

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:

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

1. ACTION DESIRED (CHECK ONE):

Trial Course	<input type="checkbox"/>	New Course	<input checked="" type="checkbox"/>
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2. COURSE IDENTIFICATION:

Dept	CTT	Course #	161	No. of Credits	5
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Justify upper/lower division status & number of credits:	This course builds on material presented in CTT 160 and covers the factors involved in integrating photovoltaic systems into residential electrical systems. 75 contact hours over 15 days.
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3. PROPOSED COURSE TITLE **Photovoltaic Systems-Part 2**

4. CROSS LISTED? YES/NO 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 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) **Fall 2011**

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: <small>(check one)</small>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6 weeks to full semester
OTHER FORMAT (specify)	Intensive					
Mode of delivery (specify lecture, field trips, labs, etc)	Lecture, lab					

9. CONTACT HOURS PER WEEK:

57 Hrs	LECTURE hours/weeks	18 Hrs.	LAB hours/week		PRACTICUM hours/week
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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) **75 Hours over 15 days**

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

CTT 161 – Photovoltaic Systems - Part II
5 Credits Credit distribution is (4+2); approved at the Jan. 4, '11 Curriculum Review meeting. Provost approved 1/6/2011.
 This course covers practical methods of installing photovoltaic systems in residential settings. The students will also learn basic troubleshooting techniques.

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).

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 No

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

18. ESTIMATED IMPACT

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

None

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (ffklj@uaf.edu, 474-6695) 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 Yes

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)

CRCD 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.

Increase in student numbers and credit hours. May provide additional students transition into the CRCD Construction Trades Technology degree programs. Should not adversely impact other courses or programs.

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.

This course has been requested by multiple Tribal governments and organizations to give the residents of rural Alaska an alternative to fossil fuels. Part One of the course was piloted Spring 2010 in Fort Yukon to an overwhelmingly positive response. This course is part 2 of a 2 part course offering in Alternative Energy and is the foundation of an Occupational Endorsement in Alternative Energy (currently under development).

APPROVALS

	Date	
Signature, Chair, Program/Department of:		

	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		

Format 1 CTT 161

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APPROVALS

[Signature] Date 10/13/10
Signature, Chair, Program/Department of: *Indigenous, Community, and Tribal Programs*

[Signature] Date 10/8/10
Signature, Chair, College/School Curriculum Council for: *CRCO*

[Signature] Date 12/9/10
Signature, Dean, College/School of: *CRCO*

Signature of Provost (if applicable) Date

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Signature, Chair, UAF Faculty Senate Curriculum Review Committee Date

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APPROVALS

Signature, Chair, Program/Department of: _____ Date _____

Andrew R. Curda Date 10/8/10
Signature, Chair, College/School Curriculum Council for: CRCD

Signature, Dean, College/School of: _____ Date _____

Signature of Provost (if applicable) _____ Date _____

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

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Signature, Chair, UAF Faculty Senate Curriculum Review Committee _____ Date _____

ATTACH COMPLETE SYLLABUS (as part of this application).

Note: syllabus must follow the guidelines discussed in the Faculty Senate Guide <http://www.uaf.edu/uafgov/faculty/cd/syllabus.html>. The department and campus wide curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missing or unclear, the proposed course change will be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES

During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

1. Course information:

Title, number, credits, prerequisites, location, meeting time
(make sure that contact hours are in line with credits).

2. Instructor (and if applicable, Teaching Assistant) information:

Name, office location, office hours, telephone, email address.

3. Course readings/materials:

Course textbook title, author, edition/publisher.
 Supplementary readings (indicate whether required or recommended) and
 any supplies required.

4. Course description:

Content of the course and how it fits into the broader curriculum;
 Expected proficiencies required to undertake the course, if applicable.
 Inclusion of catalog description is *strongly* recommended, and
 Description in syllabus must be consistent with catalog course description.

5. Course Goals (general) and Student Learning Outcomes (more specific)

6. Instructional methods:

Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).

7. Course calendar:

A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.

8. Course policies:

Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.

9. Evaluation:

Specify how students will be evaluated, what factors will be included, their relative value, and
 how they will be tabulated into grades (on a curve, absolute scores, etc.)

10. Support Services:

Describe the student support services such as tutoring (local and/or regional) appropriate for the course.

11. Disabilities Services:

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials.

State that you will work with the Office of Disabilities Services (208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities."

UNIVERSITY OF ALASKA FAIRBANKS

College of Rural and Community Development

Construction Trades Technology

Spring 2010

Interior – Aleutians Campus

Harper Building, P.O. Box 756720 Fairbanks, Alaska 99775-6720

COURSE SYLLABUS

Course Title:	Photovoltaic Systems – Part 2
Course No:	CTT 161
Credits:	5
Prerequisites:	CTT 160 or permission from instructor
Instructor:	Mario Gho Assistant Professor Construction Trades Technology
Phone:	(907) 322-8049
Address:	PO Box 756720 Fairbanks, AK 99775-6720
Email:	mghol@alaska.edu
Office Hours:	Instructor will post office hours for students during the first class session.
Location:	TBD
Dates:	20XX
Times:	10 am to 4 pm Monday through Friday
Course Textbook:	<i>Photovoltaic Systems</i> , American Technical Publishers and National Joint Apprenticeship and Training Committee for the Electrical Industry, 2007 (ISBN 978-0-8269-1287-9)
Supplemental Readings:	Recommended course handouts related to topic.
Supplies:	Photovoltaic panels, batteries, controllers, inverters.

Course Description:

This course is a practical introduction to electric power generation through photovoltaic cells. During this course the student will learn to design and install a photovoltaic system integrated with a residential electrical system.

Course Goals:

To familiarize students with the operation and maintenance of photovoltaic power systems. The students will also be able to design and operate stand-alone and grid-tied PV systems.

Instructional Methods:

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

Student Learning Outcomes:

Upon completion of the course students should be able to:

Students should be able to:	Evaluated by:
1. Explain the basic types of inverters used in PV systems.	Written tests and group discussions
2. Determine the system energy and power requirements from a load analysis.	Group discussion and group presentation.
3. Explain the primary factors that affect PV system sizing.	Written tests and group discussions.
4. Describe the methods used to install PV arrays on buildings or other structures.	Readings, group discussions, and written tests.
5. Identify the electrical codes and practices applicable to PV systems.	Written tests and class discussions.
6. Describe how interconnected PV systems can affect utility operations.	Class discussions and presentations.
7. Identify the applicable NEC requirements for both general electrical system requirements and specific PV system requirements.	Written tests and class discussions
8. Troubleshoot PV systems based on a logical process.	Group discussion and demonstration.

Course Evaluation:

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

% of Total	Grade
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/Test.....	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.

Tentative Course Calendar:

Day of Activity	Activity
Day 1	<ul style="list-style-type: none">• Introduction of syllabus, community needs, evaluation process, reading material, and proper handling of special tools.• Class discussion on personal experiences with PV systems.• Review of Ohm's Law• Introduction to Chapter 8 - Inverters
Day 2	<ul style="list-style-type: none">• Introduction to waveform characteristics• Class discussion on AC, phase balance, power factor• Discussion on stand-alone inverters, utility-interactive inverters and bimodal inverters• Review inverter features and specifications; define utilization and limitations
Day 3	<ul style="list-style-type: none">• Test on Chapter 8 – Inverters• Discussion on system sizing methods.• Work on sizing calculations for interactive systems• Work on sizing calculations for stand-alone and interactive systems.
Day 4	<ul style="list-style-type: none">• Resolve exercise problems on battery bank sizing.• Discuss array sizing and configuration. Resolve exercise problems.
Day 5	<ul style="list-style-type: none">• Test on Chapter 9 – System Sizing• Discussion on various array mounting systems.• Discussion on galvanic corrosion prevention methods• Discussion on attachment methods and weather sealing
Day 6	<ul style="list-style-type: none">• Test on Chapter 10 – Mechanical Integration• Student activity – install PV panels
Day 7	<ul style="list-style-type: none">• Student activity – install inverter, BOS
Day 8	<ul style="list-style-type: none">• Introduction to the National Electric Code• Class discussion on conductors and wiring methods
Day 9	<ul style="list-style-type: none">• Class discussion of NEC Article 690.• Class discussion on equipment disconnects and grounding requirements.
Day 10	<ul style="list-style-type: none">• Test on NEC 690 and on grounding requirements• Class discussion on codes and standards for utility interconnection• Student research on interconnection differences of rotating generators and inverters
Day 11	<ul style="list-style-type: none">• Class discussion on labeling requirements for PV systems and components

Day 12	<ul style="list-style-type: none"> • Test on Chapter 11 – Electrical Integration • Discussion and development of an inspection checklist • Class discussion on commissioning PV systems
Day 13	<ul style="list-style-type: none"> • Test on Chapter 14 – Commissioning, Maintenance and Troubleshooting • Class discussion on PV system maintenance procedures • Class activity – perform maintenance on PV panels • Class activity – perform maintenance functions on battery
Day 14	<ul style="list-style-type: none"> • Class discussion on system monitoring • Class exercises on troubleshooting PV systems • Class discussion and development of a troubleshooting guide
Day 15	<ul style="list-style-type: none"> • Test on Chapter 15 – Economic Analysis • Class discussion on incentive options for alternative energy systems • Discussion on how present and future costs are calculated • Class discussion whether a PV system can pay back its value compared to alternative energy sources.