

**M O N T A N A   B O A R D   O F   R E G E N T S**

**LEVEL II REQUEST FORM**

<b>Item No.:</b>	<b>138-1503-R0308</b>	<b>Date of Meeting:</b>	<b>March 5-7, 2008</b>
<b>Institution:</b>	<b>Montana Tech of The University of Montana – College of Technology</b>		
<b>Program Title:</b>	<b>Construction Technology – Carpentry AAS and Certificate</b>		

Level II proposals require approval by the Board of Regents.

**Level II action requested (check all that apply):** Level II proposals entail substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other campuses within the Montana University System and community colleges. Board policy 303.1 indicates the curricular proposals in this category:

- 1. Change names of degrees (e.g. from B.A. to B.F.A.)
- 2. Implement a new minor or certificate where there is no major or no option in a major;
- 3. Establish new degrees and add majors to existing degrees;
- 4. Expand/extend approved mission; and
- 5. Any other changes in governance and organization as described in Board of Regents' Policy 218, such as formation, elimination or consolidation of a college, division, school, department, institute, bureau, center, station, laboratory, or similar unit.

All other Certificate or Associate Degree programs may be placed on submission at any Board of Regents meeting. They will be placed on action agendas at subsequent meetings. All campuses agree to ensure that all other campuses receive program information well in advance of submission.

**Specify Request:**

Montana Tech of The University of Montana – College of Technology seeks Level II approval from the Montana Board of Regents to offer a Construction Technology -- Carpentry Certificate of Applied Science and Associate of Applied Science degree. The COT was granted temporary approval to offer the certificate and AAS degree in Construction Trades - Carpentry for two years under Level I approval. This request is to change the status from a temporary Level I to a Level II.

This program will prepare the student with skills and knowledge for a career in residential or commercial construction. The program coursework will provide the student with a mix of technical education, general studies, theory and hands-on learning experiences. The students in this program progress from basic skills to those required of a carpenter. General areas of study include building codes, blueprint reading and sketching, estimating, site layout, concrete

**Item No.: 138-1503+R0308**

**Institution: Montana Tech of The University of Montana**

work, framing, interior and exterior finish, cabinet making and installation, and decks. The Carpentry AAS program will provide graduates with skills required of a carpenter in a variety of building construction settings common in both rural and metropolitan areas. Students will earn a national certification after each level and a one-year Certificate of Applied Science or a two year Associate of Applied Science degree. The addition of the Construction Technology – Carpentry degree to Montana Tech COT will complement the Historic Preservation degree currently being offered.

## ITEM: 138-1503-R0308

### 1. Overview

*Provide a one paragraph description of the proposed program. Be specific about what degree, major, minor or option is sought.*

Montana Tech of The University of Montana – College of Technology seeks approval from the Montana Board of Regents to offer a Construction Technology -- Carpentry Certificate of Applied Science and Associate of Applied Science degree.

This program will prepare the student with skills and knowledge for a career in residential or commercial construction. The program coursework will provide the student with a mix of technical education, general studies, theory and hands-on learning experiences. The students in this program progress from basic skills to those required of a carpenter. General areas of study include building codes, blueprint reading and sketching, estimating, site layout, concrete work, framing, interior and exterior finish, cabinet making and installation, and decks. The Carpentry AAS program will provide graduates with skills required of a carpenter in a variety of building construction settings common in both rural and metropolitan areas. Students will earn a national certification after each level and a one-year Certificate of Applied Science or a two year Associate of Applied Science degree. At the successful completion of this program, the student is eligible for certification with the National Center for Construction Education and Research (NCCER) National Registry.

### 2. Need

*a. To what specific need is the institution responding in developing the proposed program?*

According to Montana Department of Labor occupational forecasts, between 2002 and 2012, Montana is projected to need 4,100 carpenters, 2,260 general operations managers, 1,750 construction laborers, 1,290 first-line supervisors and managers of construction trades and extraction workers, 1,210 painters and construction maintenance personnel, 1,080 construction managers, and 820 electricians. In a presentation to the Montana Workforce Conference held in Great Falls, Montana, on June 22, 2005, Bryon Roberts, Executive Director of the Montana Building Industry in Helena, Montana noted that "the construction industry in Montana is larger than mining, larger than timber and larger than the entire manufacturing center," with an increase of 2,800 net jobs in 2004. On June 22, 2005, there were approximately 400 job openings in the construction trades in Montana which represents 12% of the 3,400 open jobs posted on the [www.jobs.mt.gov](http://www.jobs.mt.gov) website.

*b. How will students and any other affected constituencies be served by the proposed program?*

Employers will have two pools from which to hire. Students will be available from our local apprenticeship pool as well as our degree program. From the inception of this program, Montana Tech COT has been in communication with our local union, establishing very good working relationships that in time will benefit all parties involved. Our students are using the apprenticeship time book to keep track of their time on each task.

**ITEM: 138-1503-R0308**

*c. What is the anticipated demand for the program? How was this determined?*

The construction industry in Montana represents 5.8% of Montana's Gross State Product and the industry's contribution to the economy exceeded \$1.48 billion in 2003. The U.S. Department of Labor reports 3,680 employees in the construction field, not counting those that are self-employed. Based on the median income of this population, this represents over \$123 million in local wages.

A well trained workforce is critical for Montana business and industries to meet their production schedules. In particular, the Montana construction industry has sorely felt the impact of the lack of trained workers in the construction industry and particularly in carpentry. Residential and commercial projects fall behind schedule resulting in a negative economic impact. According to a report developed by Dr. Paul Pozin of the Bureau of Business and Economic Research at the University of Montana and presented to the Montana Board of Regents on September 22, 2005, 21.6% of all businesses surveyed in Montana indicated that they had a shortage of qualified workers. The construction and health care industries topped the list.

**Two-Year Career Wages and Job Outlooks  
Construction Careers**

Occupation	Mean Annual	Mean Hourly	Hourly Median <sup>1</sup>	Hour Median	Hourly Median <sup>2</sup>	Employment in 2000	Employment in 2004
Cabinetmakers & Bench Carpenters	\$24,760	\$11.91	\$9.72	\$11.41	\$14.00		
Carpenters	34,300	\$16.49	\$13.75	\$16.41	\$19.50	3980	4820
Heating, A/C, & Refrigeration Mechanic	33,860	\$16.28	\$10.72	\$15.88	\$21.09	220	520
Plumbers, Pipefitters & Steamfitters	44,580	\$21.43	\$17.47	\$23.16	\$25.90	680	1140
Structural Metal Fabricators & Fitters	26,550	\$12.76	\$9.83	\$12.55	\$15.54	100	330
Welders, Cutters, & Braziers	30,410	\$14.62	\$10.60	\$13.54	\$18.12	910	800
Architectural & Civil Drafters	33,700	\$16.20	\$13.69	\$15.85	\$18.32	220	340
Electrical & Electronics Drafters	43,830	\$21.07	\$16.56	\$20.07	\$25.10	100	n/a
Mechanical Drafters (CAD Drafters)	33,260	\$15.99	\$12.64	\$14.16	\$17.43	90	190
Drafters, All Other	39,950	\$19.21	\$14.31	\$16.84	\$22.16	n/a	n/a
Civil Engineering Technicians	33,390	\$16.05	\$12.39	\$16.53	\$19.74	370	520
Environmental Engineering Technicians	32,720	\$15.73	\$12.16	\$13.63	\$17.62	70	70

<sup>1</sup> Low End of Middle Range Wages

<sup>2</sup> High End of Middle Range Wages

### 3. Institutional and System Fit

- a. *What is the connection between the proposed program and existing programs at the institution?*

The addition of the Construction Technology – Carpentry degree to Montana Tech COT will compliment the Historic Preservation degree currently being offered. Students from the Historic Preservation program can take classes such as Rough Framing and carpentry students can take Historic Preservation classes such as Plaster or Stonework and Masonry.

- b. *Will approval of the proposed program require changes to any existing programs at the institution? If so, please describe.*

No changes to existing programs have been required.

- c. *Describe what differentiates this program from other, closely related programs at the institution (if appropriate).*

This program is guided by a nationally accredited curriculum in carpentry. The other trades related programs are not guided by such a structured curriculum.

- d. *How does the proposed program serve to advance the strategic goals of the institution?*

The Construction Technology – Carpentry program will advance Montana Tech's strategic goals as follows:

#### **Goal #1 – Sustain and Enhance the Quality of All Academic Programs**

The addition of the Construction Trades – Carpentry program has enhanced our offerings and other programs by broadening the knowledge base. Students can enroll in the first semester carpentry courses to enhance their skill sets.

#### **Goal #2 – Enhance Research and Scholarly Activities**

The carpentry program offered an evening workshop in weatherization that was free to the students in the program as well as the community. The program was offered Spring of 2007. We are also currently testing different applications and durability of composite materials such as Trex® as fascia material.

#### **Goal #3 – Enhance Relationship with Business and Industry**

The program has nurtured a relationship with our local Habitat for Humanity. This relationship has not only helped in providing building sites, but has also brought eight - \$1000 scholarships to the program. Industry connections increase each semester. One of our local lumber yards has offered rejected & damaged materials to the program.

#### **Goal #4 – Advance Tech's Reputation for Quality and Value**

As the program grows and students start to fill vacancies throughout the state, Tech's reputation will be broadened to include trades-related programs.

#### **Goal #5 – Enhance Educational Access and Opportunities**

The addition of this program allows students from high schools that have building trades programs an avenue to obtain a degree in higher education. This is enhanced with Tech Prep agreements and the inclusion of high schools in the implementation of a state-wide

**ITEM: 138-1503-R0308**

common curriculum. This common curriculum will help facilitate students entering programs such as the Montana Tech COT program.

**Goal #6 – Increase Enrollment to 2,688 (FTE) by 2012**

Any program that is added to the offerings at Montana Tech will help us toward our goal of 2,688 FTE by 2012. Each year we will strive to increase and retain the enrollment in the program.

- e. Describe the relationship between the proposed program and any similar programs within the Montana University System. In cases of substantial duplication, explain the need for the proposed program at an additional institution. Describe any efforts that were made to collaborate with these similar programs; and if no efforts were made, explain why. If articulation or transfer agreements have been developed for the substantially duplicated programs, please include the agreement(s) as part of the documentation.*

Montana Tech of The University of Montana – College of Technology partnered with MSU-Billings COT, UM-Missoula COT, and MSU-Northern in a U.S. Department of Labor Community-Based Job Training Grant “Montana BILT”. This grant has allowed the partnership to standardize carpentry based curriculum statewide. The program has been developed in accordance with the National Center for Construction and Education Research (NCCER) national accredited standards. One of our completed goals was to offer the standardized curriculum at the four grant-partnered institutions by the fall of 2006. Another ongoing goal is to disseminate the curriculum to other colleges and high schools in the state that offer construction trades programs. This dissemination of the curriculum will be aided by Tech Prep and other agreements between institutions. The makeup of the NCCER curriculum allows the institutions to offer many short courses for industry. Each of the partnering institutions is currently negotiating articulation agreements between the AAS degrees and their local apprenticeship programs. As a result of these negotiations, transfer among programs should be seamless for students.

The MUS awards construction related degrees at three post-secondary institutions. These degrees have been successful, but historically have not been commonly structured under a nationally accredited program as described in this proposal. Work is currently underway to have all of the seven MUS post-secondary institutions use the same core curriculum as it relates to carpentry. Having a common core curriculum will help address a concern of industry and apprenticeship program statewide – a skilled, consistently trained workforce.

**4. Program Details**

- a. Provide a detailed description of the proposed curriculum. Where possible, present the information in the form intended to appear in the catalog or other publications. NOTE: In the case of two-year degree programs and certificates of applied science, the curriculum should include enough detail to determine if the characteristics set out in Regents’ Policy 301.12 have been met.*

See Attachment

- b. Describe the planned implementation of the proposed program, including estimates of numbers of students at each stage.*

**ITEM: 138-1503-R0308**

The Construction Technology – Carpentry program started enrolling students Fall 2006. Like other programs in the Trades and Technical department, the program is designed for fall entry. Students that enroll during the spring semester will be limited to general education courses.

**Proposed Program: Construction Technology - Carpentry**

**Campus: Montana Tech College of Technology**

Program is designed for fall entry.  
Students enrolling in spring semesters are not reflected in these projections.

	Actual				Projected			
	Year 1		Year 2		Year 3		Year 4	
	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
First year students	8	5	14	9	15	10	15	10
Second year students			3	3	9	6	10	7
FTE Enrollment			17	12	24	16	25	17
Graduates				3		6		7

**5. Resources**

*a. Will additional faculty resources be required to implement this program? If yes, please describe the need and indicate the plan for meeting this need.*

Yes, the BILT grant is providing funding for our current one FTE and some part-time assistance. Montana Tech will assume financial support of the one FTE and part-time employee at the end of the grant cycle.

*b. Are other, additional resources required to ensure the success of the proposed program? If yes, please describe the need and indicate the plan for meeting this need.*

Yes, at the end of the grant cycle a \$200/student/semester program fee will be implemented. This fee will provide for equipment and materials used in the lab portions of the program.

**6. Assessment**

*How will the success of the program be measured?*

- The program is currently being assessed using a combination of the following:
- National Center for Construction Education and Research certificates of completion
  - Student evaluations
  - Noel-Levitz Student Satisfaction Survey
  - Graduate Placement Survey
  - Survey of Seniors
  - Survey of Graduates
  - Capstone Courses
  - Advisory Board
  - Employer Satisfaction Survey

## **ITEM: 138-1503-R0308**

An outcomes assessment is conducted yearly to evaluate if course objectives and program goals are being met. The product of this assessment is submitted to the Department Head, Dean, and Vice Chancellor for Academic Affairs and Research.

### **7. Process Leading to Submission**

*Describe the process of developing and approving the proposed program. Indicate, where appropriate, involvement by faculty, students, community members, potential employers, accrediting agencies, etc.*

#### **Spring 2005**

MSU-Billings COT invited Montana Tech COT to participate in the writing of a grant sponsored by the Department of Labor that focused on Community Based Job Training.

#### **Fall 2005**

Awarded Department of Labor – Community Based Job Training grant.  
Established steering committee and industry advisory boards  
Started work on a common curriculum – Faculty and Industry involvement

#### **Spring 2006**

Finalized Certificate and AAS Degree curriculum - Faculty and Industry involvement  
Presented to:  
Montana Tech COT Administrative Council for approval  
Montana Tech Curriculum Review Committee for approval  
Montana Tech faculty-at-large for approval  
Submitted temporary Level I proposal – Need to submit Level II proposal Spring 2008  
Advertised for Construction Trades – Carpentry Instructor

#### **Summer 2006**

Attended state-wide steering committee – Faculty and Industry involvement  
Hired Construction Trades – Carpentry Instructor

#### **Fall 2006**

Started enrolling students into Construction Trades – Carpentry program

Each stage of this process involved faculty from each of the partnered institutions and those that already had building trades programs such as Helena COT, FVCC and Miles. Industry support during this process was exceptional. Construction companies, Montana Contractors Association, local unions have been instrumental in helping us shape the programs and contributing financially. Montana Contractors Association has been our bridge to the National Center for Construction and Education Research, storing all of the students' certifications.

### **Construction Technology – Carpentry-AAS**

Students enrolling in the Construction Technology – Carpentry program will develop their communication and construction skills enabling them to enter a career in residential or commercial construction. The program coursework will provide the student with a mix of technical education, general studies, theory and hands-on learning experiences. As students progress in the program they will gain the knowledge and ability to draft, read and interpret building codes for a set of construction blueprints. Estimating the amount of material and time required to construct a building with the use of estimating handbooks, spreadsheets and



**ITEM: 138-1503-R0308**

prevailing wage tables. Students will learn how to layout a building on a site and “attach” the building to the site with concrete footings and foundation walls. Students will then progress through the floor, wall and roof framing, exterior and interior finishing, door and window installation and roofing. The Construction Technology – Carpentry program will be reinforced with writing, math and people skills required to successfully communicate and problem solve in the construction trades.

Upon the completion of the required coursework, students will be eligible for certification with National Center for Construction Education and Research (NCCER) National Registry and a one-year Certificate of Applied Science or a two year Associate of Applied Science degree.

Students entering the program should have good manual dexterity skills, like to work outdoors in changing weather conditions and be comfortable working at varying heights.

**Students completing the program will be able to do the following:**

- Demonstrate problem solving, informational literacy, technological and communication skills in team and individual learning exercises.
- Exhibit a sense of pride in one’s work and the desire to progress and excel in the carpentry profession.
- Ability to safely use manual and power equipment typically used in industry.
- Skills that will promote occupational growth and life-long learning.

**Assessment**

National Center for Construction Education and Research	Survey of Graduates
Student evaluations	Capstone
Noel-Levitz Student Satisfaction Survey	Courses
Graduate Placement Survey	Advisory
Survey of Seniors	Board
	Employer Satisfaction
	Survey

**ITEM: 138-1503-R0308**

		<u>1st Semester</u>			<u>3rd Semester</u>
*CARP	0120	Carpentry Basics and Rough-in Framing (Level 1)	5	*CARP 0140	Introduction to Site Layout (Level 2) 3
*CNST	0100	Construction Technology	3	*CARP 0220	Interior Finishing (Level 3) 4
COMM	0102	Introduction to Writing	3	*CARP 0270	Metal Buildings (Level 4) 3
I.T.	1416	Microcomputer Software	3	*D.T. 0125	AutoCAD I 3
MATH	0101	Introduction to Algebra	4	*D.T. 0250	Building Methods and Materials 4
				M.T. 0220	Employment Strategies 2
		Total 18			Total 19
		<u>2nd Semester</u>			<u>4th Semester</u>
**CARP	0130	Exterior Finishing, Stair Construction, and Metal Stud Framing (Level 3)	4	**CARP0230	Advanced Roof, Floor, Wall, and Stair Systems (Level 4) 4
**CARP	0150	Carpentry Practicum I	3	**CARP0250	Carpentry Practicum II 3
		Blueprint Reading, Codes and Estimation for Construction (Core)			Concrete Forms, Reinforcement and Handling (Level 4) 5
**CNST	0110		3	**CARP0260	
**MATH	0130	College Mathematics for Trades	3	**CNST0200	Basic Rigging (Core) 1
PSYC	1000	General Psychology	3	**MFAB0140	Basic Welding 2
		Total 16			Total 15
Minimum credits for an AAS degree in Construction Technology – Carpentry					68

\* Offered only in Fall

\*\* Offered only in Spring

Completion of the first two semesters may result in CERTIFICATE OF APPLIED SCIENCE IN CARPENTRY. Student must complete a course in each of the following areas: *English, Math, and Psychology* to receive a certificate.

This program is designed for fall entry. If a spring entry is desired, it will take longer than two years to complete.

**Montana Tech College of Technology Construction Technology – Carpentry-AAS**

**CARP 0120 Carpentry Basics and Rough-in Framing** 5 cr. Co-requisite: CNST 0100 or instructor’s approval.

Introduces the carpentry trade, including history, career opportunities, and requirements. This course covers a variety of building materials, fasteners, and adhesives. It also covers installation procedures for windows and exterior doors. Skills required for framing a simple structure are studied and practiced.

**CARP 0130 Exterior Finishing, Stair Construction, and Metal Stud Framing** 4 cr.

Prerequisite: CNST 0100 and CARP 120 or instructor’s approval.

Introduces students to materials and methods for sheathing, exterior siding, stairs and roofing. Students will layout and build a simple stair system as well as a metal stud wall with door and window openings.

## ITEM: 138-1503-R0308

**CARP 0150 Carpentry Practicum I** 3 cr. Prerequisite: CARP 120 and CNST 0110 or instructor's approval.

Provides hands-on experience in which the student applies, with minimal supervision, the basic skills and knowledge presented thus far in the NCCER Carpentry Program. This course is designed as a practical task-orientated application utilizing the skills covered in CARP 120 as well as in parts of CARP 130.

**CARP 0140 Introduction to Site Layout** 3 cr. Prerequisite: CNST 0100 or instructor's approval.

Explores the process of distance measurement, differential and trigonometric leveling for site layout. It covers the principles, equipment, and methods used to perform the site layout tasks that require making angular measurements. This course is designed to let students apply the blueprint reading skills learned so far to a practical exercise.

**CARP 0220 Interior Finishing** 4 cr. Prerequisite: CARP 120 and CNST 0110 or instructor's approval.

Cover interior building materials. This course covers materials and installation techniques for interior trim, countertop, base cabinet, and wall cabinet. It also covers suspended ceiling materials, layout, and installation as well as wood and metal door installation.

**CARP 0230 Advanced Roof, Floor, Wall, and Stair Systems** 4 cr. Prerequisite: CARP 0130 and CARP 0150 or instructor's approval.

Covers the installation methods and materials for various roofing systems. It covers a variety of flooring applications as well as interior wall construction for residential and commercial structures. It also covers advanced staircase construction.

**CARP 0250 Carpentry Practicum II** 3 cr. Prerequisite: CARP 0130, CARP 0140, CARP 0150 and CARP 0220 or instructor's approval.

Provides students the opportunity to practice skills they have acquired in the entire carpentry program. It includes task-orientated projects in which students can apply many of the skills and knowledge that have been presented throughout the NCCER Carpentry program. This course is designed as a practical task-orientated exercise utilizing a variety of skills covered in all the NCCER carpentry courses required for the AAS degree.

**CARP 0260 Concrete Forms, Reinforcement and Handling** 5 cr. Prerequisite: CNST 0100 or instructor's approval.

Introduce building forms for footings and foundations as well as for a variety of concrete structures. It introduces methods for handling, placing, and finishing concrete. It also covers manufactured forms and their applications.

**CARP 0270 Metal Building Construction** 3 cr. Prerequisite: CNST 0100

Introduce the basic structural components, fastening methods, and assembly techniques for metal buildings. It provides an overview of the materials and procedures used in application of roofs, wall panels, windows, doors and flashings relating to metal buildings.

### Construction Trades

**CNST 0100 Construction Technology Fundamentals and Safety** 3 cr. Prerequisite: None

Explore the basics in construction-related safety equipment. It also covers proper safety procedures in the operation of hand and power tools.

**ITEM: 138-1503-R0308**

**CNST 0110 Blueprint Reading, Codes and Estimation for Construction** 3 cr. Prerequisite: None

Concentrates on concepts associated with blueprint reading, sketching, and interpreting light commercial and residential drawings. It includes instruction in the recognition of construction materials, procedures, specifications, codes and methods of estimating construction costs from blueprints. This course also covers trade-specific symbols found on construction drawings.

**CNST 0200 Basic Rigging** 1 cr. Prerequisite: None

Explains how ropes, chains, hoists, loaders, and cranes are used to move material and equipment from one location to another on a job site. It describes inspection techniques and load-handling safety practices as well as reviews American National Standards Institute (ANSI) hand signals.

**MATH 0130 College Mathematics for Trades** 3 cr. Prerequisite: MATH 0101 or qualifying score on the placement exam. This course presents basic mathematical topics as they are applied in a technical program. Topics covered include percent, ratio proportion, formula evaluation, basic algebra and geometry concepts, trigonometry and measurement are developed and integrated in a technical setting.