NEOSHO COUNTY COMMUNITY COLLEGE
BOARD OF TRUSTEES
MINUTES

DATE: April 9, 2009
TIME: 5:30 p.m.
PLACE: Student Union, Room 209

PRESENT: Kevin Berthot
Charles Boaz
Clint Isaac
Mariam Mih

ABSENT: Craig Bagshaw
David Peter

PRESENT: Dr. Vicky Smith, President
Dr. Brian Inbody, Vice President for Student Learning
Ben Smith, Dean of Planning and Operations
Sandi Solander, Dean of Finance
Brenda Krumm, Dean of Outreach/Workforce Development
Eric Tincher, Dean of Student Development
Sarah Robb, Faculty Senate President
Mindy Ayers, Faculty
Mary Barr
Kent Pringle, Board Attorney
Terri Dale, Board Clerk

Mr. Berthot called the meeting to order at 5:390 p.m.

Public Comment

Mindy Ayers, history instructor and sponsor of the History Club, thanked the Board for the opportunity to visit Washington, DC on behalf of the History Club. She introduced three students who participated in the trip and asked them to make a few comments. Amanda Clover said that it was a chance to view history hands on and said that her favorite place was Mt. Vernon. Cassie Ponce said she learned from the experience and that her favorite place was the Holocaust Museum. Paden Rourke said he also like Mt. Vernon and the Holocaust Museum. All three students said it was an opportunity to learn first-hand things that they had learned only in the classroom. Ben Smith was also a sponsor on the trip.

IV. Approval of the Agenda

Upon a motion and a second the agenda was approved as printed. Motion passed.

V. Consent Agenda

The following items were approved by consent.
A. Minutes from March 12, 2009
B. Claims for disbursement for March 2009
C. Personnel
D. Course Inventory Revisions

Agenda Item V-C: Personnel

1. Men's Track/Cross Country Coach Resignation
It was the President's recommendation that the Board accept the resignation of Rowdy Sargeson, assistant coach for men's track and cross country. His resignation is effective March 13, 2009.

2. Family Medical Leave Request
Brenda Schoenecker, nursing instructor, has requested leave under the Family Medical Leave Act, effective March 24, 2009 through the end of her current employment contract, May 19, 2009. Ms. Schoenecker will use her accrued sick leave, personal leave and has requested additional hours from the faculty sick leave pool to cover her requested leave. It was the President's recommendation that the Board approve her request for leave under the Family Medical Leave Act.

3. Dean of Finance Resignation
It was the President's recommendation that the Board approve the resignation of Sandi Solander as the Dean of Finance effective June 30, 2009 accepted contemporaneously with a new contract as Business Manager effective July 1, 2009 pursuant to the reorganization plan to be approved by the Board of Trustees.

Consent Agenda Item D: Course Inventory Revision

Before each semester begins, the Kansas Board of Regents asks coordinated institutions to submit a list of courses that the college is capable of teaching in that semester, but is not compelled to offer. This list of courses is referred to as the course inventory. Each change to the inventory must be approved by the academic department where it originated, the curriculum committee, the Chief Academic Officer, the President of the College and finally, the College Board of Trustees, as per NCCC policy.

The following syllabi will be delivered prior to the Board meeting. They will be approved under the agenda item new programs.

Course Inventory Changes for Summer 2009
April Board Meeting
New Courses

ENRG 100 Intro to Energy Management, 3 credit hours
ENRG 102 Energy Physics, 3 credit hours
ENRG 104 Residential/Light Commercial Energy Analysis, 3 credit hours
ENRG 106 Residential HVAC Systems Analysis, 3 credit hours
ENRG 108 Light Commercial HVAC Systems Analysis, 3 credit hours
ENRG 110 Lighting Analysis, 3 credit hours
ENRG 212 Methods of Energy Calculations, 3 credit hours
ENRG 214 Energy Management Project, 1 credit hour
ENRG 216 Energy Investment Analysis, 3 credit hours
ENRG 218 Energy Control Strategies, 3 credit hours
ENRG 220 Energy Presentation, 3 credit hours
ENRG 222 Energy Internship, 3 credit hours
SUST 100 Installation Fundamentals, 3 credit hours
SUST 102 Electrical Theory I, 3 credit hours
SUST 104 Photovoltaic Systems, 3 credit hours
SUST 106 Photovoltaic Systems Installation, 3 credit hours
SUST 108 Photovoltaic Troubleshooting, 1 credit hour
SUST 202 Electrical Theory II, 3 credit hours
SUST 204 Solar Hot Water & Heat Systems, 3 credit hours
SUST 206 Solar Hot Water & Heat Systems Installation, 3 credit hours
SUST 208 Solar Hot Water & Heat Systems Troubleshooting, 1 credit hour
SUST 220 Small Wind Systems, 3 credit hours

SUST 222 Small Wind System Installation, 3 credit hours
SUST 224 Small Wind Troubleshooting, 1 credit hour
SUST 230 Geothermal Systems, 3 credit hours
SUST 232 Geothermal System Installation, 3 credit hours
SUST 234 Geothermal Troubleshooting, 1 credit hour
SUST 240 Sustainable Energy Certificate Exam Review, 1 credit hour

Upon a motion and a second the consent agenda was approved. Motion passed unanimously.

Faculty Senate Report

Sarah Robb, Faculty Senate President, reported that NCCC Science Fair winners who went on to compete at the State Science Fair and that three won special project awards. Kegan Magathan and Lucas Hare received the US Air Force Outstanding Science or Engineer Project award, Laura Erbe and Brittney Shaw received the US Stockholm Junior Water Prize Region award and Brittney Shaw received the Society for In Vitro Biology award.

Ms. Robb also reported the following activity by faculty members:

- Terry Turner and Susan Rhodes, nursing instructors, had attended the Striving for Evidence-Based Practice in Nursing Education conference.
- Seventeen art works from t10 NCCC art students were included in the 32nd annual Neosho Valley Spring Art Exhibit at the Chanute Art Gallery. Ali Harris receiving a 1st place in the watercolor category and Ben Freeman received a 1st place in the sculpture category.
- Welding instructor, Will Jordan, reported that his department had hosted a Tig Welding competition with four area schools attending. NCCC had 6 finish in the top 10 including 1st, 2nd, 4th and 5th. Prizes were awarded and included helmets, gloves, sleeves, safety glasses and hats.
- Linda Jones and Gayle Randolph attended the Chanute High School Advisory Board meeting. Discussion centered around the Kansas Career Fields and Clusters Model.

Ms. Robb told the Board she would like to invite a faculty member to be introduced at the monthly board meetings. She introduced Mindy Ayers as her first guest. Ms. Ayers is an NCCC graduate. She obtained her BSE in History from Pittsburg State University and her Master's degree at Emporia State University. She was a teacher for the Iola High School district for five years before coming to NCCC.

Ms. Robb said that Mindy is one of the most enthusiastic people about learning she has ever met and an excellent instructor. She also serves as the sponsor for the History Club and Academic Excellence Challenge Team.

Dean of Student Development Report

Eric Tincher, Dean of Student Development, showed a video of the completed "Talent" commercial which will be seen in 40,000 homes during mid-March through May. The commercial will be viewed during American Idol television show.

Mr. Tincher also reported that the admissions department had mailed over 1,000 invitations to the six Panther Enrollment days scheduled for April 14, May 20, June 3, 11, 16 and 24. He told the Board that the enrollment day held on February 4 had over 50 prospective students attend.

Dean Tincher also reported on the following activities:

- Registration is purging 2003 files in preparation for internal office moves.
- January credit hours comparison report shows that enrollment is up 2% from spring 2008.
- A Career Resource bulletin board, which shows jobs from different career clusters, in on display in Chapman Library.
- Over three million dollars in financial aid has been disbursed for the 2008-09 academic year.
- A total of 220 residents are living in the residence halls; a 9% increase from spring 2008.
- A one-stop shop process will begin June 1 which will allow students to visit admissions, advising, registration, financial aid and the cashier in the main office of Sanders Hall.
- Graduation is Friday, May 15 at 7:00 p.m. at the Chanute Memorial Auditorium.

Treasurer's Report

Sandi Solander, Dean of Finance, distributed written reports including the Treasurer's Report and Cash Balance Comparison report. She said the month started with a $6.9 million dollar balance and ended with a balance of $6.6 million. Larger revenues were received in March included a tax disbursement check of $304,000.

President's Report

President Vicky Smith updated the Board on the budget for next fiscal year. She provided a handout detailing anticipated revenue shortfalls, required new budget expenses, and budget reductions. It is her hope to have over $745,000 in carryover money to begin the 2009-10 year.

The president discussed state revenues and said that after April 17 the state should have a better idea of what money would be available for the coming year.

Dr. Smith reported that two proposals submitted to the Carl D. Perkins Leadership Fund had been approved. The proposals include $4,200 to assist faculty with welding certification and $3,624 to assist construction technology faculty with OSHA certifications. Additionally, the college submitted two Perkins Leaderships grants in the category of developing technical talent in high schools. Erie High School is the partner in this grant. If funded it would mean $22,500 for welding and $32,797 for construction programs. The grant would allow Erie High Schools students to enroll in the welding and constructions at NCCC.

The annual surplus sale will be in conjunction with Safari Days on April 26th at the college. As per Board policy, Dr. Smith distributed a list of items that will be included in the surplus sale.

Dr. Smith reminded the board of several upcoming events at the college. May 15 at 5:00 p.m. is the Nurses' Pinning and Graduation at 7:00 p.m. Both ceremonies will be held at the Memorial Auditorium. GED Graduation will be May 16 at the 2:00 p.m. at the Sanders Hall Auditorium.

Dr. Smith also distributed the presentation that she and Dr. Brian Inbody will present at the Higher Learning Commission annual meeting in Chicago later in the month.

Agenda Item VII-A: Board Retreat Date and Topic

Setting a date and topic for the spring Board Retreat was tabled at the March meeting. Several dates were discussed and the retreat was scheduled for Thursday, May 21st at 5:30 p.m. Vice Chairman asked for suggested topics for the retreat. It was decided that Succession Planning would be the topic. Dr. Smith will develop a draft process to be discussed by Trustees. The budget will also be a topic of discussion. Dinner will be served. The retreat will be held in the Oak Room of the Student Union.

Agenda Item VII-B: Student Appeals Policy Revision (second reading)

The number of academic honesty violations is on the rise at the college as instructors become more aware of ways of combating the problem. The Chief Academic Officer is seeing more and more cases of violations as instructors have begun using electronic plagiarism software and have changed their testing methods. The college has placed a new focus on academic honesty prevention and detection. This new focus is one of the many initiatives in the Educational Master Plan. This initiative raises the quality of education for all students by assuring that the learning outcomes are truly being met.

Currently, when a student wishes to appeal an instructor's decision as to an academic honesty violation and corrective measure, the student uses the appeal process for behavioral violations. This process was designed for violations in the student code of conduct such as alcohol infractions and damage to college property, not for academic issues. The appeals committee is made up of students and faculty. Instructors have expressed concern about laying open all of a student's grades and the course tests for review by students on the appeal board.

Another concern with the current system is the grade of XF. The academic honesty policy allows the instructor to issue a grade of XF as a consequence of a serious violation of academic honesty. If a student wishes to appeal this decision, should the college direct the student to use the current appeal system for academic honesty violation or the grade appeal policy, as the XF is both a corrective measure and a grade?

Already in place is a separate appeal process for grade appeals where the student appeals directly to the Chief Academic Officer. Confidentiality is maintained through that process. The faculty have asked that the appeal process for academic honesty utilize the grade appeal process, instead of the behavioral appeal process. This would also clear up which appeal a student should use for the XF as it would be one and the same.

Whenever we examine a policy for possible changes, we examine all parts to see if there are other aspects that need updating. The current grade appeal process sets the time limit for filing an appeal to 90 days following the end of summer, fall or spring semesters. It fails to mention interterm or any of the other course time configurations that are used, such as early end courses, students given a grade of incomplete and finish the course much later, or open entry/open exit courses. The curriculum committee recommends that this time limit be changed from 90 days from the end of the semester to 90 days from the completion of the course. This will allow the time limit to begin when the final grade is posted, whenever that occurs during the academic year.

Likewise, the word grade is used often the in current policy, not final grade. The word final was added before grade so that students are clear that they can only appeal the final grade of the course, and not individual grades on tests, papers and projects (except in the case of academic honesty violations).

Below is the current language for the grade appeal process found in Board Policy. The following proposed language would expand this policy to allow academic honesty appeals as well as grade appeals and corrects the time limit issue outlined above. If this policy change is passed by the Board of Trustees, the Student Handbook would be similarly updated to reflect the change. The change would begin immediately upon passage.

These changes have been approved by the Curriculum Committee, the Executive Committee, and the Chief Academic Officer and are presented for a second reading and approval by the Board.

Current Policy

Grade Appeals (revised 3/8/01) (revised 11 13 03)

Grades are based only on academic standards and the instructor's evaluation of how well a student achieved those standards. Final grades shall be based upon written grading criteria given to the student at the beginning of each course. Each instructor is required to issue a syllabus for the course the first class session each semester outlining the requirements for the course and the grading criteria to be used in the course.

Grounds for grade appeals include:

1. Failure of the instructor to follow the written criteria given to the student at the beginning of the course (or failure of the instructor to provide written criteria as required).
2. Alleged errors in the mathematical calculation of grades.
3. Alleged errors in recording the grade on the student's transcript.
4. Non-academic issues such as attendance (i.e. if a student completed the work and would otherwise have been entitled to a grade acceptable to the student, but did not receive the grade due to poor attendance, poor class participation, discrimination, etc.).

If a student questions the calculation or recording of a grade, the student shall first confer with the appropriate course instructor. If the problem cannot be resolved, the student may initiate the grade appeal process by making an appointment with the chief academic officer. It rests within the chief academic officer's discretion to investigate and determine the basis for the appeal and then either resolve it or refer it to an ad hoc committee for review and resolution. Investigation of the grade appeal would relate to determining whether a student's grade was affected adversely by calculation, recording, or non-academic issues as outlined above. No further appeal by the student is allowed.

A grade appeal must be filed no later than ninety (90) days from the last day of the spring, summer, or fall term in which the class was attended. Each grade being questioned must be appealed separately.

Proposed Policy

Academic Appeals Grade Appeals (revised 3/8/01) (revised 11 13 03)

A. Final Grades.

Final Ggrades are based only on academic standards and the instructor's evaluation of how well a student achieved those standards. Final grades shall be based upon written grading criteria given to the student at the beginning of each course. Each instructor is required to issue a syllabus for the course the first class session each semester outlining the requirements for the course and the grading criteria to be used in the course.

Only final grades given at the conclusion of the course may be appealed. Grounds for **Final Grade** appeals include:

1. Failure of the instructor to follow the written criteria given to the student at the beginning of the course (or failure of the instructor to provide written criteria as required).
2. Alleged errors in the mathematical calculation of grades.
3. Alleged errors in recording the grade on the student's transcript.

4. Non-academic issues such as attendance (i.e. if a student completed the work and would otherwise have been entitled to a grade acceptable to the student, but did not receive the grade due to poor attendance, poor class participation, discrimination, etc.).

If a student questions the calculation or recording of a final grade, the student shall first confer with the appropriate course instructor. If the problem cannot be resolved, the student may initiate the grade appeal process by making an appointment with the chief academic officer. It rests within the chief academic officer's discretion to investigate and determine the basis for the appeal and then either resolve it or refer it to an ad hoc committee for review and resolution. Investigation of the grade appeal would relate to determining whether a student's grade was affected adversely by calculation, recording, or non-academic issues as outlined above. No further appeal by the student is allowed.

In the case of a A **final** grade appeal, **the student must begin the appeal process within** must be filed no later than **ninety (90)** days from the last day of the spring, summer, or fall term in which the class was attended ***the conclusion of the course***. Each **final** grade being questioned must be appealed separately.

B. Academic Honesty.

***In the case of an academic honesty violation (as defined in the Code Of Student Conduct And Discipline),* the students must begin the appeal process within two (2) working days from the date disciplinary action was initiated by the faculty member or other College official, except in the case of an XF. If the student wishes to appeal the grade of an XF, the above final grade appeal process deadlines are then used.**

C. Appeal Procedure.

A student begins the appeal process by completing the Academic Appeal Form available in the office of the Chief Academic Officer and then:

1. For a **final** grade appeal, conferring with the appropriate course instructor. If the problem cannot be resolved, the student may continue the appeal process by making an appointment with the Chief Academic Officer.

2. For an academic honesty appeal, including appeal of an XF grade, meeting with the course instructor is not required, and the student shall make an appointment with the Chief Academic Officer.

It rests with the Chief Academic Officer's discretion to investigate and determine the basis for the appeal and then either resolve it or refer it to an ad hoc committee appointed by the Chief Academic Officer or by the President of the College. No further appeal by the student is allowed.

Resolution 2009-9

RESOLVED, that the Board of Trustees of Neosho County Community College approves revisions to the Student Appeals Policy as presented.

Upon a motion and a second the above resolution was unanimously approved. Motion passed.

Agenda Item VIII-A: Residence Hall Rate Increase

NCCC strives to keep all of its costs as low as possible so that the cost of attendance is not a barrier to access a college education. Unfortunately, costs to provide college services increase every year. For the 2009 -2010 academic year, the administration is proposing a $200.00 per year increase for double occupancy and a $220 per year increase for single occupancy in the residence hall housing contract. This increase is necessitated by four factors: (Note: Figures below are based on an estimated yearly average occupancy of 220.)

1. Great Western Dining, our contracted food provider, is raising the meal rates by 6.7%, which equates to $105.51 more per residence hall student per year.
2. MSP Security is raising their wage rates $0.25 an hour, which equates to $2.50 more per residence hall student per year.
3. The bond payment on Bideau Hall will rise to its highest amount next year, which will add an additional $62.55 to the yearly cost per resident. (In 2010-2011 the bond payment will slowly begin to decrease.)
4. Anticipated raises in utilities and employee expenses such as health insurance and operating expenses also must be budgeted and paid by an increase in room and board rates. This figure is more nebulous at this early date in budgeting for 2009-2010.

The current housing rate for a double room (generally, two students per room) is $4,400.00 per academic year for room and board (19 meals a week), with an additional $100.00 housing contract fee. For a single room the rate is $5,780. There is no proposal to raise the housing contract fee.

Current Proposed

Double Room (either hall) $4,400 $4,600
Single Room (either hall) $5,780 $6,000
Below is a comparison of NCCC's rates to other community colleges in Kansas:

	2008-2009	**2009-2010**	**Difference**	**% Increase**
Cloud	5600	No report		
Pratt	4800	No report		
Coffeyville	4796	4796	0	0%
Butler	4764	5000	236	5%
Colby	4600	4690	90	2%
Hutch	4600	No report		
Dodge	4502	4632	130	3%
NCCC	4400	4600	200	5%
ICC	4400	No report		
Garden City	4350	4500	150	3%
Barton	4342	4472	130	3%

Cowley	4200	4500	300	7%
ACCC	4150	4250	100	2%
FSCC	4120	4600	480	12%
Seward	4100	4200	100	2%
Highland	4010	4300	290	7%

For the 2008-09 Academic Year, NCCC ranked 8th in residence hall costs. For the 2009-2010 academic year, NCCC will again rank 8th for residence hall costs.

This rate increase has been approved by the Executive Committee and by the StudentSenate.

Resolution 2009-10

RESOLVED, that the Board of Neosho County Community College approves increasing residence hall rates by $200 per year to $4,600 for double occupancy and $220 per year to $6,000 for single occupancy.

Upon a motion and a second, the above resolution was unanimously approved. Motion passed.

Agenda Item VIII-B: Tuition and Fee Increase

The NCCC Financial Plan calls for an increase in tuition and fees every two years, or as needed due to increased costs to provide educational services. NCCC increased the per credit hour tuition and fees last year, effective 2008-2009. It was the administration's intent not to raise these rates again until the 2010-2011 academic year.

The President has been keeping the Board updated as to the current financial state of both the State of Kansas and NCCC. The Board is now well aware of the projected revenue declines for 2009-2010, both at the state and local level. The College is looking at many different methods for meeting this projected decline in revenue, including spending cuts, holding vacancies open, changes to the academic calendar, and increases in tuition and fee rates.

The administration is recommending an increase of $1 per credit hour for tuition and $1 per credit hour for the incidental fee. This rate increase will be applied to all students. The increase will raise an estimated additional $72,000 in funds if enrollment is steady. Obviously, this $72,000 will not solve the large revenue decline, but coupled with the proposed cuts, NCCC will be able to maintain its high standards despite this unfortunate situation.

The proposal has been approved by the Student Senate, the Curriculum Committee, and the Executive Committee.

Attached is a chart of the proposed changes in the College's credit hour rate structure. The $1 increase to tuition and $1 increase to the incidental fee is applied to all categories of rates as illustrated by this chart.

Resolution 2009-11

RESOLVED, that the Board of Trustees of Neosho County Community College approves increasing tuition by $1 per credit hour and increasing the incidental fee by $1 per credit hour, for all categories of students effective Summer 2009 term.

Upon a motion and a second, the above resolution was approved. Motion passed unanimously.

Proposed Tuition and Fee Schedule 2009-2010 $1 increase in tuition $1 increase in incidental fee			
Neosho County Resident On Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$14/cr hr		(currently $13/cr hr)
Student Union	$5/cr hr		
Technology	$5/cr hr		
Total Fees		$24/cr hr	(currently $23/cr hr)
Neosho County Resident Off Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$14/cr hr		(currently $13/cr hr)
Student Union	$0/cr hr		
Technology	$5/cr hr		
Total Fees		$19/cr hr	(currently $18/cr hr)
Neosho County Resident On Line			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
On Line	$25/cr hr		
Incidental	$14/cr hr		(currently $13/cr hr)

Student Union	$0/cr hr		
Technology	$5/cr hr		
Total Fees		$44/cr hr	(currently $43/cr hr)
Kansas Resident Outside Neosho County (Chanute) On Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$14/cr hr		(currently $13/cr hr)
Student Union	$5/cr hr		
Technology	$5/cr hr		
Out District	$10/cr hr		
Total Fees		$34/cr hr	(currently $33/cr hr)
Kansas Resident Outside Neosho County (Chanute) Off Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$14/cr hr		(currently $13/cr hr)
Student Union	$0/cr hr		
Technology	$5/cr hr		
Out District	$10/cr hr		
Total Fees		$29/cr hr	(currently $28/cr hr)
Kansas Resident Outside Neosho County On Line			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
On Line	$25/cr hr		
Incidental	$14/cr hr		(currently $13/cr hr)

Student Union	$0/cr hr		
Technology	$5/cr hr		
Out District	$10/cr hr		
Total Fees		$54/cr hr	(currently $53/cr hr)
Kansas Resident Outside Neosho County (Ottawa) On Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$18/cr hr		(currently $17/cr hr)
Building	$12/cr hr		
Technology	$5/cr hr		
Out District	$10/cr hr		
Total Fees		$45/cr hr	(currently $44/cr hr)
Kansas Resident Outside Neosho County (Ottawa) Off Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$18/cr hr		(currently $17/cr hr)
Building	$6/cr hr		
Technology	$5/cr hr		
Out District	$10/cr hr		
Total Fees		$39/cr hr	(currently $38/cr hr)
Out-of-State Resident (Chanute) On Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$14/cr hr		(currently $13/cr hr)

Student Union	$5/cr hr		
Technology	$5/cr hr		
Out-of-State	$34/cr hr		
Total Fees		$58/cr hr	(currently $57/cr hr)
Out-of-State Resident (Chanute) Off Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$14/cr hr		(currently $13/cr hr)
Student Union	$0/cr hr		
Technology	$5/cr hr		
Out-of-State	$34/cr hr		
Total Fees		$53/cr hr	(currently $52/cr hr)
Out-of-State Resident On Line			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
On Line	$25/cr hr		
Incidental	$14/cr hr		(currently $13/cr hr)
Student Union	$0/cr hr		
Technology	$5/cr hr		
Out-of-State	$34/cr hr		
Total Fees		$78/cr hr	(currently $77/cr hr)
Out-of-State Resident (Ottawa) On Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			

Incidental	$18/cr hr		(currently $17/cr hr)
Building	$12/cr hr		
Technology	$5/cr hr		
Out-of-State	$34/cr hr		
Total Fees		$69/cr hr	(currently $68/cr hr)

Out-of-State Resident (Ottawa) Off Campus			
Tuition		$45/cr hr	(currently $44/cr hr)
Fees			
Incidental	$18/cr hr		(currently $17/cr hr)
Building	$6/cr hr		
Technology	$5/cr hr		
Out-of-State	$34/cr hr		
Total Fees		$63/cr hr	(currently $62/cr hr)

International (Chanute) On Campus			
Tuition		$118/cr hr	(currently $117/cr hr)
Fees			
Incidental	$18/cr hr		(currently $17/cr hr)
Student Union	$5/cr hr		
Technology	$5/cr hr		
Out-of-US	$10/cr hr		
Total Fees		$38/cr hr	(currently ($37/cr hr)

International (Chanute) Off Campus			
Tuition		$118/cr hr	(currently $117/cr hr)
Fees			

Incidental	$14/cr hr		(currently $13/cr hr)
Student Union	$0/cr hr		
Technology	$5/cr hr		
Out-of-US	$10/cr hr		
Total Fees		$29/cr hr	(currently $28/cr hr)
International On Line			
Tuition		$118/cr hr	(currently $117/cr hr)
Fees			
On Line	$25/cr hr		
Incidental	$14/cr hr		(currently $13/cr hr)
Student Union	$0/cr hr		
Technology	$5/cr hr		
Out-of-US	$10/cr hr		
Total Fees		$54/cr hr	(currently $53/cr hr)
International (Ottawa) On Campus			
Tuition		$118/cr hr	(currently $117/cr hr)
Fees			
Incidental	$18/cr hr		(currently $17/cr hr)
Building	$12/cr hr		
Technology	$5/cr hr		
Out-of-US	$10/cr hr		
Total Fees		$45/cr hr	(currently $44/cr hr)
International (Ottawa) Off Campus			
Tuition		$118/cr hr	(currently $117/cr hr)

Fees			
Incidental	$18/cr hr		(currently $17/cr hr)
Building	$6/cr hr		
Technology	$5/cr hr		
Out-of-US	$10/cr hr		
Total Fees		$39/cr hr	(currently $38/cr hr)
Semester Residence Hall Changes Per Semester			
Bideau Double		$2,300	(currently $2,200)
Bideau Single		$3,000	(currently $2,780)
NeoKan Double		$2,300	(currently $2,200)
NeoKan Single		$3,000	(currently $2,780)
Graduation Fee		$40	
Annual Housing Contract Fee		$100	
Book Rental Fee		$10/cr hr	

Agenda Item VIII-C: Revised Academic Calendar

In July, 2009, the President charged the Calendar Committee with examining new ways to save money for the college using the academic calendar without jeopardizing teaching and learning quality. The committee looked at many different proposals including extending the 4-day work week the college currently uses during the summer to the rest of the calendar year. After extensive investigation, the committee ultimately voted that proposal down. However, a different proposal was suggested and approved for eliminating two in-service days and moving two "campus closed" days.

There are three "major" changes proposed for the 2009-2010 academic calendar.

The first proposed change in the academic calendar removes the October break and the February break from the calendar. It moves these two "vacation days," traditionally taken on or around Columbus Day in October and Presidents Day in February, and places them on the week of Thanksgiving, thereby extending Thanksgiving Break from three days to a full five days.

Secondly, as part of this removal of the October and February break, two current faculty in-service days, one in October and one in February, will be eliminated. These two in-service days were

originally placed in the schedule due to concerns from HLC years ago about the amount of professional development opportunities for our faculty. There have been advances in faculty training since these days were added. First, there has been an addition of the professional development requirement in the PEA Negotiated Agreement, requiring all full-time faculty to receive six "education units" every five years. Along with that requirement was a large allocation of funds to help faculty pay for costs associated with completing the education units. Secondly, seasoned faculty to new faculty mentoring has been increased as well as associated funds for that mentoring. In a recent survey of faculty, many faculty stated that there are too many in-service days with varied results in effectiveness.

Lastly, the proposed schedule moves the start date for Spring 2010 from January 14 to January 19. This avoids the current situation of beginning the semester on a Thursday and immediately taking a three-day weekend due to Martin Luther King Jr. Day. This move also provides two full weeks for the interterm semester that falls between Fall and Spring semesters. Currently, interterm students have to attend class on the weekend as well as during the week, which is not ideal. The change will not impact the date of finals week or graduation.

The proposed change has the potential to save nearly $10,000 for NCCC through a combination of decreases in heat/cooling usage, less in-service meals for employees and speaker fees, no need for meals for students during the lengthened Thanksgiving break, and reduced security costs due to the lengthened Thanksgiving break.

In full disclosure, there have been a few concerns with the proposed schedule. One academic department is concerned with the quickness between the week-long Thanksgiving break and fall finals, which would be separated by only two weeks. A few instructors are concerned that students will have to be "re-taught" the same material after Thanksgiving break because that break is too long and students will have forgotten some of the covered material or may lose motivation. The Calendar Committee has requested that a study be conducted to see if this idea is borne out if the proposed change occurs. Another concern by several students is the length of time without breaks in the schedule. Students will go 11 straight weeks without a break in the fall and 8 weeks in the spring. A few students stated that those who live farther away will not be as able to go home if there are no "long weekends" for that purpose.

This proposed change has been approved by the Executive Committee, the Curriculum Committee, and discussed with the Student Senate.

Resolution 2009-12

RESOLVED, that the Board of Trustees of Neosho County Community College approves the revised academic calendar for 2009-2010 as presented.

Upon a motion and a second, the above resolution was approved. Motion passed unanimously.

Academic Calendar
2009-2010

Fall Semester 2009

July 27 4-Week Fall Intersession Classes Begin
July 30 Cert. Day for 4-Week Fall Intersession Classes
Aug. 17 Faculty Report
Aug. 18 Faculty In-Service
Aug. 20 4-Week Fall Intersession Classes End

Aug. 24 Classes Begin
Sept. 4 Last Day for Refund
Sept. 7 Labor Day (college closed)
Sept. 17 Constitution Day
Sept. 21 Certification Day
Oct. 15 Fall In-Service (no classes)
Oct. 16 Fall Break (college closed)
Oct. 19 Mid-Term
Nov. 24 Classes End at 4:00 p.m. (no night classes)
Nov. 2523-27 Thanksgiving Break (college closed)
Dec. 78-1114 Night Class Finals
Dec. 14 Fall Classes End
Dec. 15-17 Finals
Dec. 18 Faculty Assessment Day
Dec. 21 Faculty Duty Day Off Campus
Dec. 24-Jan. 1 Christmas Break (college closed)

Spring Semester 2010

Jan. 4 Intersession Classes Begin
Jan. 711 Faculty In-Service (college closed)/Faculty Report
Jan. 1315 Intersession Classes End
Jan. 18 Martin Luther King Day (college closed)
Jan. 1419 Classes Begin
Jan. 27Feb. 2 Last Day for Refund
Feb. 1115 Certification Day
Feb. 15 President's Day (college closed)
Feb. 16 Faculty In-Service (no classes)
Mar. 15-19 Spring Break
Mar. 22 Mid-Term
Apr. 2 Good Friday (college closed)
May 5-11 Night Class Finals
May 11 Tuesday Classes are Wednesday Friday Classes (day classes only)
May 11 Spring Classes End
May 12-14 Finals
May 14 Commencement 7:00 p.m.
May 17 Intersession Classes Begin
May 17-18 Faculty Assessment Days
May 19 Faculty Duty Day Off Campus
May 28 Intersession Classes End
May 31 Memorial Day (college closed)

Summer I 2010

June 1 Summer I Begins (4-week & 8-week classes)
June 43 Certification Day for Summer I Classes
June 10 Certification Day for 8-week Summer Classes
June 11 College Closed
June 18 College Closed
June 24 Summer I Ends
June 25 College Closed

Summer II 2010

June 28 Summer II Begins

July 1June 30 Certification Day for Summer II Classes
July 2 College Closed
July 5 Independence Day Observed (college closed)
July 9 College Closed
July 16 College Closed
July 22 Summer II Ends
July 23 College Closed
July 26 Fall Intersession Classes Begin
July 30 College Closed
Aug. 19 Fall Intersession Classes End

Agenda Item VIII-D: Approval of New Programs in Aviation Science, Energy Management and Sustainable Energy Installation

Aviation Science Degree: On November 6, 2008 the Curriculum Committee approved a certificate and associate of applied science degree in Aviation Science. NCCC has had several aviation (flight) courses on the master course list, but not enough to comprise a certificate or degree. After consultation with FAA flight instructors, a complete certificate program has been developed. With the addition of general education courses, the associate of applied science degree can be awarded.

Energy Management Degree: On April 2, 2009 the Curriculum Committee approved a certificate and associate of applied science degree in Energy Management. The attached program sheet describes the program, which was developed as a complimentary program to our construction technology program. Current and future emphasis on green energy makes this a relevant addition to NCCC's program offerings. With the addition of general education courses, the associate of applied science degree can be awarded. In addition, the Kansas Department of Commerce awarded $86,730 for development of energy-related programs to NCCC. This certificate and degree are the results of that development.

Sustainable Energy Installation Degree: On April 2, 2009 the Curriculum Committee approved a certificate and associate of applied science degree in Sustainable Energy Installation. As described in the attached program sheet, this program instructs students to install a wide variety of sustainable energy components including solar, wind, and geothermal energy sources. This program capitalizes on the current energy efficiency focus and trains students in this new and emerging field. With the addition of general education courses, the associate of applied science degree can be awarded. Kansas Department of Commerce funds in the amount of $86,730 will be shared with this program and the Energy Management program.

Program Degree sheets for each of the new programs are on the following pages. I recommend that the Board of Trustees approve the Aviation Science certificate/degree, the Energy Management Certificate/degree and the Sustainable Energy Installation certificate/degree.

Resolution 2009-13

RESOLVED, that the Board of Trustees of Neosho County Community College approves the Aviation Science certificate/degree, the Energy Management Certificate/degree and the Sustainable Energy Installation certificate/degree.

Upon a motion and a second the above resolution was approved. Motion passed unanimously.

COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 100
Course Title: Introduction to Energy Management
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course defines the need for energy management as an integral part of society at all levels. This course will present the various vocational opportunities available to energy management students through lectures, video, and guest speakers.

PREREQUISITE AND/OR CO-REQUISITE
CSIS 100 Computer Concepts and Application; 3 credit hours or test out.

TEXTS
Guide To Energy Management, 6th Edition, Barney L. Capehart, Wayne C. Turner, and William J. Kennedy, 2006 ISBN 0-88173-605-8

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Define energy auditing and energy bills.
2. Demonstrate an understanding of lighting and HVAC.
3. Discuss control systems and computers
4. Define insulation and renewable energy sources.
5. Demonstrate an understanding of water management.
6. Describe career opportunities and the future of energy management.

COURSE OUTLINE

I. Introduction
II. Overview of Energy Auditing
III. Basic Understanding of Energy Bills
IV. Lighting
V. HVAC
VI. Control Systems and Computers
VII. Insulation
VIII. Renewable Energy Sources
IX. Water Management
X. Career Opportunities

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Review of student applications

5. Class discussions
6. Field trips and guest speakers
7. Tests (written)
8. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION

Evaluation of student performance is determined primarily from results of written tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through written testing. Comparison will determine the extent of student gain.

ATTENDANCE POLICY
Absences that occur due to students participating in official college activities are excused except in those cases where outside bodies, such as the State Board of Nursing, have requirements for minimum class minutes for each student. Students who are excused will be given reasonable opportunity to make up any missed work or receive substitute assignments from the instructor and should not be penalized for the absence. Proper procedure should be followed in notifying faculty in advance of the student's planned participation in the event. Ultimately it is the student's responsibility to notify the instructor in advance of the planned absence.

Unless students are participating in a school activity or are excused by the instructor, they are expected to attend class. If a student's absences exceed one-hundred (100) minutes per credit hour for the course or, in the case of on-line or other non-traditional courses, the student is inactive for one-eighth of the total course duration, the instructor has the right, but is not required, to withdraw a student from the course. Once the student has been dropped for excessive absences, the registrar's office will send a letter to the student, stating that he or she has been dropped. A student may petition the chief academic officer for reinstatement by submitting a letter stating valid reasons for the absences within one week of the registrar's notification. If the student is reinstated into the class, the instructor and the registrar will be notified.

ACADEMIC INTEGRITY
NCCC expects every student to demonstrate ethical behavior with regard to academic pursuits. Academic integrity in coursework is a specific requirement. Definitions, examples, and possible consequences for violations of Academic Integrity, as well as the appeals process, can be found in the College Catalog, Student Handbook, and/or Code of Student Conduct and Discipline.

CELL PHONE POLICY
Student cell phones and pagers must be turned off during class times. Faculty may approve an

exception for special circumstances.

NOTE:
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NOTE: If you are a student with a disability who may need accommodation(s) under the Americans with Disabilities Act (ADA), please notify the *Director of Advising and Counseling*, Chanute Campus, Student Union, 620-431-2820 ext 280 or the *Dean,* Ottawa Campus, 785-242-2607 ext 312, as soon as possible. You will need to bring your documentation for review in order to determine reasonable accommodations, and then we can assist you in arranging any necessary accommodations.

COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 102
Course Title: Energy Physics
Division: Outreach and Workforce Development
Program: Energy Management and Sustainable Energy Installation
Credit Hours: 3
Initiation/Revision Date: Spring 2009
Assessment Goal per Outcome(s): 70%

INSTRUCTION CLASSIFICATION
Vocational

COURSE DESCRIPTION
This course is a one-semester conceptual Physics intended for both science and non science majors. The course enables the learner to appreciate and explore the nature of Physics and explanations of the physical phenomena that surrounds us. Course work includes studying mechanics, properties of matter, thermodynamics, waves, electricity, magnetism and optics. A conceptual approach rather than a mathematical point of view is emphasized.

PREREQUISITES AND/OR CO-RECQUISITES
None

COURSE TEXT
Griffith, T. W., and Brosing, W. J. (2008). Physics of Everyday Phenomena: A Conceptual Introduction to Physics, 6th ed., McGraw-Hill.

Additionally, the student must have a scientific calculator with trigonometric functions.

COURSE OUTCOMES/COMPENTENCIES (as required)
Upon the successful completion of the course, the student should be able to:

1. Demonstrate an understanding to use scientific reasoning and principles to describe Physics concepts.
    - Know the definitions, units of measurements and use them appropriately to describe natural phenomena.

1. Understand the concepts of Newtonian mechanics

- Apply Newton's Laws of Motion to solve problems
- Demonstrate an understanding of motion in one and two dimension.
- Apply the Law of Conservation of Energy to solve problems

1. Describe thermodynamic and thermal properties of matter

    - Understand fluid flow
    - Understand kinetic theory of matter
    - Understand the modes of heat transfer
    - Describe phase changes.

1. Understand the relationships between electricity and magnetism in describing electromagnetic waves.

    - Demonstrate comprehension of similarities and differences that exist in electric and magnetic systems.

1. Demonstrate an understanding of optics

    - Understand the nature and properties of light

COURSE OUTLINE

1. Physics, the Fundamental Science
2. Describing Motion
3. Falling Objects and Projectile Motion
4. Circular Motion, the Planets, and Gravity
5. Energy and Oscillations
6. Momentum and Impulse
7. Rotational Motion of Solid Objects
8. The Behavior of Fluids
9. Temperature and Heat
10. Heat Engines and the Second Law of Thermodynamics
11. Electrostatic Phenomena
12. Electric Circuits
13. Magnets and Electromagnetism
14. Making Waves
15. Light Waves and Color
16. Light and Image Formation

INSTRUCTIONAL METHODS

A variety of teaching methods will be used that includes lectures, discussions, and demonstrations. A variety of audio-visual presentations will be used as appropriate to help stress important concepts. Additional handouts will be provided. Each student should obtain the textbook presented in this syllabus's TEXT section.

GRADING SCALE

90 – 100 % ® A

80 – 89 % ® B

70 – 79 % ® C

60 – 69 % ® D

Below 60% ® F

ATTENDANCE POLICY
Absences that occur due to students participating in official college activities are excused except in those cases where outside bodies, such as the State Board of Nursing, have requirements for minimum class minutes for each student. Students who are excused will be given reasonable opportunity to make up any missed work or receive substitute assignments from the instructor and should not be penalized for the absence. Proper procedure should be followed in notifying faculty in advance of the student's planned participation in the event. Ultimately it is the student's responsibility to notify the instructor in advance of the planned absence.

Unless students are participating in a school activity or are excused by the instructor, they are expected to attend class. If a student's absences exceed seventy five (75) minutes per credit hour for the course or, in the case of on-line or other non-traditional courses, the student is inactive for one-eighth of the total course duration, the instructor has the right, but is not required, to withdraw a student from the course. Once the student has been dropped for excessive absences, the registrar's office will send a letter to the student, stating that he or she has been withdrawn. Alternatively, the faculty member may summarily issue the grade of "F" to any student whose absences exceed the above amounts. The normal appeal process may be utilized by the student.

ACADEMIC INTEGRITY
NCCC expects every student to demonstrate ethical behavior with regard to academic pursuits. Academic integrity in coursework is a specific requirement. Definitions, examples, and possible consequences for violations of Academic Integrity, as well as the appeals process, can be found in the College Catalog, Student Handbook, and/or Code of Student Conduct and Discipline.

CELL PHONE POLICY
Student cell phones and pagers must be turned off during class times. Faculty may approve an exception for special circumstances.

NOTES:

- The information and statements contained in this document are subject to change at the discretion of the instructor and NCCC. Changes will be published in writing and made available to students
- All the written materials given to students' remains a property of NCCC.

DISABILITY
If you are a student with a disability who may need accommodation(s) under the Americans with Disabilities Act (ADA), please notify the *Director of Advising and Counseling*, Chanute Campus, Student Union, 620-431-2820 ext 280 or the *Dean,* Ottawa Campus, 785-242-2607 ext 312, as soon as possible. You will need to bring your documentation for review in order to determine reasonable accommodations, and then we can assist you in arranging any necessary accommodations.

COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 104
Course Title: Residential/Light Commercial Energy Analysis

Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3 – Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course teaches concepts in residential/light commercial heating systems; heat transfer through the building envelope; degree days; sources of internal heat gains; heat loss calculations; indoor air pollution; and codes and regulations. In addition students will be introduced to energy auditing software.

PREREQUISITE
NONE

TEXTS
Thumann, Albert and Younger, William J. Handbook of Energy Audits. 7th edition. Fairmont Press. 2007. ISBN: 9781420067910

Krigger, John. Residential Energy: Cost Savings & Comfort for Existing Buildings. Saturn Resources, 2004. ISBN: 9781880120125

REFERENCE:
Turner, Wayne C., Doty, Steve. Energy Management Handbook. 6th edition, 2006. Fairmont Press.

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate an understanding of energy auditing procedures.
2. Demonstrate the ability to utilize energy accounting and analysis through the use of energy auditing software.
3. Demonstrate an understanding of the cost of energy and saving potential.
4. Demonstrate the ability to effectively utilize energy survey instruments.
5. Demonstrate building envelope audit.
6. Demonstrate electrical system audit.
7. Demonstrate HVAC system audit.
8. Demonstrate the ability to analyze the results of system audits.

COURSE OUTLINE

I. Auditing Basics
II. Analysis software
III. Understanding cost/benefit (economics) of energy
IV. Survey Instrumentation
V. Building Envelope
VI. Electrical Systems
VII. HVAC Systems
VIII. Analysis/Recommendation

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Review of student applications
5. Class discussions
6. Field trips and guest speakers
7. Tests (written)
8. Skills tests (performance-based)
9. Laboratory experience

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of written tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through written testing. Comparison will determine the extent of student gain.

ATTENDANCE POLICY
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 106
Course Title: Residential HVAC Systems Analysis
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3 – Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
Students will investigate the physical principles of heating, ventilation, and air conditioning commonly found in the residential setting. Topics will include: the energy equation, change of state, and refrigeration. The course will also cover heat equation, psychometrics, heating and cooling load equations, piping system design, duct system design, solar effects, effects of thermal mass, and central forced air furnaces. Students will learn Seasonal Energy Efficiency Ratios (SEERs), Energy Efficient Resource Standards (EERSs), Annual Fuel Utilization Efficiency (AFUEs,) fuels, and unitary single zone and multi-zone secondary systems. This course requires field work where students will identify and perform calculations.

PREREQUISITE
ENRG 102 Energy Physics

TEXT
McQuiston, Faye C., Parker, Jerald D., Spitler, Jeffrey D. Heating, Ventilating and Air Conditioning Analysis and Design. 6th edition. Wiley. ISBN 978-0471470151

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate an understanding of the physical principles of heating, ventilation, and air conditioning.
2. Discuss effects of solar, thermal mass and system design in the heat equation.
3. Demonstrate an understanding of SEERs, EERs, and AFUEs.

4. Demonstrate an understanding of single zone and multi-zone systems and associated efficiencies.

COURSE OUTLINE

I. Introduction
II. Air-Conditioning Systems
III. Moist Air Properties and Conditioning Processes
IV. Comfort and Health – Indoor Air Quality
V. Heat Transmission
VI. Space Heating Load
VII. Solar Radiation
VIII. Cooling Loads
IX. Energy Calculations and Building Simulation
X. Flow, Pumps, and Piping Design
XI. Space Air Diffusion
XII. Fans and Air Distribution
XIII. Direct Contact Heat and Mass Transfer
XIV. Extended Surface Heat Exchanges
XV. Refrigeration

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Review of student applications
5. Class discussions
6. Field trips and guest speakers
7. Tests (written)
8. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION

Evaluation of student performance is determined primarily from results of written tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through written testing. Comparison will determine the extent of student

gain.

ATTENDANCE POLICY
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 108
Course Title: Light Commercial HVAC Systems Analysis
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3 – Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION

Vocational

COURSE DESCRIPTION
This course is the second of a two-course sequence. This course teaches students to identify commercial HVAC system types and the general energy impact of each type. Calculations of system equipment efficiencies will be used to determine Energy Efficient Resource Standards (EERS), Seasonal Energy Efficiency Ratios (SEERs), Annual Fuel Utilization Efficiencies (AFUEs), combustion and seasonal efficiency in boilers, balance point partial load efficiency, and Bin analysis. Students will investigate HVAC delivery systems that include fans, pumps, dampers, control valves, and ducting. This course requires field work where students will identify and perform calculations.

PREREQUISITE
ENRG 102 Energy Physics
ENRG 106 Residential HVAC Systems Analysis

TEXT
McQuiston, Faye C., Parker, Jerald D., Spitler, Jeffrey D. Heating, Ventilating and Air Conditioning Analysis and Design. 6th edition. Wiley. ISBN 978-0471470151

Whitman, Bill and Tomczyk, John and Johnson, Bill and Silberstein, Eugene. Refrigeration and Air Conditioning Technology. 6th edition. Cengage. 2008 ISBN: 9781428319363.

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate an understanding of the physical principles of heating, ventilation, and air conditioning.
2. Discuss effects of solar, thermal mass and system design in the heat equation.
3. Demonstrate an understanding of SEERs, EERs, and AFUEs.
4. Demonstrate an understanding of single zone and multi-zone systems and associated efficiencies.

COURSE OUTLINE

I. Introduction
II. Air-Conditioning Systems
III. Moist Air Properties and Conditioning Processes
IV. Comfort and Health – Indoor Air Quality
V. Heat Transmission
VI. Space Heating Load
VII. Solar Radiation
VIII. Cooling Loads
IX. Energy Calculations and Building Simulation
X. Flow, Pumps, and Piping Design
XI. Space Air Diffusion
XII. Fans and Air Distribution
XIII. Direct Contact Heat and Mass Transfer
XIV. Extended Surface Heat Exchanges
XV. Refrigeration

INSTRUCTIONAL METHODS

1. Lecture

2. Audio-Visual aids
3. Example and demonstration
4. Review of student applications
5. Class discussions
6. Field trips and guest speakers
7. Tests (written)
8. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of written tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through written testing. Comparison will determine the extent of student gain.

ATTENDANCE POLICY
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 110
Course Title: Lighting Analysis
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3 – Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course includes assessment of quantity and quality of light, light sources, luminaries, lighting controls, manufacturer lamp and ballast specifications, lighting power density, lighting-HVAC interactions, retrofit opportunities, cost savings analysis, and lighting codes regulations. Course includes a supervised lighting audit project.

PREREQUISITE
None

TEXT
Economic Analysis of Lighting by IES (Illumination Engineering Society)

Intermediate Level Lighting Course Student Materials, IES

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate an understanding of light sources and qualities of each.
2. Demonstrate an understanding of lighting-HVAC interactions.
3. Perform illuminance calculations.
4. Evaluate lighting systems.
5. Recommend lighting efficiencies.
6. Conduct an audit of a lighting project.

COURSE OUTLINE

I. Lighting 101
II. Lighting Controls.
III. Assessment Techniques
IV. Lighting Analysis – Residential/Light Commercial
V. Retrofitting

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Review of student applications
5. Class discussions
6. Field trips and guest speakers
7. Tests (written)
8. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of written tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through written testing. Comparison will determine the extent of student gain.

ATTENDANCE POLICY
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ACADEMIC INTEGRITY
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 212
Course Title: Methods of Energy Calculation
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course will emphasize energy management calculation methods focusing on conversion factors and specific fuel types. Fundamental equipment efficiency calculations will be practiced for combustion, motors, and refrigeration. Field data collection and safety procedures will be reviewed.

PREREQUISITE
ENRG 100 Introduction to Energy Management
ENRG 102 Energy Physics

TEXT
Thumann, Albert and Younger, William J. Handbook of Energy Audits. 7th edition. Fairmont Press. 2007. ISBN: 9781420067910

Guide To Energy Management, 6th Edition, Barney L. Capehart, Wayne C. Turner, and William J. Kennedy, 2006 ISBN 0-88173-605-8

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate field data collection techniques.
2. Demonstrate safety procedures.
3. Utilize data to perform energy management calculations.
4. Demonstrate ability to use conversion software.
5. Demonstrate ability to analyze data and make appropriate recommendations.

COURSE OUTLINE

I. Basic Concepts
II. Field Data Collection
III. Data Input
IV. Software Conversions
V. Analysis
VI. Recommendations

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Review of student applications
5. Class discussions
6. Field trips and guest speakers
7. Tests (written)
8. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of written tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through written testing. Comparison will determine the extent of student gain.

ATTENDANCE POLICY
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opportunity to make up any missed work or receive substitute assignments from the instructor and should not be penalized for the absence. Proper procedure should be followed in notifying faculty in advance of the student's planned participation in the event. Ultimately it is the student's responsibility to notify the instructor in advance of the planned absence.

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 214
Course Title: Energy Management Project
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is open to students in the Energy Management certificate program. Students will identify a project, subject to instructor's approval, to demonstrate competence in a specific area of energy management.

PREREQUISITE
ENRG 100 Introduction to Energy Management

TEXT
None

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Create a project.
2. Conduct project as approved by instructor.
3. Present results of project.

COURSE OUTLINE

I. Project Identification
II. Timeline for Project Completion
III. Conduct Project
IV. Presentation of final project and results.
V. Evaluation/Recommendations

INSTRUCTIONAL METHODS
This project-based class is instructor facilitated and student driven. Time management skills and troubleshooting skills are expected to be demonstrated by the students. Instructors are available for support and encouragement as students complete the project.

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of the final project.

GRADING SCALE

100. A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed on knowledge prior to beginning the project and again after completion of the project. Prior to the course, student knowledge is primarily theory-based. After the course, students should have practical, application knowledge. Comparison will determine the extent of student gain. Assessment will be based on a contract signed with the student and instructor.

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 216
Course Title: Energy Investment Analysis
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course teaches energy investment analysis. Topics include interest, simple payback, and life-cycle cost analysis, time value of money, cash flow equivalence, cost-benefit analysis, effects of tax credits, depreciation, inflation and/or escalating fuel costs on energy investments, and cost estimating procedures. The emphasis will be on analysis of energy investments using spreadsheets to consider total cost-benefits over the life of the investment.

PREREQUISITE
ENRG 104 Residential/Light Commercial Energy Analysis or Permission of Instructor
CSIS 121 Principles of Spreadsheets: Microsoft Excel 2007

TEXT
CANMET Energy Technology Centre in collaboration with NASA, UNEP, and GEF. Clean Energy Project Analysis: RETScreen ® Engineering & Cases Textbook.

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate the ability to use energy investment software.
2. Demonstrate the ability to perform investment calculations.
3. Demonstrate the ability to make conclusions based on data analysis.

COURSE OUTLINE

I. Determining the Variables
II. Data Input
III. Software Conversions
IV. Analysis
V. Recommendations

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Review of student applications
5. Class discussions
6. Field trips and guest speakers
7. Tests (written)
8. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of written tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through written testing. Comparison will determine the extent of student

gain.

ATTENDANCE POLICY
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 218
Course Title: Energy Control Strategies
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3 – Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION

Vocational

COURSE DESCRIPTION
This course includes building system control theory and devices, including electric, pneumatic, and digital controls. An emphasis is placed on identifying and understanding control strategies related to energy using systems and methods to estimate energy savings. Hands-on labs reinforce device identification.

PREREQUISITE
ENRG 106 Residential HVAC Systems Analysis
ENRG 212 Methods of Energy Calculation

TEXT

Karti, Moncef. Energy Audit of Building Systems: An Engineering Approach. ISBN 978-0843935871

Krigger, John T., Dorsi, Chris. Residential Energy Costs: Cost Savings and Comfort for Existing Buildings. 978-1880120125

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate an understanding of building system control theory.
2. Identify system control devices.
3. Identify the types of control devices and appropriate uses for each.
4. Demonstrate an understanding of control strategies related to energy using systems and how to estimate energy savings.
5. Complete an energy efficiency control calculation project.

COURSE OUTLINE

I. Introduction
II. Types of Controls
III. Appropriate Controls for specific systems.
IV. Application
V. Calculation of energy savings
VI. Cost analysis

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Class discussions
5. Field trips and guest speakers
6. Tests (written)
7. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
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GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 220
Course Title: Energy Presentation
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course will guide students through the technical presentation process – both written and oral. Electronic communication skills are included.

PREREQUISITE
CSIS 110 Principles in Word Processing Applications, Microsoft Word 2007

TEXT
Gerson, Sharon J. Gerson, Steven M. Technical Writing: Process and Product, 5th edition. Prentice Hall, 2005. ISBN: 978-0131196643

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate appropriate pre-writing processes.
2. Create first draft writing products.
3. Demonstrate effective editing skills.
4. Produce finished written product.
5. Develop support materials for oral presentation.
6. Develop a final oral presentation.

COURSE OUTLINE

I. Professional Letters/Memos
II. Reports
III. Proposals
IV. Electronic Communication
V. Oral Presentations

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Class discussions
5. Field trips and guest speakers
6. Tests (written)
7. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION

Students must complete each assignment. Evaluation of student performance is determined primarily from results of written and skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through written and skills tests. Comparison will determine the extent of student gain.

ATTENDANCE POLICY
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: ENRG 222
Course Title: Energy Internship
Division: Outreach and Workforce Development
Program: Energy Management
Credit Hours: 3
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: 70%

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course provides relevant field experience that integrates theory and practice while providing opportunities to develop skills, explore career options and network with professionals and employers in the energy management field. This course is a required course in the Energy Management Certificate and Degree programs.

PREREQUISITE
Student must be enrolled in the Energy Management program and have a minimum of 21 hours of coursework completed before taking this Energy Internship course or have permission of instructor.

TEXT
None

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Apply formal classroom knowledge learned to an employment situation.
    a. This capstone course allows students to apply all of the program outcomes:
2. Evaluate energy use patterns in residential and commercial structures in a variety of climates/environments.
3. Understand traditional energy sources.
4. Understand sustainable energy sources.
5. Demonstrate an understanding of and ability to use energy monitoring equipment.
6. Demonstrate the ability to measure costs associated with energy usage.
7. Demonstrate the ability to analyze efficient water use.
8. Demonstrate the ability to evaluate energy consuming appliances, lighting, HVAC.
9. Demonstrate the ability to analyze indoor environmental quality.
10. Develop data collection skills.
11. Demonstrate the ability to analyze data and make sound conclusions.
12. Make energy efficiency and energy cost savings recommendations.
13. Demonstrate the ability to construct technical reports and presentations.

COURSE OUTLINE

I. Internship site selection (with instructor).
II. Meet with instructor and internship mentor.
III. Establish internship goals/objectives.
IV. Complete internship goals/objectives
V. Submit final report.
VI. Mentor/instructor consultation.
VII. Conference with internship mentor/instructor/student.
VIII. Evaluation.

INSTRUCTIONAL METHODS

1. Self-directed learning
2. Instructor facilitated
3. Internship Mentor facilitated

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of the skills demonstrate in the internship. Instructor and Internship Mentor will evaluate student on all 12 of the program outcomes previously identified.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through observations by the internship mentor in conjunction with the course instructor. Students will have input on the learning gains during the mentor/instructor/student meeting at the conclusion of the course. An evaluation tool will be developed and used to assess student gain.

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 100
Course Title: Installation Fundamentals
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 - Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course provides a basic overview of plumbing tasks, basic roof materials and terminologies required for sustainable energy installation. Hands-on labs reinforce skills.

PREREQUISITE
None

TEXT
None

REFERENCES
National Center for Construction Education and Research. Construction Technology. 2006. ISBN 0132282186
National Center for Construction Education and Research. L2 Plumbing. 2005. ISBN 0131091832
National Center for Construction Education and Research. L3 Plumbing. 2006. ISBN 0132273012

COURSE OUTCOMES/ COMPETENCIES (as required)

1. Demonstrate the ability to connect pipe joints, seal fittings and check for leaks.
2. Identify and list properties of basic roof materials.
3. Demonstrate ability to apply flashing.
4. Demonstrate ability to seal roofing components.
5. Demonstrate an understanding of terms related to plumbing and roofing.

COURSE OUTLINE

I. Review
II. Plumbing Concepts
III. Application Lab
IV. Roofing Concepts
V. Application Lab

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 102
Course Title: Electrical Theory I
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: Three (3) Lecture (2) and Lab (1)
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This is the first of a two-course sequence in electrical theory. This course defines the basic electrical units, the basic laws of electrical theory as they apply to direct current (DC) circuits such as series, parallel, and series-parallel circuits. Alternating current (AC) waveforms and circuit components are introduced. Electronic test equipment such as digital multimeter and oscilloscope are used to measure electrical signals and troubleshoot basic electrical circuits. Hands-on labs reinforce skills.

PREREQUISITE

None

TEXT
Mullin, Ray C. Electrical Wiring Residential. Cengage Delmar Learning, 2007 ISBN: 9781418050955
National Fire Prevention Association. National Electric Code Handbook 2008. ISBN: 9780877657903

COURSE OUTCOMES/ COMPETENCIES (as required)

I. Demonstrate an understanding of basic electrical units.
II. Describe and understand the laws of electrical theory.
III. Describe and understand AC waveforms and circuits.
IV. Demonstrate the ability to use a digital multimeter.
V. Demonstrate the ability to use an oscilloscope.
VI. Demonstrate electrical circuit troubleshooting skills.

COURSE OUTLINE

I. Theory of Electricity
II. Electrical Equipment
III. Hands-on Application
IV. Troubleshooting

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
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GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 104
Course Title: Photovoltaic Systems
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 – Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course covers the National Electrical Code (NEC) specifics concerning photovoltaic (PV) installation article 690. Code compliant wiring of modules, inverters, charge controllers, and

batteries will be explored in detail. Students will use materials designed for installation practice both indoors and out.

PREREQUISITE
ENRG102 Energy Physics

TEXT
National Electrical Contractors Association (NECA) and International Brotherhood of Electrical Workers (IBEW). Photovoltaic Systems. American Technical Publishers, Inc. 2007.

COURSE OUTCOMES/ COMPETENCIES (as required)

Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005. Upon completion of this course students will demonstrate the ability to:

I. Work safely with photovoltaic systems.
   a. As part of safety considerations associated with installing and maintaining PV systems, any PV installer must be able to:
      i. Maintain safe work habits and clean, orderly work area
      ii. Demonstrate safe and proper use of required tools and equipment
      iii. Demonstrate awareness of safety hazards and how to avoid them
      iv. Demonstrate proficiency in basic first aid and CPR
   b. The installer must be able to identify electrical and non-electrical hazards associated with PV installations, and implement preventive and remedial measures to ensure personnel safety:
      i. Identify and implement appropriate codes and standards concerning installation, operation and maintenance of PV systems and equipment.
      ii. Identify and implement appropriate codes and standards concerning worker and public safety
      iii. Identify personal safety hazards associated with PV installations
      iv. Identify environmental hazards associated with PV installations

II. Conduct a site assessment.
   a. In conducting site surveys for PV systems, the installer shall be able to:
      i. Identify typical tools and equipment required for conducting site surveys for PV installations and demonstrate proficiency in their use
      ii. Establish suitable location with proper orientation, sufficient area, adequate solar access and structural integrity for sustaining PV array
      iii. Establish suitable locations for installing inverters, control, batteries and other balance-of-system components
      iv. Diagram possible layouts and locations for array and equipment, including existing building or site features
      v. Identify and assess any site-specific safety hazards or other issues associated with installation of system
      vi. Obtain and interpret solar radiation and temperature data for site for purposes of establishing performance expectations and use in electrical system calculations
      vii. Quantify the customer electrical load and energy through review of utility bills, meter readings, measurements and/or customer interview
      viii. Estimate and/or measure the peak load demand and average daily energy use for all loads directly connected to inverter-battery systems for purposes of sizing equipment, as applicable
      ix. Determine requirements for installing additional subpanels and interfacing PV

system with utility service, and/or other generation sources as applicable

x. Identify opportunities for the use of energy efficient equipment/appliances, conservation and energy management practices, as applicable

III. Select a System Design
   a. Based on results from a site survey, customer requirements and expectations, the installer shall be able to :
      i. Identify appropriate system designs/configurations based on customer needs, expectations and site conditions
      ii. Estimate sizing requirements for major components based on customer load, desired energy or peak power production, autonomy requirement, size and costs as applicable
      iii. Identify and select major components and balance of system equipment required for installation
      iv. Estimate time, materials and equipment required for installation, determine installation sequence to optimize use of time and materials

IV. Adapt the Mechanical Design
   a. In adapting a PV system mechanical design, the practitioner shall be able to:
      i. Identify a mechanical design, equipment to be used and installation plan that is consistent with the environmental, architectural, structural, code requirements and other conditions of the site
      ii. Identify appropriate module/array layout, orientation and mounting method for ease of installation, electrical configuration and maintenance at the site

COURSE OUTLINE

1. Working safely with photovoltaic systems
2. Conducting a site assessment
3. Selecting a system design
4. Adapting the mechanical design

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION

Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 106
Course Title: Photovoltaic System Installation
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 – Lecture 1 and Lab 2.

Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is a continuation of SUST 104. It covers the unique differences between grid intertie and off-grid systems and associated components. Students will use the National Electrical Code (NEC) as it relates to photovoltaic (PV) installation. Safety on the job will be emphasized.

PREREQUISITE
SUST 104 Photovoltaic Systems

TEXT
National Electrical Contractors Association (NECA) and International Brotherhood of Electrical Workers (IBEW). Photovoltaic Systems. American Technical Publishers, Inc. 2007.

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005. Upon completion of the course students will demonstrate the ability to:

I. Adapt the electrical design.
   a. In adapting a PV system electrical design, the practitioner shall be able to:
      i. Determine the design currents for any part of a PV system electrical circuit
      ii. Select appropriate conductor types and ratings for each electrical circuit in the system based on application
      iii. Determine the derated ampacity of system conductors, and select appropriate sizes based on design currents
      iv. Determine appropriate size, ratings and locations for all system overcurrent and disconnect devices
      v. Determine appropriate size, ratings and locations for grounding, surge suppression and associated equipment
      vi. Determine voltage drop for any electrical circuit based on size and length of conductors
      vii. Verify that the array operating voltage range is within acceptable operating limits for power conditioning equipment, including inverters and controllers
      viii. Select an appropriate utility interconnection point, and determine the size, ratings and locations for overcurrent and disconnect devices
II. Install subsystems and components at the site.
   a. As part of the PV system installation process, the practitioner shall be able to:
      i. Utilize drawings, schematics, instructions and recommended procedures in installing equipment
      ii. Implement all applicable personnel safety and environmental protection measures
      iii. Visually inspect and quick test PV modules
      iv. Assemble modules, panels and support structures as specified by module manufacturer or design
      v. Install module array interconnect wiring, implement measures to disable array during installation
      vi. Complete final assembly, structural attachment and weather sealing of array to

building or other support mechanism
vii. Install and provide required labels on inverters, controls, disconnects and overcurrent devices, surge suppression and grounding equipment, junction boxes, batteries and enclosures, conduit and other electrical hardware
viii. Label, install and terminate electrical wiring; verify proper connections, voltages and phase/polarity relationships
ix. Verify continuity and measure impedance of grounding system
x. Program, adjust and/or configure inverters and controls for desired set points and operating modes

III. Perform a system checkout and inspection.
a. After completing the installation of a PV system, as part of system commissioning, inspections and handoff to the owner/operator, the practitioner shall be able to:
i. Visually inspect entire installation, identifying and resolving any deficiencies in materials or workmanship
ii. Check system mechanical installation for structural integrity and weather sealing
iii. Check electrical installation for proper wiring practice, polarity, grounding and integrity of terminations
iv. Activate system and verify overall system functionality and performance, compare with expectations
v. Demonstrate procedure for connecting and disconnecting the system and equipment from all sources
vi. Identify and verify all required markings and labels for the system and equipment
vii. Identify and explain all safety issues associated with operation and maintenance of system
viii. Identify what documentation is required to be provided to the PV system owner/operator by the installer

COURSE OUTLINE

I. Adapt the electrical design.
II. Install subsystems and components at the site.
III. Perform a system checkout and inspection.

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 108
Course Title: Photovoltaic Troubleshooting
Division: Outreach and Workforce Development

Program: Sustainable Energy Installation
Credit Hours: 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is a continuation of SUST 106. It provides students experience evaluating problems with photovoltaic systems, determining solutions, and implementing repairs.

PREREQUISITE
SUST 106 Photovoltaic System Installation

TEXT
National Electrical Contractors Association (NECA) and International Brotherhood of Electrical Workers (IBEW). Photovoltaic Systems. American Technical Publishers, Inc. 2007.

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005. Upon completion of this course students will be able to demonstrate the ability to:

I. Maintain and Troubleshoot a Photovoltaic System.
    a. In maintaining and troubleshooting PV systems, the practitioner shall be able to:
        i. Identify tools and equipment required for maintaining and troubleshooting PV systems; demonstrate proficiency in their use
        ii. Identify maintenance needs and implement service procedures for modules, arrays, batteries, power conditioning equipment, safety systems, structural and weather sealing systems, and balance of systems equipment
        iii. Measure system performance and operating parameters, compare with specifications and expectations, and assess operating condition of system and equipment
        iv. Perform diagnostic procedures and interpret results
        v. Identify performance and safety issues, and implement corrective measures
        vi. Verify and demonstrate complete functionality and performance of system, including start-up, shut-down, normal operation and emergency/bypass operation
        vii. Compile and maintain records of system operation, performance and maintenance

COURSE OUTLINE

1. Maintenance
2. Repair
3. Troubleshooting

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids

3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
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GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 202
Course Title: Electrical Theory II
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 - Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This is the second of a two-course sequence in electrical theory. This course covers basic AC circuits and components, right triangle mathematics, resonant circuits, filters, and transient circuits. In the lab, students will build and troubleshoot basic alternating circuits using the oscilloscope, function generator, and digital multimeter

PREREQUISITE
SUST 102 Electrical Theory I

TEXT
Mullin, Ray C. Electrical Wiring Residential. Cengage Delmar Learning, 2007, ISBN: 9781418050955
National Fire Prevention Association. National Electric Code Handbook 2008. ISBN: 9780877657903

COURSE OUTCOMES/ COMPETENCIES (as required)

I. Define and understand AC circuits and components.
II. Demonstrate the ability to use right triangle mathematics.
III. Demonstrate an understanding of RLC circuits.
IV. Demonstrate an understanding of resonant circuits.
V. Demonstrate an understanding of RL/RC transient circuits.
VI. Demonstrate electrical troubleshooting skills.

COURSE OUTLINE

I. Review
II. Electrical Theory
III. Electrical Equipment
IV. Hands-on Application

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)
5. Lab

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
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GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 204
Course Title: Solar Hot Water & Heat Systems
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: Three (3) Two hours lecture; One hour lab.
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course provides instruction on solar water system components, specifications, schematics and drawings. It teaches installation of solar water heating systems that meet the performance and reliability needs of the customer, incorporates quality craftsmanship, and complies with all applicable codes and standards.

PREREQUISITE
SUST 102 Electrical Theory I

TEXT
Ramlow, Bob and Nusz, Benjamin. Solar Water Heating: A Comprehensive Guide to Solar Water and Space Heating Systems. New Society Publishers. 2006. ISBN 9780865715615

The International Association of Plumbing and Mechanical Codes (IAPMO). 2006 Uniform Solar Energy Code .

COURSE OUTCOMES/ COMPETENCIES (as required)

Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005.

I. Work safely with solar hot water and pool heating systems.
    a. As part of safety considerations associated with installing and maintaining solar thermal systems, any solar thermal installer must be able to:
        i. Maintain safe work habits and clean, orderly work area

ii. Demonstrate safe and proper use of required tools and equipment
iii. Demonstrate safe and accepted practices for personnel protection
iv. Demonstrate awareness of safety hazards and how to avoid them

b. The installer must be able to identify plumbing, electrical and other hazards associated with solar thermal installations, and implement preventative and remedial measures to ensure personnel safety:
i. Identify and implement appropriate codes and standards concerning installation, operation and maintenance of solar thermal systems and equipment.
ii. Identify and implement appropriate codes and standards concerning worker and public safety
iii. Identify personal safety hazards associated with solar thermal installations
iv. Identify environmental hazards associated with solar thermal installations through demonstrated awareness of pertinent Material Safety Data Sheets and other appropriate documents.

II. Identify systems and their components.
a. Give the components required for an installation, the installer shall be able to:
i. Identify components specific to an active direct solar system
ii. Identify components specific to an active indirect solar system
iii. Identify components specific to a passive direct solar system
iv. Identify components specific to a passive indirect solar system
v. Identify components specific to a swimming pool heating solar system

III. Adapt a system design.
a. Give a solar system design package the installer shall be able to:
i. Determine active direct system components' location and system layout and configuration
ii. Determine active indirect system components' location and system layout and configuration
iii. Determine passive direct system components' location and system layout configuration
iv. Determine passive indirect system components' location and system layout and configuration
v. Determine solar pool system components' location and system layout and configuration
vi. Apply for building permits
vii. Estimate time, materials, tools and labor required for installation
viii. Determine installation sequence to optimize use of time and materials

IV. Conduct a site assessment.
a. Given a selected site, the solar installer shall be able to:
i. Determine the required installation area, orientation, and tilt for proposed collector installation
ii. Establish whether there is suitable installation area with unobstructed solar access for installing collector
iii. Determine the extent of current and future shading for any proposed collector location using typical sun path calculations or similar methods
iv. Assure structural integrity and suitability of collector site by determining soil conditions and integrity for footing design and pipe path
v. Determine suitable location for installing all subsystem components
vi. Practice all personnel safety requirements
vii. Identify any other constraints and options for the installation related to local and state code requirements

viii. Verify that system to be installed is appropriate for the building and the climate
ix. Verify with the homeowner the proposed location of the collector and other major components

V. Install solar collectors.
   a. Given roofs of various types and of varying pitch, the installer shall be able to:
      i. Identify specific manufacturer's mounting design and materials
      ii. Identify acceptable National Roofing Contractor's Association roof mounting and penetration methods
      iii. Identify different system (in the case of ICS and thermosiphon systems, due to extra weight and components) mounting methods suitable for roof type
      iv. Identify locations for roof/wall, foundation penetrations, and structural attachments
      v. Evaluate the suitability of selected mounting structural attachments and compliance with applicable local codes
      vi. Determine multi-collector piping strategy
      vii. Install collector mounting device to installation area
      viii. Weather seal roof penetrations and other structural devices with flashings and sealants
      ix. Lift collectors to installation area
      x. Attach mounting bracket and struts (if required) to collector
      xi. Secure collector to collector mounting device
      xii. Connect collector to piping

COURSE OUTLINE

1. Safety with solar hot water and pool heating systems
2. Systems and components
3. Adapting a system
4. Site assessment
5. Installing solar collectors

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
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ACADEMIC INTEGRITY

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 206
Course Title: Solar Hot Water & Heat Systems Installation
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation

Credit Hours: 3 – Lecture 1 and Lab 2
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This is the second solar hot water and heat systems course providing hands-on experience installing water heater and storage tanks, pipe, mechanical/plumbing and other components. This course teaches installing electrical control systems, tagging and labeling. It also includes system checkout.

PREREQUISITE
SUST 204 Solar Hot Water & Heat Systems

TEXT
Ramlow, Bob and Nusz, Benjamin. Solar Water Heating: A Comprehensive Guide to Solar Water and Space Heating Systems. New Society Publishers. 2006. ISBN 9780865715615

The International Association of Plumbing and Mechanical Codes (IAPMO). 2006 Uniform Solar Energy Code .

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005. Upon completion of the course, students will be able to demonstrate the ability to:

I. Install solar collectors.
    a. Given roofs of various types and of varying pitch, the installer shall be able to:
        i. Identify specific manufacturer's mounting design and materials
        ii. Identify acceptable National Roofing Contractor's Association roof mounting and penetration methods
        iii. Identify different system (in the case of ICS and thermosiphon systems, due to extra weight and components) mounting methods suitable for roof type
        iv. Identify locations for roof/wall, foundation penetrations, and structural attachments
        v. Evaluate the suitability of selected mounting structural attachments and compliance with applicable local codes
        vi. Determine multi-collector piping strategy
        vii. Install collector mounting device to installation area
        viii. Weather seal roof penetrations and other structural devices with flashings and sealants
        ix. Lift collectors to installation area
        x. Attach mounting bracket and struts (if required) to collector
        xi. Secure collector to collector mounting device
        xii. Connect collector to piping
II. Install water heater and storage tanks.
    a. Given a water heater and/or storage tank and system design, the installer shall be able to:
        i. Prepare the environment for tank installation (water and power source)
        ii. Determine by inspection that the new water heater and/or storage tank and

required subcomponents are damage free
iii. Determine tank ports to be used for plumbing lines
iv. Determine dip tube strategy
v. Determine plumbing retrofit method to be used if conventional water heater tank (electric or gas) is used
vi. Install drain pan per local codes
vii. Remove the old conventional water heater tank, if required
viii. Install dip tubes
ix. Install port fittings, if required
x. Install tank valves
xi. Connect plumbing and valves between solar tank and conventional auxiliary tank
xii. Connect water heater and/or storage tank to water source
xiii. Fill tank with water
xiv. Connect the water heater and/or storage tank to power source
xv. Determine that water heater and storage tanks are installed per manufacturer's recommendations and code
xvi. Determine that installed tank and fittings have no leaks
xvii. Install exterior tank insulation blanket if required
xviii. Install thermosiphon solar tank

III. Install pipe, pipe insulation and connections
a. Given copper pipe fittings, a pipe cutter, acetylene torch, solder, wire brush, sand cloth, and flux, the installer shall be able to (for solar water heating systems):
i. Determine the extent of and make allowances for expansion of pipe and its effect on hangers and the integrity of the pipe
ii. Determine type, length, and diameter of copper piping required
iii. Cut copper pipe to desired length
iv. Solder copper piping connections
v. Test soldering fittings for leaks
b. Given plastic pipe, fittings, pipe cutter, plastic pipe cleaner and glue, the installer shall be able to (for solar pool heating system):
i. Determine type, length, and diameter of plastic piping required
ii. Cut plastic pipe to desired length
iii. Glue plastic piping connections
iv. Test glued fittings for leaks
c. Given a run of piping insulation, a cutting tool, and adhesive material, the installer shall be able to :
i. Determine type, diameter, and length of insulation required
ii. Cut insulation and install over piping and plumbing fittings
iii. Miter insulation ends, where appropriate
iv. Glue and seal insulation joints, as required
v. Select ultraviolet radiation protective method
vi. Protect insulation from ultraviolet degradation
d. Given a standard tool set, sealant, and copper pipe or tubing, the installer shall be able to:
i. Determine the type of pipe flashing to use for specific roof type
ii. Determine the area where pipe flashing will be installed
iii. Make roof penetrations
iv. Install pipe flashing and sealant
e. Given a standard tool set, a pipe cutter, solder and soldering equipment (solar water heating), pipe cleaner and glue (solar pool heating systems), pipe and fittings, the installer shall be able to:

i. Determine slope strategy of piping to avoid traps on horizontal runs
ii. Slope piping to avoid traps in horizontal pipe runs
iii. Attach pipe hangers and supports
iv. Install stand-off hangers beneath piping on roof if needed
v. Connect all system piping to water heater tank, collector, valves, pumps, etc.
vi. Determine under-ground piping method
vii. Install under-ground piping

IV. Install mechanical/plumbing equipment and other components
a. Given system valves and monitoring components and the system installation manual, manufacturer's product directions, piping, fittings, and a standard tool set, the installer shall be able to:
i. Determine system plumbing, valves and other components required
ii. Determine location of plumbing valves and other components
iii. Install system plumbing valves and monitoring system components as specified in component manufacturer's or solar manufacturer's installation manual and schematic
b. Given a heat exchanger and installation manual, manufacturer's directions, piping, solder and soldering equipment, fittings, and a standard tool set, the installer shall be able to:
i. Determine the heat exchange locator
ii. Install heat exchange and heat exchanger fluids as specified in manufacturers installation manuals and schematics
c. Given a circulating pump and manufacturer's directions, pipe, fittings, solder and soldering equipment, electrical supplies, Teflon tape and a standard tool kit and other plumbing materials, the installer shall be able to:
i. Determine pump location
ii. Install the pump according to the manufacturer's installation manual

V. Install electrical control systems.
a. Given a system controller, manufacturer's directions, and a standard tool set, the installer shall be able to:
i. Determine the location of the controller
ii. Install differential controller and sensors
iii. Install photovoltaic module controller and pump
iv. Install a timer controller
v. Install control wiring
vi. Select ultraviolet radiation protective method for external wiring
vii. Protect external wiring from ultraviolet degradation
viii. Test operation of controller
b. Given flashing, sensor wires, sealant and a standard tool set, the installer shall be able to:
i. Determine the type of flashing to use for specific roof type
ii. Determine the area where wire flashing will be installed
iii. Make roof penetrations
iv. Install wire flashing and sealant
v. Install control wiring

VI. Install operation and identification tags and labels.
a. After completing the installation of the solar system equipment and prior to operating the system, the installer shall be able to:
i. Determine components that require identification tag and/or label
ii. Install identification tags and/or label

VII. Perform a system checkout.
a. After completing the installation of the solar system equipment and prior to operating

the system, the installer shall be able to:

i. Identify any deficiencies in materials, workmanship, function or appearance by visually inspecting entire installation
ii. Determine that the system mechanical installation has structural integrity and is weather sealed
iii. Determine that the system plumbing installation is correctly installed
iv. Determine that the electrical installation is correctly installed
v. Verify system start-up and shut-down functionality
vi. Verify overall system operation and functionality

b. Given an installed system, the installer shall be able to:
   i. Demonstrate to the owner operation and functionality of system
   ii. Demonstrate to the owner start-up and shut-down procedure for the system
   iii. Demonstrate to owner simple maintenance and diagnostic procedures
   iv. Identify for owner all markings and labels for system service and owner interaction
   v. Indentify for owner safety issues associated with operation and maintenance of system
   vi. Complete and transfer documentation package to system owner/operators
   vii. Review system/component warranties and requirements with owner

COURSE OUTLINE

1. Installing water heater and storage tanks
2. Installing piping, pipe insulation, and connecting system piping
3. Installing electrical control systems
4. Installing operation and identification tags and labels
5. Performing a system checkout

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)
5. Lab

STUDENT REQUIREMENTS AND METHOD OF EVALUATION

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GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 208
Course Title: Solar Hot Water & Heat Systems Troubleshooting
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is a continuation of SUST 206. It provides students experience evaluating problems with solar hot water and heat systems, determining solutions, and implementing repairs.

PREREQUISITE
SUST 206 Solar Hot Water & Heat Systems Installation

TEXT
Ramlow, Bob and Nusz, Benjamin. Solar Water Heating: A Comprehensive Guide to Solar Water and Space Heating Systems. New Society Publishers. 2006. ISBN 9780865715615

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COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005. Upon completion of this course students will be able to demonstrate the ability to:

I. Maintain and troubleshoot a solar thermal system.
   a. As part of honoring system/component warranties or through service contract, the installer shall be able to:
      i. Demonstrate proficiency using tools and materials required for maintenance and troubleshooting
      ii. Interpret installation manual, wiring diagrams, drawings, and other specifications to plan maintenance or repair work
      iii. Determine evaluation points for system monitoring, maintenance and troubleshooting
      iv. Identify cause of problems based on evaluation results
      v. Determine what repairs or system modifications are needed to restore the system to its baseline operating conditions
      vi. Perform any identified repairs or modifications to restore system to manufacturer's or operators specifications

COURSE OUTLINE

1. Maintenance
2. Repair
3. Troubleshooting

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
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mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 220
Course Title: Small Wind Systems
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 – Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course teaches small wind energy system installers skills necessary to specify, configure, install, inspect and maintain a grid-connected or off-grid small wind energy system. Technical skills that meet the performance and reliability needs of the customer, incorporates quality craftsmanship, and complies with all applicable safety codes and standards will be taught.

PREREQUISITE
SUST 102 Electrical Theory I and SUST 202 Electrical Theory II

TEXT
Gipe, Paul. Wind Power: Renewable Energy for Home, Farm and Business. Chelsea Green Publishing Company, 2004.

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005. Upon completion of this course students will be able to demonstrate the ability to:

a. Conduct a wind energy site assessment.
    1. In conducting a site assessment for a small wind energy system, the wind energy site assessor or wind system installer shall be able to:

i. Identify typical tools and equipment required for conducting site assessments for small wind energy systems, including computer skills, spreadsheets, topogrophic and wind speed maps, aerial photographs, and wind speed calculations, and demonstrate proficiency in their use
ii. Quantify the customer electrical load and energy use through review of utility bills, meter readings, measurements, and/or customer interview
iii. Identify opportunities incorporating energy efficient equipment or appliances, conservation, and energy management practices
iv. Determine the location and impact of buildings, trees, local terrain, and other obstacles at the client's site, and suggest solutions to overcome their interference
v. Understand and be able to estimate the wind shear at a client's site based on local terrain and ground clutter

vi. Determine the minimum acceptable tower height for the client's site based on terrain and obstacles
vii. Determine average annual wind speed at the specified tower height based on the most currently available wind maps, wind speed data, and computer programs
viii. Interpret wind speed data (and altitude data, if relevant) for the client's site for the purpose of establishing performance expectations and use in wind system output calculations
ix. Specify several wind turbine system options that would be suitable for the client's energy needs as well as technical experience and expertise
x. Estimate and/or measure the peak load demand and average daily energy use for all loads directly connected to the inverter-battery system for the purposes of sizing equipment (for off-grid systems)
xi. Identify several suitable locations for a small wind energy system at a client's home site
xii. Diagram tower location relative to existing homes and site features
xiii. Identify any site-specific safety hazards or other issues associated with the installation of the wind turbine, tower, and associated equipment, including underwater, gas, LP, sewer, and telephone lines
xiv. Identify a suitable wire run from the tower base to the location of the control systems and electronics
xv. Estimate turbine output performance for the client, including impact on their utility bill for on-grid systems, or energy contributions to an off-grid battery charging system
xvi. Research utility interconnection requirements for the wind system, and how they will apply to the client
xvii. Identify any potential zoning barriers or building permit obstacles
xviii. Determine the proximity of any nearby airports and the need to apply to the Federal Aviation Administration for permission to construct the tower
xix. Identify an concerns about soil type or depth to bedrock for suitability of the tower foundation and/or footings
xx. Determine the need for any appropriate setbacks from overhead utility lines, road right-of-ways, or property lines, if applicable
xxi. Be familiar with wind turbine technologies and component parts, and have an understanding of the physics behind their operation
xxii. Be familiar with current technologies appropriate for the site and the client, for the purpose of providing several system options
xxiii. Be familiar with the maintenance requirements for the small wind energy systems specified
xxiv. Be familiar with current pricing of small wind energy systems and components for the purpose of providing the client with rough cost estimates
xxv. Produce a written report detailing an estimate of the client's wind resource, the minimum acceptable tower height at the client's site, wind speed at that height, opportunities for energy efficiency and/or conservation, possible system and equipment options, and potential technical, zoning, or social barriers to the installation of the small wind energy system
xxvi. Identify potential incentives, grants, and other funding sources that might be available to the client
xxvii. Identify any educational resources or opportunities that might be of help to the client
xxviii. Identify a list of next steps for the client to follow as they progress through the installation process

I. Work safely with small wind energy systems.

1. As part of safety considerations associated with installing and maintaining small wind energy systems, a wind energy installer must be able to:

i. Maintain safe work habits, a clean shop area, and a clean area at the installation site
ii. Demonstrate safe and proper use of required tools and equipment
iii. Identify electrical and non-electrical personal safety hazards associated with wind system installations and how to avoid them
iv. Demonstrate safe and proper practices in working with wind turbines, towers, and associated electrical and mechanical equipment
v. Implement preventive and remedial measures to ensure personnel safety
vi. Demonstrate safe and accepted practices for personnel protection
vii. Identify and implement safe and accepted practices for worker safety
viii. Demonstrate proficiency in basic first aid and CPR
ix. Identify public safety hazards associated with wind system installations
x. Identify environmental hazards associated with wind system installations

I. Select a final system design.
1. Based on results from a site survey and customer requirements and expectations, the installer shall be able to:
i. Identify appropriate system designs/configurations for the wind turbine and tower based on the client needs, expectations, and site considerations
i. Possess appropriate math skills to be able to lay out any tower configuration at the client's site, including guy lengths for guyed towers
ii. For on-grid systems, determine all applicable interconnection requirements
iii. For off-grid systems, estimate sizing requirements for the wind turbine, battery bank, gen-set, and inverters based on customer load, desired energy or peak power production, autonomy requirements, and costs, as applicable
iv. Establish suitable locations and diagram possible layouts for installing inverters, controllers, batteries, other balance of system components, disconnect switches, metering and logging devices, and other electronics
v. Determine requirements for installing additional sub-panels and interfacing the wind system with the utility service, and/or other generating sources as applicable
vi. Identify the suitability, location, and approximate system size for a photovoltaic component in a wind/PV hybrid system, and estimate energy output for all components of the hybrid system
vii. Identify and select major balance-of-system components required for the installation
viii. Identify and select appropriate system monitoring equipment, including energy monitor and wind speed indicator or datalogger
ix. Determine the installation sequence to optimize use of time and materials
x. Estimate time, materials, and equipment required for the installation, and provide an appropriate bid price

COURSE OUTLINE

1. Wind energy site assessment
2. Safety
3. Selecting a final system design

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

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59. % F

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 222
Course Title: Small Wind System Installation
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 – Lecture 1 and Lab 2
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is a continuation of SUST 220. It covers adapting the small wind mechanical design, adapting the electrical design, and installing subsystems and components at the site. This course also teaches students how to perform a system checkout and inspection before leaving the job site.

PREREQUISITE
SUST 220 Small Wind Systems

TEXT
Gipe, Paul. Wind Power: Renewable Energy for Home, Farm and Business. Chelsea Green Publishing Company, 2004.

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005. Upon completion of this course students will be able to demonstrate the ability to:

I. Adapt the mechanical design.
    a. In adapting a small wind system, the installer shall be able to:
        i. Identify the equipment to be used in the installation that is consistent with environmental, structural, code requirements, acceptable safety protocol, and other conditions of the site.
        ii. Identify appropriate tower location, wire run, electrical configuration, tower set backs, and maintenance considerations at the site
        iii. Understand if and when a soil analysis is required to properly specify, configure, and engineer a suitable foundation or footing for the tower
        iv. Understand if and when the foundation or footings need to be adjusted based on soil type or depth to bedrock, and who to consult to obtain the proper foundation

or footing specifications

II. Adapt the electrical design.
    a. In adapting a small wind energy electrical design, the installer shall be able to:
        i. Be familiar with the local utility interconnection guidelines, and be able to design the system to satisfy those requirements
        ii. Select appropriate conductor types and ratings for each electrical circuit in the system based on application
        iii. Where appropriate, determine the de-rated ampacity of system conductors, and select appropriate sizes based on design currents
        iv. Determine appropriate size, ratings, and locations for all system over-current and disconnect devices
        v. Understand the appropriate grounding system for the wind turbine and tower as specified by the equipment manufacturer
        vi. Determine appropriate size, ratings, and locations for grounding, lighting protection, surge suppression, and associated equipment
        vii. Where appropriate, determine minimum acceptable voltage drop for all electrical circuits based on size and length of conductors, and adjust accordingly

III. Install subsystems and components at the site
    a. As part of a small wind energy system installation process, the installer shall be able to:
        i. Utilize drawings, schematics, instructions mathematics and recommended procedures in installing equipment
        ii. Implement all applicable personnel safety, environmental protection, and public safety protection equipment, measures, and protocol
        iii. Utilize appropriate math skills to lay out the tower
        iv. Excavate, properly form, pour, and properly backfill the tower foundation per the tower supplier's specifications, or be able to oversee such activities as carried out by a concrete contractor
        v. Visually inspect the tower and components, wind turbine, wiring, lighting protection, disconnect and over-current protection devices, inverters, batteries, and balance of system components for readily identifiable problems before installation
        vi. Test the wind turbine for voltage and current output
        vii. Assemble the tower and wind turbine as specified by the appropriate equipment manufacturers or suppliers
        viii. For crane installations, understand crane operator signals and protocol, and be able to communicate with the crane operator during the tower and turbine lift
        ix. For tilt-up tower installations, understand the installation process and safety considerations unique to the equipment and situation
        x. Install the turbine, tower, and underground wiring, disconnect switches, and over-current protection devices
        xi. Complete the final assembly and installation of all electrical components, inverters, controllers, disconnects and over-current devices, surge and lightning arrestors, grounding equipment, junction boxes, batteries and enclosures, conduit and other electrical hardware, anemometers, and energy and wind monitoring equipment
        xii. Label, install, and terminate electrical wiring, verify proper connections, voltages, and phase/polarity relationships
        xiii. Verify continuity and measure impedance of the grounding system
        xiv. Program, adjust, and configure inverters and controllers for desired set-points and operating modes

COURSE OUTLINE

I. Adapt mechanical design.
II. Adapt the electrical design.
III. Install subsystems and components at the site.

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through skill demonstration. Comparison from beginning to end of class will determine the extent of student gain.

ATTENDANCE POLICY
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 224
Course Title: Small Wind Troubleshooting
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is a continuation of SUST 222. It provides students experience evaluating problems with small wind systems, determining solutions, and implementing repairs.

PREREQUISITE
SUST 222 Small Wind System Installation

TEXT
Gipe, Paul. Wind Power: Renewable Energy for Home, Farm and Business. Chelsea Green Publishing Company, 2004.

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken directly from the North American Board of Certified Energy Practitioners Technical Committee Document Approved April 11, 2005. Upon completion of this course students will be able to demonstrate the ability to:

I. Maintain and troubleshoot a small wind system.
    a. In maintaining and troubleshooting a small wind energy system, the install shall be able to:
        i. Identify tools and equipment required for maintaining and troubleshooting wind

energy systems and demonstrate proficiency in their use
ii. Identify maintenance needs and implement service procedures for the tower, wind turbine, wiring, grounding system, lighting protection, batteries, power conditioning equipment, safety systems and balance of system equipment
iii. Measure system output and operating parameters, compare with specifications and expectations, and assess the operating condition of the system and components
iv. Perform mechanical and electrical diagnostic procedures and interpret results
v. Identify performance issues and safety concerns, and implement corrective measures
vi. Verify and demonstrate complete functionality and performance of the system, including start-up, shut-down, normal operation, and emergency or bypass operation
vii. Compile and maintain records of system maintenance and repairs, and provide a copy to the owner or operator

COURSE OUTLINE

1. Maintenance
2. Repair
3. Troubleshooting
4. Record Keeping

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 230
Course Title: Geothermal Systems
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 – Lecture 2 and Lab 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course teaches geothermal principles including utilizing the earth's relatively constant

temperature to provide heating, cooling, and hot water for residential and light commercial applications. This course provides instruction on the three requirements for geothermal systems including heat, permeability, and water as well as various types and configurations of heat pumps appropriate for specific geographic locations.

PREREQUISITE
SUST 102 Electrical Theory I

TEXT
Ochsner, Karl. Geothermal Heat Pumps: A Guide for Planning and Installing. Earthscan Publications Ltd. 2007. ISBN: 978-1844074068

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken from the International Ground Source Heat Pump Association and the Geothermal Energy Association. Upon completion of the course students will be able to demonstrate the ability to:

a. Describe the variety of ground source heat pumps appropriate in various land and soil types.
b. Conduct a geothermal site assessment.
    1. In conducting a site assessment for a geothermal heating and cooling system, the assessor shall be able to:

i. Identify typical tools and equipment required for conducting site assessments for geothermal systems
ii. Quantify the customer electrical load and energy use through review of utility bills, meter readings, measurements, and/or customer interview
iii. Identify opportunities incorporating energy efficient equipment or appliances, conservation, and energy management practices
iv. Determine the location and impact of buildings, trees, local terrain, and other obstacles at the client's site, and suggest solutions to overcome their interference
v. Interpret soil data, satellite images, heat charts, and other site selection criteria at the client's site
vi. Determine the acceptable location for the client's site based on terrain and obstacles
vii. Specify several geothermal system options that would be suitable for the client's energy needs as well as site limitations
viii. Diagram geothermal location relative to existing homes and site features
ix. Identify any site-specific safety hazards or other issues associated with the installation of the geothermal system and associated equipment, including underwater, gas, LP, sewer, and fiber lines
x. Identify a suitable wire run from the geothermal source to the location of the control systems and electronics
xi. Estimate output performance for the client, including impact on their utility bill
xii. Identify any potential zoning barriers or building permit obstacles
xiii. Be familiar with geothermal technologies and component parts, and have an understanding of the physics behind their operation
xiv. Be familiar with current technologies appropriate for the site and the client, for the purpose of providing several system options
xv. Be familiar with the maintenance requirements for the geothermal systems specified
xvi. Be familiar with current pricing of geothermal systems and components for the purpose of providing the client with rough cost estimates
xvii. Produce a written report detailing an estimate of the client's geothermal resource, the

recommended location, opportunities for energy efficiency and/or conservation, possible system and equipment options, and potential technical, zoning, or social barriers to the installation of the geothermal system

xviii. Identify potential incentives, grants, and other funding sources that might be available to the client

xix. Identify any educational resources or opportunities that might be of help to the client

xx. Identify a list of next steps for the client to follow as they progress through the installation process

I. Work safely with geothermal systems.

1. As part of safety considerations associated with installing and maintaining geothermal systems, an installer must be able to:

i. Maintain safe work habits, a clean shop area, and a clean area at the installation site

ii. Demonstrate safe and proper use of required tools and equipment

iii. Identify personal safety hazards associated with geothermal system installations and how to avoid them

iv. Demonstrate safe and proper practices in working with geothermal systems and associated electrical and mechanical equipment

v. Implement preventive and remedial measures to ensure personnel safety

vi. Demonstrate safe and accepted practices for personnel protection

vii. Identify and implement safe and accepted practices for worker safety

viii. Demonstrate proficiency in basic first aid and CPR

I. Select a final system design.

1. Based on results from a site survey and customer requirements and expectations, the installer shall be able to:
   i. Identify appropriate system designs/configurations for the geothermal system based on the client needs, expectations, and site considerations

i. Possess appropriate math skills to be able to lay out geothermal configuration at the client's site

ii. Determine all applicable interconnection requirements

iii. Establish suitable locations and diagram possible layouts for installing inverters, controllers, and other system components,

iv. Identify and select appropriate system monitoring equipment,

v. Determine the installation sequence to optimize use of time and materials

vi. Estimate time, materials, and equipment required for the installation, and provide an appropriate bid price

COURSE OUTLINE

1. Geothermal energy – what is it
2. What systems are available
3. What are the geological issues
4. Safety
5. Selecting a final system design

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids

3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
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GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 232
Course Title: Geothermal System Installation
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 – Lecture 1 and Lab 2
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is a continuation of SUST 230. It covers adapting the geothermal mechanical design, adapting the electrical design, and installing subsystems and components at the site. This course also teaches students how to perform a system checkout and inspection before leaving the job site.

PREREQUISITE
SUST 230 Geothermal Systems

TEXT
Ochsner, Karl. Geothermal Heat Pumps: A Guide for Planning and Installing. Earthscan Publications Ltd. 2007. ISBN: 978-1844074068

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken from the International Ground Source Heat Pump Association and the Geothermal Energy Association. Upon completion of the course students will be able to demonstrate the ability to:

I. Adapt the mechanical design.
    a. In adapting a geothermal system, the installer shall be able to:
        i. Identify the equipment to be used in the installation that is consistent with environmental, structural, code requirements, acceptable safety protocol, and other conditions of the site.
        ii. Identify appropriate pond, well, and pipe location, duct connection configuration, and maintenance considerations at the site
II. Install subsystems and components at the site
    a. As part of a geothermal system installation process, the installer shall be able to:
        i. Utilize drawings, schematics, instructions mathematics and recommended procedures in installing equipment
        ii. Implement all applicable personnel safety, environmental protection, and public

safety protection equipment, measures, and protocol
iii. Utilize appropriate math skills to lay the underground loops
iv. Excavate, properly install underground loops, and properly backfill
v. Test the system
vi. Assemble the at-the-house connection and house duct components
vii. Understand the installation process and safety considerations unique to the equipment and situation
viii. Complete the final assembly and installation of all electrical components, inverters, controllers, disconnects, grounding equipment, junction boxes, batteries and enclosures, conduit and other electrical hardware, and energy and temperature monitoring equipment
ix. Label components
x. Program, adjust, and configure controllers for desired set-points and operating modes

III. Perform a system checkout.
a. After completing the installation of the geothermal system equipment and prior to operating the system, the installer shall be able to:
i. Identify any deficiencies in materials, workmanship, function or appearance by visually inspecting entire installation
ii. Determine that the system mechanical installation has structural integrity and is weather sealed
iii. Determine that the system plumbing installation is correctly installed
iv. Determine that the electrical installation is correctly installed
v. Verify system start-up and shut-down functionality
vi. Verify overall system operation and functionality
b. Given an installed system, the installer shall be able to:
i. Demonstrate to the owner operation and functionality of system
ii. Demonstrate to the owner start-up and shut-down procedure for the system
iii. Demonstrate to owner simple maintenance and diagnostic procedures
iv. Identify for owner all markings and labels for system service and owner interaction
v. Indentify for owner safety issues associated with operation and maintenance of system
vi. Complete and transfer documentation package to system owner/operators
vii. Review system/component warranties and requirements with owner

COURSE OUTLINE

I. Adapt mechanical design
II. Install subsystems and components at the site
III. Perform system checkout

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate

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GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 232
Course Title: Geothermal System Installation
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 3 – Lecture 1 and Lab 2
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is a continuation of SUST 230. It covers adapting the geothermal mechanical design, adapting the electrical design, and installing subsystems and components at the site. This course also teaches students how to perform a system checkout and inspection before leaving the job site.

PREREQUISITE
SUST 230 Geothermal Systems

TEXT
Ochsner, Karl. Geothermal Heat Pumps: A Guide for Planning and Installing. Earthscan Publications Ltd. 2007. ISBN: 978-1844074068

COURSE OUTCOMES/ COMPETENCIES (as required)
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    a. In adapting a geothermal system, the installer shall be able to:
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        ii. Identify appropriate pond, well, and pipe location, duct connection configuration, and maintenance considerations at the site
II. Install subsystems and components at the site
    a. As part of a geothermal system installation process, the installer shall be able to:
        i. Utilize drawings, schematics, instructions mathematics and recommended procedures in installing equipment
        ii. Implement all applicable personnel safety, environmental protection, and public safety protection equipment, measures, and protocol
        iii. Utilize appropriate math skills to lay the underground loops
        iv. Excavate, properly install underground loops, and properly backfill
        v. Test the system
        vi. Assemble the at-the-house connection and house duct components

vii. Understand the installation process and safety considerations unique to the equipment and situation
viii. Complete the final assembly and installation of all electrical components, inverters, controllers, disconnects, grounding equipment, junction boxes, batteries and enclosures, conduit and other electrical hardware, and energy and temperature monitoring equipment
ix. Label components
x. Program, adjust, and configure controllers for desired set-points and operating modes

III. Perform a system checkout.
a. After completing the installation of the geothermal system equipment and prior to operating the system, the installer shall be able to:
i. Identify any deficiencies in materials, workmanship, function or appearance by visually inspecting entire installation
ii. Determine that the system mechanical installation has structural integrity and is weather sealed
iii. Determine that the system plumbing installation is correctly installed
iv. Determine that the electrical installation is correctly installed
v. Verify system start-up and shut-down functionality
vi. Verify overall system operation and functionality
b. Given an installed system, the installer shall be able to:
i. Demonstrate to the owner operation and functionality of system
ii. Demonstrate to the owner start-up and shut-down procedure for the system
iii. Demonstrate to owner simple maintenance and diagnostic procedures
iv. Identify for owner all markings and labels for system service and owner interaction
v. Indentify for owner safety issues associated with operation and maintenance of system
vi. Complete and transfer documentation package to system owner/operators
vii. Review system/component warranties and requirements with owner

COURSE OUTLINE

I. Adapt mechanical design
II. Install subsystems and components at the site
III. Perform system checkout

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
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GRADING SCALE

100. % A

89. % B

    70-79 % C

69. % D

59. % F

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Students will be assessed through skill demonstration. Comparison from beginning to end of class will determine the extent of student gain.

ATTENDANCE POLICY
Absences that occur due to students participating in official college activities are excused except in those cases where outside bodies, such as the State Board of Nursing, have requirements for minimum class minutes for each student. Students who are excused will be given reasonable opportunity to make up any missed work or receive substitute assignments from the instructor and should not be penalized for the absence. Proper procedure should be followed in notifying faculty in advance of the student's planned participation in the event. Ultimately it is the student's responsibility to notify the instructor in advance of the planned absence.

Unless students are participating in a school activity or are excused by the instructor, they are expected to attend class. If a student's absences exceed one-hundred (100) minutes per credit hour for the course or, in the case of on-line or other non-traditional courses, the student is inactive for one-eighth of the total course duration, the instructor has the right, but is not required, to withdraw a student from the course. Once the student has been dropped for excessive absences, the registrar's office will send a letter to the student, stating that he or she has been dropped. A student may petition the chief academic officer for reinstatement by submitting a letter stating valid reasons for the absences within one week of the registrar's notification. If the student is reinstated into the class, the instructor and the registrar will be notified.

ACADEMIC INTEGRITY
NCCC expects every student to demonstrate ethical behavior with regard to academic pursuits. Academic integrity in coursework is a specific requirement. Definitions, examples, and possible consequences for violations of Academic Integrity, as well as the appeals process, can be found in the College Catalog, Student Handbook, and/or Code of Student Conduct and Discipline.

CELL PHONE POLICY
Student cell phones and pagers must be turned off during class times. Faculty may approve an exception for special circumstances.

NOTE:
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NOTE: If you are a student with a disability who may need accommodation(s) under the Americans with Disabilities Act (ADA), please notify the *Director of Advising and Counseling*, Chanute Campus, Student Union, 620-431-2820 ext 280 or the *Dean,* Ottawa Campus, 785-242-2607 ext 312, as soon as possible. You will need to bring your documentation for review in order to determine reasonable accommodations, and then we can assist you in arranging any necessary accommodations.

COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 234
Course Title: Geothermal Troubleshooting
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This course is a continuation of SUST 232. It provides students experience evaluating problems with geothermal systems, determining solutions, and implementing repairs.

PREREQUISITE
SUST 232 Small Wind System Installation

TEXT
Ochsner, Karl. Geothermal Heat Pumps: A Guide for Planning and Installing. Earthscan Publications Ltd. 2007. ISBN: 978-1844074068

COURSE OUTCOMES/ COMPETENCIES (as required)
Note: Course Outcomes/Competencies are taken from the International Ground Source Heat Pump Association and the Geothermal Energy Association. Upon completion of the course students will be able to demonstrate the ability to:

I. Maintain and troubleshoot a geothermal system.
   a. In maintaining and troubleshooting a geothermal system, the installer shall be able to:
      i. Identify tools and equipment required for maintaining and troubleshooting geothermal systems and demonstrate proficiency in their use
      ii. Identify maintenance needs and implement service procedures for system equipment
      iii. Measure system output and operating parameters, compare with specifications and expectations, and assess the operating condition of the system and components
      iv. Perform mechanical and electrical diagnostic procedures and interpret results
      v. Identify performance issues and safety concerns, and implement corrective measures
      vi. Verify and demonstrate complete functionality and performance of the system, including start-up, shut-down, normal operation, and emergency or bypass operation
      vii. Compile and maintain records of system maintenance and repairs, and provide a copy to the owner or operator

COURSE OUTLINE
1. Maintenance
2. Repair
3. Troubleshooting
4. Record Keeping

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

ASSESSMENT OF STUDENT GAIN
Students will be assessed through skill demonstration. Comparison from beginning to end of class will determine the extent of student gain.

ATTENDANCE POLICY
Absences that occur due to students participating in official college activities are excused except in those cases where outside bodies, such as the State Board of Nursing, have requirements for minimum class minutes for each student. Students who are excused will be given reasonable opportunity to make up any missed work or receive substitute assignments from the instructor and should not be penalized for the absence. Proper procedure should be followed in notifying faculty in advance of the student's planned participation in the event. Ultimately it is the student's responsibility to notify the instructor in advance of the planned absence.

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COURSE SYLLABUS

COURSE IDENTIFICATION
Course Prefix/Number: SUST 240
Course Title: Sustainable Energy Certification Exam Review
Division: Outreach and Workforce Development
Program: Sustainable Energy Installation
Credit Hours: 1
Initiation/Revision Date: Spring 2009
Assessment Goal Percentage per Outcome: Seventy Percent (70%)

CLASSIFICATION OF INSTRUCTION
Vocational

COURSE DESCRIPTION
This repeatable course is taken prior to taking the national certification exam in photovoltaic systems, solar hot water & heat systems, small wind systems, or geothermal systems. This course should not be taken before completing all the courses in the program related to the certification test to be attempted. Program coordinator will advise students prior to taking this course.

PREREQUISITE
Related courses in the program must be complete before taking this test preparation course.

TEXT
No text
Exam review material will be provided

COURSE OUTCOMES/ COMPETENCIES (as required)

I. Demonstrate the ability to pass practice certification examinations.

COURSE OUTLINE

1. Review
2. Practice Testing
3. Test arrangements/confirmations

INSTRUCTIONAL METHODS

1. Lecture
2. Audio-Visual aids
3. Example and demonstration
4. Skills tests (performance-based)

STUDENT REQUIREMENTS AND METHOD OF EVALUATION
Evaluation of student performance is determined primarily from results of skills tests to validate mastery of course competencies.

GRADING SCALE

100. % A

89. % B

70-79 % C

69. % D

59. % F

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Agenda Item VIII-E: Administrative Reorganization

An institution should revisit its organization from time to time to ensure the right structure is in place to accomplish its mission. Neosho County Community College is at that time and such a review of the organization structure is timely.

Currently, the organization structure of the College is fairly flat. Directly reporting to the President are the vice-president for student learning, the dean of finance, the dean of planning and operations, the director of development, the human resources director, the athletic director, the grant writer, and an administrative assistant. As the president is spending more time externally, fundraising, working with the community, business and industry, and civic groups, she has less time to oversee the daily operations of several administrative functions.

Implementation of new College plans, such as the educational master plan, the facility master plan, and the emergency action plan, also requires an organizational structure that will insure proper oversight of their implementations. Consolidating some of the administrative functions under a senior staff position will allow integrated responses to the implementation of our plans.

It was the President's recommendation that a vice-president for administration position be established (see attached position description.) The vice president will be responsible for the following functions: human resources, technology services, financial and business services, facilities and maintenance, auxiliary services, and safety and security. Included within the new organization structure is a reconfiguration of the business services functions at the College. A new position, Business Manager will be established to supervise the Business office. Auxiliary services oversight will now be handled out of the vice president's office rather than in its current position.

An organization chart is attached. Reporting to the new position will be the following positions:

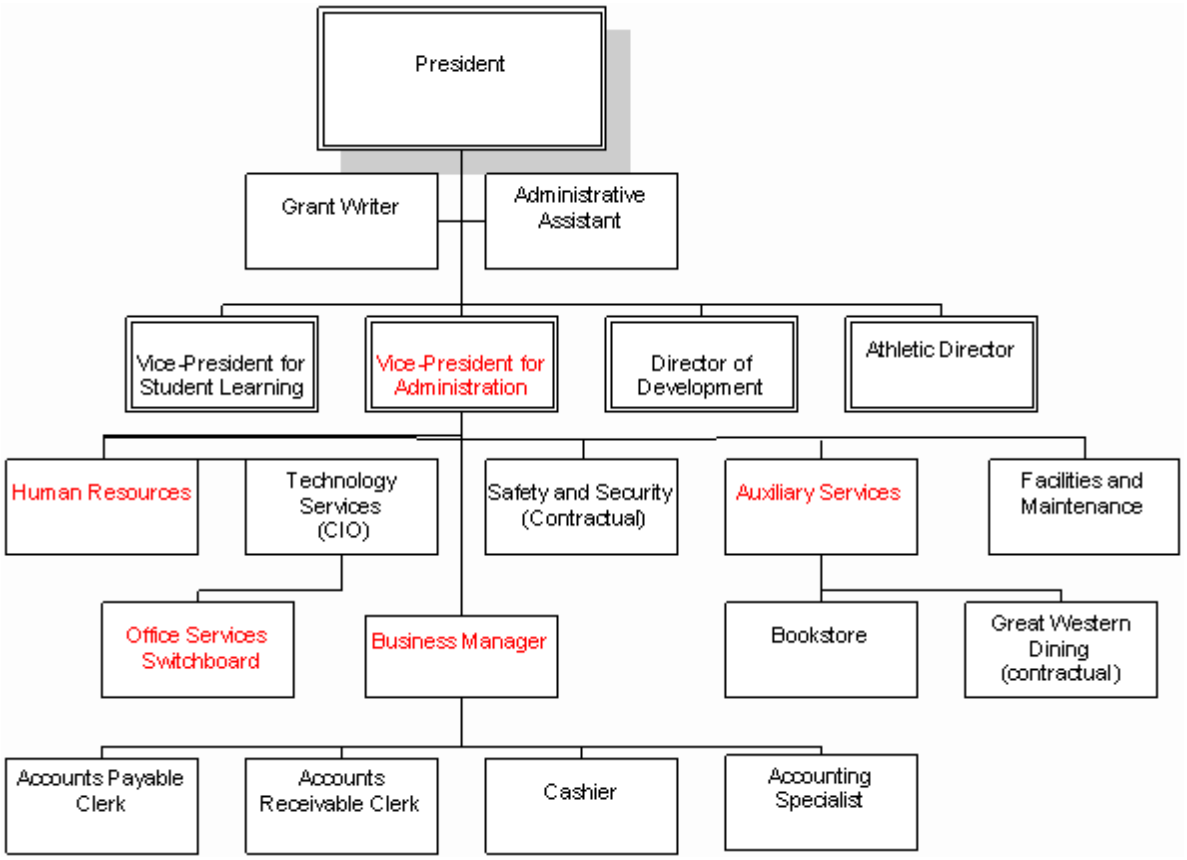
- Director of Technology Services/CIO (see attached revised position description);
- Human Resources Director
- Business Manager (see attached new position description)
- Bookstore Manager
- Maintenance Supervisor

The President recommended that the implementation of the new organization structure occur on July 1, 2009. The reorganization will be budget neutral.

Resolution 2009-14

RESOLVED, that the Board of Trustees of Neosho County Community College approves the reorganization of the administration and approves the new positions of vice president for administration, business manager and the revision of the director of technology services/CIO position description.

Upon a motion and a second the above resolution was approved. Motion passed unanimously.



Vice-president for Administration
Reports to: President
Organizational Unit: Exempt, Executive Administrator
Starting Salary range: $75,000-$85,000
Based on Education and Experience
Establishment Date: April, 2009

Purpose of Position:

This position reports to the President and provides executive leadership and administrative oversight for the following areas of the College: financial and business affairs, human resources, technology services, auxiliary services, maintenance and facilities, safety and security, and planning. The Vice-president shall serve on the President's executive team.

Duties and Responsibilities:

1. Exercises leadership for and executive management of assigned areas and for the professional development of assigned personnel
2. Oversees the implementation of College administrative strategic goals and action plans for areas of responsibility.
3. Assists in the formulation of the College's overall operating budget.
4. Participate in the overall planning operations of the College and provide direct oversight of the strategic technology plan, emergency action plan, capital improvement plan, and facility

master plan.
5. Oversees the fiscal affairs operations through the direct supervision of the Business Manager.
6. Oversees the human resources operation of the college, including affirmative action and federal and state regulations, through the supervision of the Director of Human Resources.
7. Oversees the information technology aspects of the college through direct supervision of the Director of Technology Services (CIO).
8. Oversees auxiliary services through direct supervision of the Bookstore Manager and management of the contractual supervision over food service.
9. Oversees the maintenance and facilities operations through the direct supervision of the Maintenance Supervisor.
10. Leads the development and implementation of the College's safety and emergency plans, and provides oversight for safety and security of the College and its constituents.
11. Serves as College's chief financial officer.
12. Other duties as assigned by supervisor.

Experience and Education:

1. Masters degree required in one of the areas of responsibility; Doctorate preferred.
2. CPA license preferred.
3. Ten years of administrative experience required, preferably in one of the areas of position's responsibility; five years in higher education preferred.

Supervision:

1. Direct: Five (Including Business Manager, Director of Human Resources, Director of Technology Services (CIO), Bookstore Manager, and Maintenance Supervisor.)
2. Indirect: Twenty

Business Manager
Reports to: Vice-President for Administration
Organizational Unit: Exempt, Administrator
Starting Salary range: $45,000-$55,000
Based on Education and Experience
Establishment Date: April, 2009

Purpose of Position:

This position reports to the Vice-president for Administration and will provide hands-on, daily operation of business services and budget oversight. Duties include but are not limited to:

Duties and Responsibilities:

1. Supervise all financial records of the college and the reconciliation of monthly bank statements;
2. Prepare the annual budget at direction of the senior staff, for review and adoption by the board of trustees;
3. Prepare materials for the annual public budget hearing;
4. Manage the college budget in conjunction with the vice-president;
5. Supervise and manage the investment of temporarily idle funds;
6. Establish and operate a system of fixed asset accounting;
7. Establish and operate a system of purchasing, including competitive bidding procedures, to provide materials, and other items needed to maintain and improve the total educational

program;
8. Direct the preparation of necessary state and federal quarterly and yearly reports for social security, federal withholding, state withholding, state sales tax, Kansas school retirement (KPERS), tax sheltered annuities, and other reports as may be necessary;
9. Gather, organize, analyze, and communicate financial and accounting data in such a manner as to meet the state and federal requirements as well as those of the regulatory bodies to whom the college must report;
10. Ensure timely financial aid disbursement to students;
11. Supervise the college inventory, and oversee the computer entries for fixed asset accounting purposes;
12. Perform other duties as assigned by the supervisor.

Education and Experience:

1. Bachelors degree in accounting required; Masters Degree in business or accounting preferred.
2. Prefer CPA license/credential
3. Five years work experience required, with three focused in areas of duties, especially accounting.
4. Experience in supervision of staff.

Supervision:

1. Direct: Five (Accounting Specialist, Cashier(s), Accounts Receivable Clerk, Accounts Payable Clerk)
2. Indirect: None

Director of Technology Services/CIO

Reports to: Vice-president for Administration
Classification: Exempt, Administrator
Full-time 12-month
Starting Salary range: $ $45,000-$55,000
Revised: April, 2009

Purpose of Position:

This position reports to the vice-president for administration and serves as the chief information officer for the college. The Director supervises duties relative to the effective and efficient operation of all technology service activities encompassing computer and telecommunications hardware, software, and services. In addition, the Director oversees the College's institutional research activities and office services. Duties include, but are not limited to:

Duties and Responsibilities:

1. Provide overall coordination for the planning and integration of multi-faceted administrative, facilities, and instructional technology;
2. Implement and evaluate all technology service programs and services;
3. Prepare the annual Technology Services budget and coordinate the acquisition of all Technology Service hardware, software, supplies, forms, and services;
4. Provide overall system-level communication and telecommunication direction and oversight

and coordinate telecommunications systems including WAN activities, ATM, ITV, Telnet II, ISDN, leased digital and switched public communication lines and serve as Internet activity coordinator for all campuses, including VOIP (voice-over-IP) applications;
5. Supervise and manage the Technology Service daily operation including network services, help desk, web support, hardware and software maintenance, data research and office services;
6. Coordinate and maintain current and new inventory control of technology hardware and software;
7. Coordinate management and student information systems operations;
8. Research, evaluate and recommend technological innovations beneficial to the institution;
9. Design, develop, test, and implement various components of the management and student information systems;
10. Coordinate the monitoring, tuning, and ongoing evaluation of network operations;
11. Coordinate network and EX software modification installation, testing, and implementation;
12. Provide excellent customer service to all levels of users and encourage timely, accurate resolution of problems;
13. Assist with coordination of departmental training of personnel in use of web update tools and web page design and maintenance;
14. Ensure compliance with applicable legal requirements and NCCC system policies on web site usage, security and standards;
15. Meet regularly with the vice-president to review and establish priorities for all Technology Service operations of the college;
16. Assist in the recruitment and retention of NCCC students; and,
17. Perform other duties assigned by the vice-president.

Education and Experience:

A Masters degree in Information Systems, Business Computer Technology, or other related field of study; AND five years experience with essential functions listed above requiring initiative and judgment; OR

A Bachelors degree in Information Systems, Business Computer Technology, or other related field of study; AND ten years experience with essential functions listed above requiring initiative and judgment.

Supervision:

1. Direct 5 (Including Technology Services, Office Services, Institutional Research, and Telecommunications.)
2. Indirect: 4

Working Conditions:

1. Normal office working environment.

2. Ability to sit in an office chair for long periods while operation a personal computer is

required.

3. Ability to reach and work overhead on an occasional basis is required.

4. Occasional lifting of up to 50 pounds from the floor to waist height is required.

5. Some travel during normal working hours will be required.

6. Occasional overtime will be required.

Agenda Item VIII-F: Exempt Employee Contract Renewals

It was the President's recommendation that the Board approve 2009-2010 employment contracts for the employees listed below under the classification system which was approved at the September 2008 Board meeting.

Executive Administrator

Dr. Brian Inbody, Vice President for Student Learning
Ben Smith, Dean of Planning and Operations

Senior Administrator

Claudia Christiansen, Director of Development and Marketing
Dale Ernst, Dean of the Ottawa Campus
Brenda Krumm, Dean of Outreach and Workforce Development
Eric Tincher, Dean of Student Development

Administrator

*Krista Clay, ABE Coordinator
Kerrie Coomes, Director of Financial Aid
Pam Covault, Director of Nursing
Randy Kettler, Director of Basic Skills/CAVE
Melissa Kiefer, Director of Admissions
Julie Loring, Director of Advising & Counseling
Mark Nesmith, Coordinator of Residence/Student Life
Brian Patrick, Assistant Dean of Ottawa
Kerry Ranabargar, Director of Technology Services/CIO
Tracy Rhine, Director of Allied Health
Beverly Roush, Assistant Director of Nursing
Brenda Rowe, Director of Human Resources
Paul Smith, Maintenance Supervisor
Sarah Smith, Registrar
Sandi Solander, Business Manager
Selina Wallace, Bookstore Manager
Susan Weisenberger, Director of Library Services
*Bart Chaney, Student Support Services Director
*Karen Bertels, GEAR UP Director
*Marie Moore, Talent Search Director
*Maranda Collins, Upward Bound Director
*Denotes grant positions. Employment is contingent upon continued funding of the individual grant.

Resolution 2009-15

RESOLVED, that the Board of Trustees of Neosho County Community College approves 2009-2010 employment contracts for employees as presented under the classification system and contingent upon future grant funding for grant employees and that notices of intent not to renew employment contracts be given as required by Board Policy for contingent renewals.

Upon a motion and a second the above resolution was approved. Motion passed unanimously.

Agenda Item VIII-G: 2008-09 Administrator Contract Non-renewals

At the September 2008 meeting, employee policy revisions were approved. Included in the revisions were policies which created a clear classification of administrators and their respective contracts, benefits, and responsibilities. Contracts were reissued to employees under the new classification system. One significant difference for employees going into the Management Support classification was that their contract could be terminated with a 2-week notice. Some employees elected to not sign the new contract understanding that they would be non-renewed under their old administrator contract and a new employment contract offered under the new management support classification.

Below are the employees who are working on the former administrator contracts. I am recommending that they be non-renewed under terms of their 2008-09 administrative contracts with new employment contracts offered consistent with the new Management Support classification.

Tonya Bell, Student Support Services English Specialist
Carol Shepard, Student Support Services Math Specialist
Jennifer Williams, Medical Assistant Coordinator/Instructor

Resolution 2009-16

RESOLVED, that the Board of Trustees of Neosho County Community College approves the recommendation to non-renew administrative employment contracts for Tonya Bell, Carol Shepard and Jennifer Williams with new employment contracts offered consistent with the new Management Support classification.

Upon a motion and a second the above resolution was approved. Motion passed unanimously.

Agenda Item VIII-H: Management Support Contract Renewals

It is my recommendation that the Board approve 2009-2010 employment contracts for the following Management Support classification personnel.

Brenda Armstrong, Grant Writer
Deborah Bretthauer, HIT Coordinator
Derrick Bruenger, Graphic Design Artist
Jo Jurgenson, HIT Instructor/Coordinator (1/2 time)
LuAnn Hauser, Institutional Research Specialist
Karen McAdoo, Assistant Bookstore Manager/Developmental Coordinator
Leslie Mader, Assistant Director of Admissions-Ottawa
Bud Moore, Construction Coordinator (1/2 time, 9 month)
Ann Neff, International Student Coordinator
Sandy Robb, Lifetime Learning Coordinator (1/2 time)
Anthony Reed, Assistant Director of Residence/Student Life
Dwight Smith, Network Administrator
Amber Vail, Health Occupations Coordinator
Kim Vanatta, Coordinator of Development Lab
Jennifer Williams, Medical Assistant Coordinator/Instructor (10 month)
*Tonya Bell, Student Support Services English Specialist (10 month)

*Heather Garrett, ABE Instructor
*Ella Jones, ABE Instructor
*Carol Shepard, Student Support Services Math Specialist
*Wade Collins, Talent Search Academic Advisor
*Michael Rose, Talent Search Academic Advisor
*Laurie Kerns, Upward Bound Interim Academic Coordinator
*Jacqueline Doty, GEAR UP Academic Advisor (11 month)

*Denotes grant positions. Employment is contingent upon continued funding of the individual grant.

Resolution 2009-17

Resolved, that the Board of Trustees of Neosho County Community College approves 2009-2010 employment contracts for the individuals listed above under the Management Support Classification and contingent upon future grant funding for grant employees and that notices of intent not to renew employment contracts be given as required by Board Policy for contingent renewals.

Upon a motion and a second the above resolution was approved. Motion passed unanimously.

Agenda Item VIII-I: Hourly, Non-Exempt Employees

It is my recommendation that the Board approve the employment of the following hourly, non-exempt employees.

Mary Barr, Switchboard/Administrative Assistant
Susan Beddo, Financial Aid Specialist-Ottawa
Gloria Beeman, Office Services Clerk
Patty Benton, Cashier
Gayla Berger, Receptionist/Registration Clerk
Sarah Cadwallader, Development Assistant
Steve Crawford, Electrician/Plumber
Jennifer Daisy, Cashier-Ottawa
Terri Dale, Administrative Assistant to the President
Vicki Dent, Custodian
Marcy Dix, Assistant Registrar-Ottawa
Kim Ensminger, Administrative Assistant to the Dean of Planning and Operations and the Dean of Student
Development
Julian Fisher, Maintenance-Ottawa
Joan Gill, Library Assistant
Denise Gilmore, Administrative Assistant, Vice President for Student Learning
Susan Haddan, Assistant Registrar
Kara Hale, Financial Aid Specialist
Kelly Hamm, Administrative Assistant-Nursing-Ottawa
Teddy Johnson, Library Clerk (1/2 time)
Amanda Keller, Accounts Payable Clerk
Jackie Kinzer, Administrative Assistant-Outreach/Workforce Development
Steve Marks, Custodian
Mia Neely, Accounts Receivable Clerk
Paulette Parriott, Receptionist/Switchboard-Ottawa
Sharon Proctor, Administrative Assistant-Nursing
Pat Recoy, Accounting Specialist
Debra Schommer, Administrative Assistant-Faculty

Jon Seibert, Tech Services Technician
Donna Shumway, Tech Services Technician-Ottawa
Rena Snyder, Financial Aid/Library Clerk
Joe Ward, Maintenance
Brandi Williams, Administrative Assistant-Allied Health
Jan Wolfe, Administrative Assistant-Business Manager/Bookstore Manager
*Marcie Burk, Administrative Assistant-Student Support Services
*Nicci Wiltse, Administrative Assistant-Talent Search
*Christina Stich, Administrative Assistant-Upward Bound
*Denotes grant positions. Employment is contingent upon continued funding of the individual grant.

Resolution 2009-18

RESOLVED, that the Board of Trustees of Neosho County Community College approves 2009-2010 employment contracts for the individuals listed above under the hourly, non-exempt classification and contingent upon future grant funding for grant employees effective at the end of the current contracts and conditioned upon continued good standing.

Upon a motion and a second the above resolution was approved. Motion passed unanimously.

Agenda Item VIII-J: Executive Session-Employer/Employee Negotiations

Upon a motion and a second, the Board recessed into executive session for 10 minutes to discuss matters relating to employer-employee negotiations and to include the President, Vice President for Student Learning, Dean of Finance and Attorney. Motion passed. The Board entered executive session at 6:54 p.m.

The Board returned to open meeting at 7:04 p.m.

Agenda Item IX-A: Adjournment

Upon a motion and a second the meeting adjourned at 7:05 p.m.