and Powerplant Mechanic Certificate. Completion of the program will also give the student the necessary job skills to gain employment in the aircraft maintenance industry. The Aviation Maintenance Technology program is approved and certified by the FAA and requires four semesters of study to complete the course.

Students will need professional tools to gain employment upon graduation; therefore, they are required to purchase a tool set as outlined in the tool section. Students are required to purchase school-approved coveralls and red rags for use in the shops and are responsible for a cleaning fee each semester.

### Gainful Employment

Aviation Maintenance Technology

Associate of Applied Science

Career Outlook: According to the Bureau of Labor Statistics employment of aircraft mechanics and avionics technicians is projected to grow 6 percent from 2010 to 2020, slower than the average for all occupations.

Modest employment growth is expected as air travel gradually increases over the coming decade. However, as airlines increasingly outsource maintenance work to other countries, employment growth is expected to be limited.

Job prospects should be best for mechanics and technicians who hold an Airframe and Powerplant (A&P) certificate and a bachelor's degree in aircraft maintenance. Job prospects also will be better for those who keep up with technical advances in aircraft electronics and composite materials.

Job opportunities may arise from the need to replace mechanics who leave the workforce. Over the next decade, many aircraft mechanics are expected to retire. As older mechanics retire and younger mechanics advance, entry-level positions may open up.

However, if airlines continue to send maintenance work to other countries, competition for new jobs will remain strong.

Employment Opportunities with SOC Code:

Aircraft Mechanics and Service Technicians 49-3011.00

Avionics Technicians 49-2091.00

Aviation Inspectors 53-6051.01

Salary Forecast: **MT CO**

Aircraft Mechanics & Service

Technicians 49-3011.00 46,630 57,250

Avionics Technicians 49-2091.00 33,110 46,260

Aviation Inspectors 53-6051.01 52,300 68,510

For the most current salary information please refer to the Bureau of Labor Statistics "Occupational Outlook Handbook found at [www.bls.gov/ooh/](http://www.bls.gov/ooh/).

Program Cost:

Approximately \$7,300



## Aviation Maintenance Technology

### Aviation Maintenance Technology

**Length of Program:** 4 Semesters

**Type of Program:** Associate of Applied Science

**Semester of Entry:** Fall and Spring

*The suggested sequence in this catalog is for students entering in the fall semester. Please see your advisor for a suggested spring entry sequence.*

#### **FIRST YEAR**

##### **Fall Semester**

AVMT100 Intro to Aviation Maintenance/Mathematics and Basic Physics 2

AVMT105 Basic Electricity 2

AVMT110 Aircraft Drawings/Weight and Balance 2

AVMT115 Materials and Processes/Fluid Lines and Fittings/Cleaning and Corrosion Control 3

AVMT120 Ground Operation and Servicing 2

AVMT125 Maintenance Publications/Forms & Records/Mechanic Privileges & Limitations 2

AVMT130 Basic Aerodynamics 2

AVMT135 Assembly & Rigging/Airframe Inspection 3

M111T Technical Mathematics 3

**Total Semester Credits 21**

##### **Spring Semester**

AVMT140 Sheet Metal 3

AVMT145 Composites and Plastics 3

AVMT150 Wood Structures 2

AVMT155 Aircraft Covering/Aircraft Finishes 2

AVMT160 Aircraft Welding 3

AVMT165 Hydraulic and Pneumatic Power Systems 3

AVMT170 Aircraft Landing Gear Systems/Position and Warning Systems 2

**Total Semester Credits 18**

#### **SECOND YEAR**

##### **Fall Semester**

AVMT205 Aircraft Electrical Systems 2

AVMT210 Aircraft Fuel Systems/Fire Protection Systems/Ice and Rain Control Systems 3

AVMT215 Cabin Atmosphere Control Systems 2

AVMT220 Aircraft Instrument Systems/Communication and Navigation Systems 3

AVMT225 Development of Aircraft Powerplants 2

AVMT230 Reciprocating Engines and Systems 6

WRIT121T Introduction to Technical Writing 3

**Total Semester Credits 21**

##### **Spring Semester**

AVMT235 Turbine Engines and Systems 6

AVMT240 Engine Instrument Systems 2

AVMT245 Engine Electrical Systems/Auxiliary Power Unit 2

AVMT250 Engine Fire Protection Systems 2

AVMT255 Propellers and Unducted Fans 6

HR100T Career and Human Development 2

**Total Semester Credits 20**

**TOTAL CREDITS 80**



## Aviation (A&P) Instructor

<b>Position Description:</b>	Permanent, full-time position as an Aviation (Airframe & Powerplant) Instructor. Under the direction of the Associate Dean of Academic Affairs, the Aviation Instructor position is a permanent, tenure-track position
<b>Duties &amp; Responsibilities:</b>	<p>Duties and responsibilities include, but are not limited to, the following:</p> <ul style="list-style-type: none"><li>▪ Maintaining compliance with FAR Part 147 Course Standards</li><li>▪ Remaining current in the area of expertise and updating course content when appropriate to reflect the current levels of knowledge in the discipline.</li><li>▪ Developing, implementing, and reviewing – at least annually – an effective learning process that incorporates appropriate methodology, technology, and other tools.</li><li>▪ Developing a system for ongoing evaluation of both teaching and learning, including course competency expectations and student outcome measures.</li><li>▪ Working in partnership with aviation instructor and advisory committee to develop a budget, applicable coursework, a plan of action for the program and program expansion.</li><li>▪ Working in partnership with the Associate Dean of Academic Affairs through a formal system of evaluation of instruction to identify strengths and weaknesses in the instructional process and identify professional development activities that will lead to effective student learning.</li><li>▪ Maintaining an appropriate schedule to allow for student access and inquiry.</li><li>▪ Working in partnership with student services personnel on student advising, orientation, recruitment, and marketing.</li><li>▪ Participating in necessary institutional functions such as, but not limited to, college committees, club sponsorship, facilitation of advisory committees, student/faculty recruitment, budget development, and mentoring of new and part-time faculty.</li></ul>
<b>Qualifications:</b>	<p><b>Required:</b></p> <ul style="list-style-type: none"><li>▪ Airframe and Powerplant Mechanic certificate.</li><li>▪ Three years of aviation maintenance technician experience.</li></ul> <p><b>Preferred:</b></p> <ul style="list-style-type: none"><li>▪ Inspection Authorization and/or Designated Mechanic Examiner Authorization.</li><li>▪ Three years teaching experience in aviation maintenance.</li></ul>

September 2013