

**ITEM 118-201-R0103 ATTACHMENT**

**PROGRAM PROPOSAL  
“AGRICULTURAL POWER AND MACHINERY”  
TWO-YEAR A.A.S. DEGREE  
AND  
ONE-YEAR CERTIFICATE PROGRAM**

DAWSON COMMUNITY COLLEGE  
GLENDDIVE, MONTANA

**I. PROPOSED PROGRAM DESCRIPTION:**

**A. Introduction:**

Dawson Community College – Glendive, proposes to initiate a program in Agricultural Power and Machinery. This program will prepare students in mechanical and technical skills associated with production agriculture. Students will be instructed on the repair and maintenance of farm and ranch equipment, including tractors, sprayers, tillage equipment, livestock equipment, harvest machinery, and storage equipment.

Farm equipment dealerships across the country are constantly in search of qualified agricultural machinery technicians. Graduates will also be very well prepared to return to production agriculture. The nearest similar program is over 300 miles from Dawson Community College.

**B. Proposed Program Title:** Agricultural Power and Machinery

**C. Length of Program:** Associate of Applied Science – Two Years or Four Semesters / Certificate – One Year or Two Semesters

**D. Credit Hours:** A.A.S. – 60 hours / Certificate – 31 hours

**E. Contact Hours:** A.A.S. – 1,110 / Certificate – 600

**F. Proposal Implementation Date:** Fall Semester 2003

**II. PROGRAM DEVELOPMENT AND DOCUMENTATION:**

**A. Brief Description of the Proposal:**

This proposal represents an effort by Dawson Community College to implement a program in Agricultural Power and Machinery that will offer both a certificate and an A.A.S. degree. The curriculum will provide training and experience that will prepare students to enter the field of agricultural power and equipment or to engage in production agriculture. The A.A.S. degree shall consist of 60 credit hours of coursework, 39 of which will be directly related to the subject while the remaining 21 credit hours will be academic and supporting courses. Academic and support course work will include Math, English, Speech, Human Relations, Social Science, Intro to Business, and an internship.

**B. Appropriate Within Mission and Goals Statement:**

The institution's mission states that it will “provide special occupational training and skill upgrading programs responsive to the needs of local employers and service providers.” It furthermore states that the college will “provide training in the skills required by a changing workplace, for students seeking entry into a variety of careers.” This new program will address all of these statements and more. Local business and agricultural operations will benefit greatly from a workforce trained in this field of agriculture.

**C. Need for the Program:**

As agriculture becomes ever more mechanized and controlled by electronics, the average farmer or rancher becomes less capable of addressing his/her own mechanical needs without expert assistance. Furthermore, local newspapers have run ads for months, advertising for well trained and qualified technicians to work in equipment dealerships. The program will endeavor to link up with partners in industry to help provide internship experiences for students and to also serve as a source of employment opportunities for program graduates.

This program will occupy a facility that is currently empty, increasing the college's ability to efficiently utilize its resources while providing needed training to the region. This program will also increase the efficiency of agricultural operations and

businesses in the area by providing qualified individuals who can maintain, service, and repair modern agricultural equipment.

**D. Student Demand for the Program:**

According to the Montana Agricultural Statistics Service, there are over 28,000 farms and ranches across the state of Montana; area farms average over 2,800 acres each. More than 236,580 acres are in harvested crops while there are over 1,400,000 acres involved in agriculture within Dawson County. These large farms require significant investments in mechanization. As farm and ranch machinery develops, its complexity increases both mechanically and electronically. The days of an agriculturalist, doing shade tree repairs, is long past. While the economics of agriculture dictate that on-farm repairs are less expensive, farmers and ranchers must be properly trained in order to initiate most repairs. They are, therefore, faced with either taking equipment to a dealership or obtaining the training to do it themselves. This program addresses the most basic need of the modern agriculturalist; that of maintaining efficient and cost effective production by keeping equipment operational at all times.

**E. Advisory Committee:**

The advisory committee will be representative of local businesses and industry engaged in agricultural mechanization. Working farmers and ranchers will round out the group to enable it to provide accurate and practical advice for program development.

Advisory Committee Members: David Beniick, Arvid Cornelison, Tom Eaton, Edwin Falkensten, Guy Kolberg, Curt Milne, George Rice, Fred Stortz. This list is tentative as all have not yet agreed to serve.

**F. Articulation with Public Secondary Schools:**

A program of this nature will fit together extremely well with current practice and curriculum in high school vocational agriculture programs. As the program is being initiated, these programs within the eastern part of Montana will be visited to explain the college plan.

The college will work with Tech Prep to establish articulation relationships with interested high schools. The resulting coordination of curricula will permit the college to present an advanced curriculum providing an excellent pathway to higher education for high school vocational students.

**G. Articulation with Higher Education Institutions:**

Some students may transfer to senior institutions that offer curricula in agricultural engineering or agricultural education. Efforts will be made to establish agreements and articulation plans that will permit such transitions without undue loss of credits.

**H. Coordination with Other Work Force Training Sources:**

Dawson Community College will coordinate with the Montana Department of Labor and Industry along with the Montana Job Service to provide placement services and follow-up activities. These resources will also work with the college to determine program direction that will allow the program to remain responsive to a changing job market.

**I. Resources:**

This program will serve to meet the need for agricultural mechanics and better trained farmers in eastern Montana. Graduates will be uniquely qualified to return to the farm or ranch much better prepared to deal with the modern, highly mechanized world of agriculture. Businesses that are engaged in the agriculture service area will also benefit from a ready supply of graduates to fill positions in their firms. Efforts are being made to engage major agricultural equipment manufacturers in a training program that will provide program support and potential employment for program graduates.

The program will occupy a currently existing facility at Dawson Community College and will therefore only require ancillary tools and equipment in order to become fully operational. The proposed location for the program had been used in the past as an automotive mechanics shop and therefore has the space and access needed for this program. The building has over 6,100 square feet of shop space with an additional 2,000 square feet of ancillary space that includes a classroom, tool storage area, locker room and restrooms. The area is well lit, has high ceilings and is well ventilated to control smoke and noxious emissions. There is a lit and fenced outside storage area where machinery and equipment can be stored. Internships and field

visits will also comprise a critical component of the curriculum and will be done off-site at equipment dealerships, farms, and ranches.

Appropriate training materials, and some specialized tooling and diagnostic equipment will need to be acquired. Library resources already in place will provide a foundation of academic support but will need to be supplemented with material specific to the program.

A portion of the program will involve computer instruction. Adequate, well equipped facilities are currently available to address this component.

To initiate the program, one full-time faculty member will be employed. This person will need a background in agricultural education with an orientation in agricultural power and machinery. Minimum educational preparation will be a Bachelor's degree in the field with a Master's being preferred. Teaching experience will be necessary, with a preference that such experience have been at the post-secondary level. Practical agricultural experience will be desirable.

New equipment needed will include testing and diagnostic equipment for diesel engines, heavy lifting equipment, electrical testing equipment, metal fabrication equipment, measuring tools, large size hand tools, hydraulic equipment, and electronic testing devices. If training partnerships can be established with major manufacturers, much of the needed equipment may be donated.

**J. Community Participation:**

Local involvement will be demonstrated by the active participation of a program advisory committee, local business and industry support and the development of cooperative work experience sites that will provide opportunities for student practice. The advisory committee will be made up of farmers and ranchers who best represent mechanized agriculture and business people who have a vested interest in the success of such a program. These will include machinery dealers, elevator operators, and parts suppliers, to name a few.

**K. Impact on Other Programs at DCC:**

As the program will be largely self contained within its facility, there should be little impact related to space. Administratively, the program will be included with other occupationally oriented programs already in place and will be operated accordingly. Academically, the program will rely upon the inclusion of courses found elsewhere within the college. The program's degree will follow the current practice of including a significant block of general studies courses within the parameters of the degree. Mathematics, communications, and human relations will be included along with appropriate science and computer course work. The initiation of this program will have a positive influence on the enrollment of other academic courses across campus.

**L. Evolution of the Program Concept:**

Initialization of the program began with its presentation to the college academic affairs committee and the Board of Trustees for Dawson Community College. The Board of Trustees of Dawson Community College approved the program on November 25, 2002 and agreed to fund the costs of program initiation. Approval of the Montana Board of Regents is being sought, herein, to permit the program to be started.

The original concept for this program was born of discussions about how to best serve agriculture and also better utilize a now vacant facility on the DCC campus. Agriculture is the industry of greatest economic impact in eastern Montana. This program will help meet needs in that field and improve the development of the region. There exists a pronounced need for these graduates as evidenced by employment advertisements from across the state and region. Support gathered from those actively engaged in agriculture has been overwhelmingly positive for the program and the need to utilize the now vacant facility on the DCC campus.

**M. Program Costs:**

These costs are based on an initial enrollment of 15 students with one instructor.

Instructional Materials	\$ 5,000.00
Specialized Tools	\$ 10,000.00
Equipment	\$ 25,000.00
Travel	\$ 500.00
Personnel Costs (salary and benefits)	<u>\$ 36,000.00</u>
Total	\$ 76,500.00

**N. Enrollment Impact and Expected Revenues:**

Enrollment Impact:

24.0 Annualized FTE minimum per full-time instructor

30.0 Annualized FTE maximum per full-time instructor

Expected Revenue (from one full-time instructor):

Minimum:

Tuition and Fees (24 students)	\$ 30,504.00
FTE Reimbursement	\$ <u>66,984.00</u>
Total	\$ 97,488.00

Maximum:

Tuition and Fees (30 students)	\$ 38,130.00
FTE Reimbursement	\$ <u>83,730.00</u>
Total	\$121,860.00

**III. CURRICULUM**

**A. Curriculum Design:**

A.A.S. Degree:

AG111	Plant Science in Agriculture	4 credits
AG232	Farm and Ranch Management w/Computers	2 credits
AM101	Tools Measurements and Safety	3 credits
AM105	Welding and Metal Fabrication	4 credits
AM150	Electricity AC/DC	3 credits
AM175	Service Fundamentals	3 credits
AM205	Hydraulics	3 credits
AM210	Agricultural Electronics	3 credits
AM230	Farm and Ranch Machinery	4 credits
AM250	Farm and Ranch Engines	4 credits
AM255	Power Transmission	<u>4 credits</u>
		37 credits

BU120*	Human Relations in the Workplace	3 credits
CA 280	Computer Bootcamp	1 credit
EN101	Composition I	3 credits
EN102	Composition II	3 credits
CA109	Integrated Software	3 credits
CM159*	Interpersonal Communications	3 credits
HL103	Standard First Aid and CPR	1 credit
MA105*	Finite Math	3 credits
SO230	Rural Sociology	<u>3 credits</u>
		23 credits

**Total 60 credits**

Certificate:

BU120*	Human Relations in the Workplace	3 credits
CM159*	Interpersonal Communications	3 credits
HL103	Standard First Aid and CPR	1 credit
MA105*	Finite Math	<u>3 credits</u>
		10 credits

AM101	Tools Measurements and Safety	3 credits
AM105	Welding and Metal Fabrication	4 credits
AM150	Electricity AC/DC	3 credits
AM175	Service Fundamentals	3 credits
AM230	Farm and Ranch Machinery	4 credits
AM250	Farm and Ranch Engines	<u>4 credits</u>
		21 credits

**Total 31 credits**

The certificate program is provided for the individual who does not wish to engage in a two-year degree program. This curriculum will provide basic academic preparation and technical skills needed for an entry level position in mechanized agriculture.

\* All certificate programs are required by the Northwest Association of Schools and Colleges, Commission on Colleges to contain "a recognizable body of instruction in

three program-related areas: (1) communication, (2) computation, and (3) human relations..."

## **B. Program Outcomes**

### **A.A.S. Degree:**

Upon successful completion of the Agricultural Power and Machinery A.A.S. Program, students will be prepared and able to:

1. Obtain an entry level position in business or industry in the field of agricultural mechanics.
2. Return to a farm or ranch uniquely qualified to operate and maintain machinery in a manner that will increase efficiency and production on the operation.
3. Operate, maintain, diagnose, and repair agricultural engines and power systems.
4. Operate, maintain, and repair farm and ranch machinery involved in the operations of tillage cultivation, spraying, irrigation, harvesting, and livestock handling.
5. Understand the principles of electrical components in commercial, as well as agricultural equipment.
6. Understand the principles and procedures for safety, hand tools, and measurement.
7. Work in such specialized fields as hydraulics and agricultural electronics.
8. Understand the applications of computers in agriculture and machinery.
9. Apply basic skills in welding and metal fabrication.
10. Understand and apply the basics of plant science.
11. Demonstrate academic literacy and functionality in computation, communication, human relations, and computer applications.
12. Demonstrate the ability to think critically and solve problems.

### **Certificate:**

Upon successful completion of the Agricultural Power and Machinery Certificate Program, students will be prepared and able to:

1. Qualify for an entry level position in the field of service and maintenance at an agricultural mechanics business.
2. Obtain employment on a farm or ranch with a working knowledge of mechanized agriculture.
3. Operate and service agricultural engines.
4. Operate and service farm and ranch equipment involved in tillage, cultivation, harvesting, and livestock handling.
5. Understand the fundamentals of electricity and its applications in agriculture.
6. Understand the principles of safety, hand tools, and measurement.
7. Apply basic skills in welding and metal fabrication.
8. Demonstrate academic literacy and functionality in computation, communication, and human relations.
9. Demonstrate the ability to think critically and solve problems.

## **C. Course Descriptions:**

### **AM101 Tools, Measurement and Safety**

**3 cr**

This course will cover identification and proper use of both hand and power tools associated with the content of this program. While safety will be an important part of every course, the issue will be examined in greater depth within this course. Specific topics will include, shop and field safety, equipment and tool safety, welding safety, personal safety devices, farm rescue, and associated topics.

### **AM105 Welding and Metal Fabrication**

**4 cr**

Welding theory and safety issues along with metal working skills will be emphasized. Students will learn shielded metal arc welding and metal inert gas welding, as well as oxyacetylene cutting, welding, and brazing. These skills will be used to cut out and properly assemble a small project that will represent a practical application for the course.

### **AM150 Electricity AC/DC**

**3 cr**

This course is designed to provide a fundamental knowledge of the theory, operation, and safety related to both industrial and low voltage applications. Students will learn about both high voltage, high amperage power and low voltage current. Basic operating characteristics of motors, regulators, and controls found in agricultural machinery will also be covered. Study will cover farm power from 480 volt three phase down to 12 volt ag machinery.

**AM175 Service Fundamentals****3 cr**

Proper equipment service and maintenance are the focus of this class. Lubrication, filters, wear detection, part replacement, scheduling, preventative maintenance and repair, and proper fuel selection will be included. Students will learn how to keep equipment in production.

**AM205 Hydraulics****3 cr**

This course will examine the principles and operation of hydraulic power systems from transmissions to lifting devices. Proper maintenance, safety procedures, and repair will be critical components of the curriculum. Students will learn to fabricate using hydraulics to perform work. They will design systems, sizing hydraulic applications to achieve efficient work and utility. Related equipment, like pumps, cylinders, reservoirs, motors, filters, valves, and pressure regulators will be studied.

**AM210 Agricultural Electronics****3 cr**

Virtually all of today's agricultural equipment utilizes some form of electronics to control its function. This course is designed to provide the student with a basic understanding of electronics and their applications in agricultural mechanics. A major focus of this effort will be the diagnosis of electronic problems and the location of the troublesome component(s). Circuit components and their function will be covered along with the inter-connection of electronic and mechanical components. Study will include power supplies, switches, relays, regulators, wiring, circuit breakers, capacitors, resistors, and indicators. Prerequisite: AM150.

**AM230 Farm and Ranch Machinery****4 cr**

Operation, maintenance and repair of a wide variety of machinery will be covered here. Primary focus will be on tillage, planting, cultivation, and harvesting machinery but the course will also include ranch equipment such as windmills, feeders, corrals, and livestock equipment. Both powered and non-powered machinery will be included to cover most of the common equipment found on farms and ranches of eastern Montana.

**AM250 Farm and Ranch Engines****4 cr**

Both gasoline and diesel engines will be addressed in this course. Topics ranging from basic operating principles to advanced diagnostics will be covered in detail. Proper operation and preventative maintenance will be stressed along with field based repair procedures. The basic intent of the course is to teach students, internal combustion principles so they can operate, maintain, and recognize potential problems with engines. Students will learn how to keep engines in production.

**AM255 Power Transmission****4 cr**

This course will cover topics related to the transfer of power from motor or engine to the work. Specific emphasis will be placed on standard transmissions, automatic transmissions, direct drives, gear reductions, belt drive systems, chain drive systems, power take offs, remote hydraulics, and remote electrical applications. Proper operation, maintenance, diagnostics, and repair of these systems will be included.