

Submit original with signatures + 1 copy + electronic copy to UAF Governance.  
 See <http://www.uaf.edu/uafgov/faculty/cd> for a complete description of the rules governing curriculum & course changes.

**TRIAL COURSE OR NEW COURSE PROPOSAL**

**SUBMITTED BY:**

<b>Department</b>	<b>Construction Trades Technology</b>	<b>College/School</b>	<b>CRCD/ Interior-Aleutians Campus</b>
<b>Prepared by</b>	<b>Bryan Uher</b>	<b>Phone</b>	<b>474-2613</b>
<b>Email Contact</b>	<b>bmuher@alaska.edu</b>	<b>Faculty Contact</b>	<b>Mario Gho</b>

**1. ACTION DESIRED (CHECK ONE):** Trial Course  New Course

**2. COURSE IDENTIFICATION:** Dept  Course #  No. of Credits

Justify upper/lower division status & number of credits: Current Topics builds on existing 100 CTT courses to explore specific new technologies in the construction industry.

**3. PROPOSED COURSE TITLE:** Current Topics in Construction Trades

**4. CROSS LISTED? YES/NO**  If yes, Dept:  Course #   
 (Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

**5. STACKED? YES/NO**  If yes, Dept:  Course #

**6. FREQUENCY OF OFFERING:** As Demand Warrants  
 (Every or Alternate) Fall, Spring, Summer – or As Demand Warrants

**7. SEMESTER & YEAR OF FIRST OFFERING (if approved)** Spring 2012

**8. COURSE FORMAT:**

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check one)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6 weeks to full semester
OTHER FORMAT (specify)	One to three weeks					
Mode of delivery (specify lecture, field trips, labs, etc)	Face to Face lecture, demonstrations and hands-on participation					

**9. CONTACT HOURS PER WEEK:**  LECTURE hours/weeks  LAB hours /week  PRACTICUM hours /week

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See <http://www.uaf.edu/uafgov/faculty/cd/credits.html> for more information on number of credits.

**OTHER HOURS (specify type)** Hours vary depending on course offered. Minimum hours 14 per credit.

10. COMPLETE CATALOG DESCRIPTION including dept., number, title and credits (50 words or less, if possible):

CTT 250  
Current Topics in Construction Trades  
1-3 Credits

Various topics of current interest in Construction Trades. Topics announced prior to each offering and course may be repeated for credit.

11. COURSE CLASSIFICATIONS: (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

H = Humanities  N = Natural Science  S = Social Sciences

Will this course be used to fulfill a requirement for the baccalaureate core?  YES  NO

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, Format 6  W = Writing Intensive, Format 7  Natural Science, Format 8

12. COURSE REPEATABILITY:

Is this course repeatable for credit?  YES  NO

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).

The current topics vary depending on the location of the course and what is applicable to the area. There may be more than one system that is applicable and requested by students.

How many times may the course be repeated for credit?  TIMES

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?  CREDITS

13. GRADING SYSTEM:

LETTER:  PASS/FAIL:

RESTRICTIONS ON ENROLLMENT (if any)

14. PREREQUISITES

These will be required before the student is allowed to enroll in the course.

RECOMMENDED

Classes, etc. that student is strongly encouraged to complete prior to this course.

15. SPECIAL RESTRICTIONS, CONDITIONS

16. PROPOSED COURSE FEES

Has a memo been submitted through your dean to the Provost & VCAS for fee approval? Yes/No

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously? Yes/No

If yes, give semester, year, course #, etc.:

18. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (ffklj@uaf.edu, 474-

educational and training needs as it applies to rural Alaska.

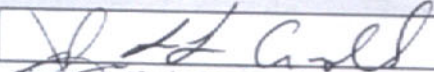
JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

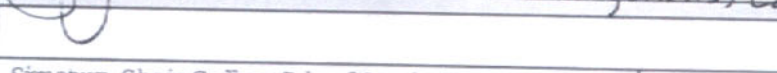
The Construction Trades program services many different locations and topography. Each individual area has its own set of energy resources; the natural conditions also determine the optimal construction technology that would apply there.

Our students are trained in identifying the technology that best applies to their own region, both for construction and for energy conversion. By creating a Current Topics course, the student may explore emerging technologies as they apply to construction trades.

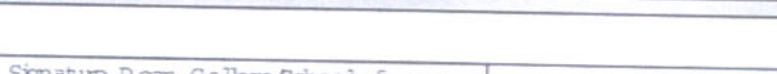
APPROVALS:

 Date 9/16/11

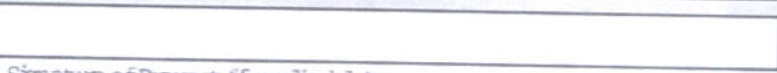
Signature, Chair, Program Department of: Indigenous, Community and Tribal Programs

 Date

Signature, Chair, College School Curriculum Council for:

 Date

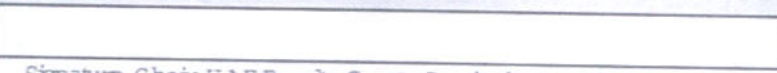
Signature, Dean, College School of:

 Date

Signature of Provost (if applicable)

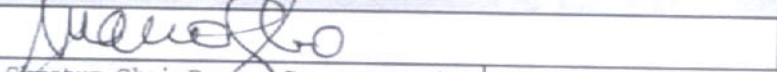
Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

 Date

Signature, Chair, UAF Faculty Senate Curriculum Review Committee

ADDITIONAL SIGNATURES: (if required)

 Date 16 Sep 2011

Signature, Chair, Program Department of:

 Date

Signature, Chair, College School Curriculum Council for:

 Date

Signature, Dean, College School of:

6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No additional items needed
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20. IMPACTS ON PROGRAMS/DEPTS

What programs/departments will be affected by this proposed action? Include information on the Programs/Departments contacted (e.g., email, memo)

CRCO Construction Trades Technology Program

21. POSITIVE AND NEGATIVE IMPACTS

Please specify positive and negative impacts on other courses, programs and departments resulting from the proposed action.

This will increase the ability of the Construction Trades Technology program to respond to the specific educational and training needs as it applies to rural Alaska.

JUSTIFICATION FOR ACTION REQUESTED

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The Construction Trades program services many different locations and topography. Each individual area has its own set of energy resources; the natural conditions also determine the optimal construction technology that would apply there.

Our students are trained in identifying the technology that best applies to their own region, both for construction and for energy conversion. By creating a Current Topics course, the student may explore emerging technologies as they apply to construction trades.

A sample syllabus has been provided with a potential CTT 250 course topic.

APPROVALS:

Note: please see next page for Jennifer Carroll's signature.

	Date	
Signature, Chair, Program/Department of:		

	Date	10/2/11
Signature, Chair, College/School Curriculum Council for:		CRCO

	Date	10/3/11
Signature, Dean, College/School of:		CRCO

	Date	
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Signature of Provost (if applicable)  
Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

Signature, Chair, UAF Faculty Senate Curriculum  
Review Committee

Date

**ADDITIONAL SIGNATURES: (If required)**

Signature, Chair,  
Program/Department of:

Date

Signature, Chair, College/School Curriculum  
Council for:

Date

Signature, Dean, College/School  
of:

Date

**UNIVERSITY OF ALASKA FAIRBANKS**  
**College of Rural and Community Development**  
**Construction Trades Technology**

Interior – Aleutians Campus  
 Harper Building, P.O. Box 756720 Fairbanks, Alaska 99775-6720

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**COURSE SYLLABUS**

<b>Course Title:</b>	<b>Current Topics in Construction Trades: Thermal Energy Generation</b>
<b>Course No:</b>	CTT 250
<b>Credits:</b>	2 (40 contact hours) 32 lecture & 18 lab
<b>Recommended:</b>	CTT 106 and CTT 100
<b>Instructor:</b>	Mario Gho Assistant Professor Construction Trades Technology
<b>Phone:</b>	(907) 474-5958
<b>Address:</b>	PO Box 756720 Fairbanks, AK 99775-6720
<b>Email:</b>	<a href="mailto:mgho1@alaska.edu">mgho1@alaska.edu</a>
<b>Office Hours:</b>	Instructor will post office hours for students during the first class session.
<b>Location:</b>	TBD
<b>Dates:</b>	2011
<b>Times:</b>	9 am to 1 pm Monday through Friday
<b>Course Textbook:</b>	None
<b>Supplemental Readings:</b>	Course handouts related to topic consisting of printed articles and instructor's notes.
<b>Students Supplies:</b>	Notebook, calculator

**Course Description:**

This course introduces the basic components of a water and air heating systems with solar modules, their operation parameters and procedures for their installation and maintenance.

This course is divided into three modules. Each module must be successfully passed. Generally, each module will have assigned reading articles, homework, a written exam and a hands-on competency test

### **Learning Objectives:**

Upon completion of the modules, the participant will be able to:

1. Describe the components of solar energy and how it can be converted to useful thermal energy.
2. Identify the components of an air heating system.
3. Identify the components of the principal water heating systems.
4. Install a thermal energy system in a residence.
5. Monitor, maintain and troubleshoot a residential thermal energy system.
6. Determine the economic feasibility of solar air or water heating systems.

### **Instructional Methods:**

Instructional method will be a combination of face-to-face instruction/lecture, small group discussions, and assembly of solar hot water system. Classroom environment consists of work tables/desks; overhead projector/LCD projector; wipe boards; TV/VCR; standard instructional equipment dealing with testing instruments.

### **Student Learning Outcomes:**

Upon completion of the course students should be able to:

<b>Students should be able to:</b>	<b>Evaluated by:</b>
1. Locate true south from the current location	Field demonstration with a compass and a magnetic declination table
2. Determine optimal tilt for a thermal module	Group discussions, and written test.
3. Differentiate between a hot water tank and a solar storage tank	Group discussion and demonstration
4. Size a circulating pump for a solar water system	Written test and group presentations.

**Module Content:**

1. Solar energy
2. Solar air heating systems
  - a. Collector
  - b. Circulating fan
3. Solar water heating system
  - a. Collector
  - b. Collector Mounting system
  - c. Solar water storage tank
  - d. Water pump
  - e. Heat exchanger
  - f. Expansion tank
  - g. Controls
  - h. Isolation and tempering valves

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## Solar Energy

### **Module Description:**

This module introduces the principles of solar energy, radiation, refraction and convection, and thermal energy units. It also introduces concepts of earth magnetic declination, peak sun hours and solar radiation tables.

### **Learning Objectives:**

Upon completion of the modules, the participant will be able to:

1. Describe the components of solar radiation
2. Explain the relationship between incident radiation, reflection, refraction and absorption
3. Explain the effect of magnetic declination
4. Demonstrate how to read an insolation table

### **Performance Objectives**

Under the supervision of the instructor, the trainee should be able to:

1. Locate true south from the current location
2. Determine optimal tilt for a thermal module

### **Module Content:**

1. Solar radiation
2. Reflection, refraction, absorption
3. Btu, Kwh, peak sun hour
4. Earth declination, latitude
5. Earth magnetic declination
6. Insolation table

### **Lab Supplies Requirements:**

Lab equipment will consist of solar meter, compass, earth globe, solar water heating module, circulating pumps, Pex tubing, Sharkbite connectors.

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## **Air Solar Heating System**

### **Module Description:**

This module introduces the components and operation of an air solar heating system with thermal modules.

### **Learning Objectives:**

Upon completion of the modules, the participant will be able to:

1. Describe the purpose of an air solar heating system for residential applications.
2. Describe the components of an air solar heating system.
3. Recognize the factors that affect the installation and optimum operation of an air solar heating system

### **Performance Objectives:**

Under the supervision of the instructor, the trainee should be able to:

1. Describe the limitations of an air solar heating system
2. Calculate the thermal effect and economic effect of an air solar heating system

### **Module Content:**

1. Air solar heating as supplemental heating system
2. Collector
3. Circulating fan
4. Alternate PV module as electrical supply source
5. Control module
6. Module installation considerations
7. Interpreting module spec sheets and labels

### **Lab Supplies Required:**

Lab equipment will consist of a calculator.

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## Solar Hot Water System

### **Module Description:**

This module introduces the various types of water heating systems and their application; it describes the components and how they differ in function and operation among the different types of solar heating systems. It covers design and installation factors related to geographic location, space availability and needs as they relate to residential installations.

### **Learning Objectives:**

Upon completion of the modules, the participant will be able to:

1. Describe the purpose of a solar hot water system for residential applications.
2. Describe the five types of solar hot water systems
3. Describe the components of a solar hot water system.
4. Recognize the factors that affect the installation and optimum operation of solar hot water systems.
5. Describe the limitations of an air solar heating system

### **Performance Objectives:**

Under the supervision of the instructor, the trainee should be able to:

1. Calculate the thermal effect and economic effect of a solar hot water system
2. Design a solar hot water system
3. Assemble a solar hot water system

### **Module Content:**

1. Batch solar water heating system
2. Thermosiphon
3. Open-loop direct solar hot water system
4. Pressurized glycol solar hot water system
  - a. Propylene glycol
  - b. Ethylene glycol
5. Closed-loop drain back solar hot water system
6. Collector
  - a. Flat plate collector
  - b. Evacuated tube collector
  - c. Integrated Collector Storage (ICS)
7. Collector mounting systems
  - a. Roof mount
  - b. Ground mount
  - c. Awning mount
8. Solar storage tank
  - a. Storage only
  - b. Indirect backup
  - c. Direct backup
  - d. Anode protection

9. Water pump
10. Heat exchanger
  - a. Single wall
  - b. Double wall
  - c. In storage tank
  - d. External
  - e. In drainback reservoir
11. Differential Controller
12. Valves
  - a. Isolation
  - b. Tempering
13. Maintenance
  - a. Physical observation for leaks
  - b. pH and freeze point for heat transfer fluid
  - c. Control temperature sensors set points
  - d. Preheat tank temperature check

**Lab Supplies Requirements:**

Lab equipment will consist of various types of solar collector, storage tank, heat exchanger, mounting system, pumps, control box, valves, piping, soldering gun, solder and flux, pipes, reamer, pipe cutter, plumbing connectors and support brackets.

**Course Evaluation:**

A letter grade will be issued for participants who successfully complete the course.

<b>% of Total</b>	<b>Grade</b>
91 to 100%	A letter grade
81 to 90%	B letter grade
71 to 80%	C letter grade
60 to 70%	D letter grade
59% and below	F letter grade

Total points for the course will be assigned and weighted based on the following:

Attendance/ Participation .....	10%
Homework.....	20%
Demonstration of Skill Mastery.....	30%
Exams/Tests.....	40%

*Attendance/Participation (10%)* means the student is in class, has read the required material, and is actively participating in the classroom session.

*Homework (20%)* means getting prepared for future classes by reading ahead in text and filling out handouts/worksheets. This can be done individually or as a group.

*Return Demonstration (30%)* means under the observation of the instructor, the students will demonstrate safety methods of handling electrical systems and circuits.

*Exam (40%)* is the evaluation tool the instructor will use to determine final mastery of a skill. A test will be issued after completion of each unit; an average of these tests forms the weighted test points.

**Course Policies:**

1. Students are expected to arrive ready to actively participate in class discussion and activities.
2. Attendance is mandatory; students must be on time and prepared for the course material.
3. Late assignments are not accepted without prior approval of instructor.
4. The instructor reserves the right to amend this course outline as needed.

### Support Services:

The instructor is available by appointment for additional assistance outside normal session/class hours. Time and place will be announced at the beginning of class.

### UAF Disabilities Services for Distance Students:

UAF has a Disability Services office that operates in conjunction with the College of Rural and Community Development (CRCDD) campuses and UAF's Center for Distance Education (CDE). Disability Services, a part of UAF's Center for Health and Counseling, provides academic accommodations to enrolled students who are identified as being eligible for these services.

If you believe you are eligible, please visit <http://www.uaf.edu/chc/disability.html> on the web or contact a student affairs staff person at your nearest local campus. You can also contact Disability Services on the Fairbanks Campus at (907) 474-7043, [fydso@uaf.edu](mailto:fydso@uaf.edu).

### Tentative Course Calendar:

<b>Day of Activity</b>	<b>Activity</b>
Day 1	<ul style="list-style-type: none"><li>• Introduction of students, instructor, syllabus, community needs, evaluation process, reading material, and proper handling of special tools.</li><li>• Class discussion on alternative energy systems</li><li>• Solar radiation</li><li>• Reflection, refraction, absorption</li></ul>
Day 2	<ul style="list-style-type: none"><li>• Btu, Kwh, peak sun hour</li><li>• Earth declination, latitude</li><li>• Earth magnetic declination</li><li>• Insolation table</li></ul>
Day 3	<ul style="list-style-type: none"><li>• Test on Solar Energy</li><li>• Field trip to view a collector (thermal or photovoltaic)</li><li>• Air solar heating as supplemental heating system</li><li>• Collector</li></ul>
Day 4	<ul style="list-style-type: none"><li>• Circulating fan</li><li>• Alternate PV module as electrical supply source</li><li>• Control module</li><li>• Module installation considerations</li><li>• Interpreting module spec sheets and labels</li><li>• Test on Air Solar Heating System</li></ul>

Day 5	<ul style="list-style-type: none"> <li>• Batch solar water heating system</li> <li>• Thermosyphon</li> <li>• Open-loop direct solar hot water system</li> </ul>
Day 6	<ul style="list-style-type: none"> <li>• . Pressurized glycol solar hot water system <ul style="list-style-type: none"> <li>○ Propylene glycol</li> <li>○ Ethylene glycol</li> </ul> </li> <li>• Closed-loop drain back solar hot water system</li> </ul>
Day 7	<ul style="list-style-type: none"> <li>• . Collector <ul style="list-style-type: none"> <li>○ Flat plate collector</li> <li>○ Evacuated tube collector</li> </ul> </li> <li>• Collector mounting systems <ul style="list-style-type: none"> <li>○ Roof mount</li> <li>○ Ground mount</li> <li>○ Awning mount</li> </ul> </li> </ul>
Day 8	<ul style="list-style-type: none"> <li>• Solar storage tank</li> <li>• Water pump</li> </ul>
Day 9	<ul style="list-style-type: none"> <li>• Heat exchanger</li> <li>• Controls</li> <li>• Valves <ul style="list-style-type: none"> <li>○ Isolation</li> <li>○ Tempering</li> </ul> </li> </ul>
Day 10	<ul style="list-style-type: none"> <li>• Review solar hot water systems</li> <li>• Test on solar hot water systems</li> <li>• Maintenance <ul style="list-style-type: none"> <li>○ Physical observation for leaks</li> <li>○ pH and freeze point for heat transfer fluid</li> </ul> </li> </ul>