EL CAMINO COLLEGE
MINUTES OF THE COLLEGE CURRICULUM COMMITTEE
SEPTEMBER 22, 2009

Present: F. Arce, J. Davidson, S. Gates, A. Himsel, R. Hughes, L. Kjeseth, M. Lipe, V. Lloyd, E. Martinez, M. Odanaka, S. Panski, V. Rapp, V. Rayford, J. Sims, J. Thompson

Ex-Officio Members Present: L. Alford, M. Hall, J. Harmon, J. Young

Ex-Officio Members Absent: C. Brinkman, Q. Chapman, R. Smith, L. Suekawa

Also Present: S. Black, V. Cafarchia, S. Cocca, B. Jaffe, T. Jackson, M. Kline, R. Lewis, J. Ruggirello

CALL TO ORDER

Chair Kjeseth called the College Curriculum Committee (CCC) meeting to order at 2:34 p.m.

APPROVAL OF MINUTES

- In today's packets were the minutes from the meeting on September 8, 2009 that were electronically approved by the consent of members of the Committee.

CHAIR'S REPORT

Program Content and Approval Handbook

- Chair Kjeseth advised CCC that the Chancellor's Office has been working hard to rework the PCAH. Modules I and II of the PCAH were distributed to the CCC Committee for complete replacement of the previous version. Chair Kjeseth informed the Committee members that Module III will be received some time in the spring, and that module will deal solely with noncredit courses.

Changes to Coding Definitions (CB 04 & CB 08)

- The coding of courses in the Data Element Dictionary contains CB 04 (Course-Credit Status) and CB 08 (Course-Basic Skills Status). Chair Kjeseth informed CCC that Title V states courses cannot be coded as Credit, Degree Applicable and as Basic Skills. Currently Elementary Algebra is coded as such, and a decision needs to be made as a college as to which status this course is going to take.
- Chair Kjeseth explained the impact of the coding changes:
    - Some degrees and certificates still require Elementary Algebra.
        i. All certificates that require Elementary Algebra will have to be re-worked if decision is made to change credit status.
    - If Elementary Algebra is changed to a Basic Skills course, increase in funding for Basic Skills will have a fiscal impact.
- Discussion among the CCC included questions regarding the benefit of the course to CTE students, not just students who intend to transfer; is there another rationale to change to Basic Skills other than funding?; preference to remain as degree-applicable for student unit-load reasons, and choosing to take Math instead of not taking a Math course; and what are other colleges doing with their Elementary Algebra course.
- Chair Kjeseth informed the CCC the Math Department has had discussion regarding the matter but has not made a recommendation. S. Panski stated that Math faculty should

provide direction on the course's status, and change to Basic Skills if the decision makes sense, not solely for funding purposes. He also remarked how the State is cutting Basic Skills funding by 30%, and future cutting may be forthcoming. J. Young also agreed that Math faculty should provide direction on this matter.

Course Review Worksheet and Checklist – Draft

- Feedback on the Course Review Worksheet and Checklist draft document that was distributed at the September 8th meeting.
- Chair Kjeseth suggested setting up a Wiki for instructors and committee to leave comments on. A. Himsel noted that many people do not know what a Wiki is or how to use it. The committee members agree to continue sending comments to Chair Kjeseth via email.
- Chair Kjeseth stated that he will send electronic copy of the document at the request of J. Thompson.

CurricUNET Update

- Chair Kjeseth described how there are two ends to CurricUNET and that primary focus has been organizing the input side. He stated that the faculty still needs some training and afterwards, the program will become very straightforward for them. Chair Kjeseth said that we still have to work on the output side, and need to put together a folder of different outputs we would like to receive. He asks for any suggestions on what sort of output ECC should have. He states that it is not an efficient use of time to do this at the committee meetings with forms.
- S. Gates inquired about seeing the ECC CurricUNET site setup. Chair Kjeseth stated he planned to show the site to the CCC at the next meeting and he will email everyone their username and password. Chair Kjeseth requested the list of desired outputs that are to be requested of CurricUNET be emailed to him.

VICE PRESIDENT – ACADEMIC AFFAIRS' REPORT

- VPAA F. Arce thanked everyone for all of their diligent work. He stated the goal for Summer Review had been made thanks to the willingness of those who served.
- Chair Kjeseth concurred with VPAA F. Arce, and requested the sentiments be directed to faculty as well.

CURRICULUM REVIEW

Industry and Technology Proposals

- Chair Kjeseth invited Associate Dean T. Jackson to present proposals for Air Conditioning and Repair 20, Electronic and Computer Hardware Technology 146ab, Electronic and Computer Hardware Technology 148ab, and Environmental Technology 1.
- T. Jackson introduced faculty members present to answer any of the Committee's questions. He then distributed an errata sheet and explained each section where revisions were made to the course reactivation proposal (ACR 20), and the new course proposals (AJ 106, ECHT 146ab, ECHT 148ab, and ET 1).
- A. Himsel made the suggestion that Administration of Justice 106 change "Major Topic" III on the Outline of Subject Matter to read "APPLICATION FORMS AND PROCESSES".
- T. Jackson proceeded to discuss Electronics and Computer Hardware Technology 146ab. Under "Major Topic" XVII. A. of the Outline of Subject Matter, Chair Kjeseth noted the

activities listed are those that are assumed to happen in the course. Committee members suggested that it would be nice to see more on something such as the development of a project. Chair Kjeseth agrees and states he would like to see a little bit of change made here in the language used.

- Instructors will work on the matter during the meeting and will provide revisions to the CCC for review.
- Electronics and Computer Hardware Technology 148ab was the next course presented. Clarification was provided with regard to the Descriptive Title similarity with Electronics and Computer Hardware Technology 146ab. It was noted the same revision under Major Topic XVII. A. of the Outline of Subject Matter would be necessary for this course as well.
- V. Lloyd remarked that it does not appear the typical assignment in V.A. is not demonstrating a skill, but rather knowledge. J. Ruggirello stated the typical assignment is demonstrating a skill involving a problem. A suggestion was made by J. Young, and accepted by CCC to switch the statements located in V.B.2 (COLLEGE-LEVEL CRITICAL THINKING ASSSIGNMENTS) and V.A. (TYPICAL ASSIGNMENT). It was noted the switch will be made in ECHT 146ab as well.
- Members of the CCC commented on the "Entrance Skills/Knowledge" in VIII.A.3. (CONDITIONS OF ENROLLMENT) are the same as ECHT 146ab, with the exception of item #6, and requests clarification. J. Ruggirello provided clarification regarding the matter, and it was resolved to remain as it is written.
- T. Jackson proceeded with Environmental Technology 1. With regard to the Course Objectives, S. Panksi inquired about global warming's inclusion because of the assumption that "global warming" is an indisputable phenomena in the way it is worded in the course description rather than an idea not universally accepted.
    - S. Cocca informs the CCC this issue is covered in the bio-gas section and the study of Greenhouse Gas Emissions, and the course will look at what the international community will be discussing.
    - A. Himsel suggests the use of "global climate change" because so as not to politicize the course and issue, although global warming has been backed by scientific research.
    - Chair Kjeseth states that he does not see that a student reading the description would tie this to global warming very clearly, and points to changing the catalog description.
    - S. Cocca feels the proposed catalog description is currently written appropriately for the course, and would not like to change the description.
- With the consent of S. Cocca, Chair Kjeseth reiterates the original suggestion to change wording from "global warming" to "global climate change".
- Chair Kjeseth asked for a motion to approve the Industry and Technology proposals. A. Himsel moved, M. Lipe seconded, and the motion carried.
- Chair Kjeseth asked for a motion to approve Environmental Technology 1 as a Stand-Alone course. M. Lipe moved, J. Thompson seconded, and the motion carried.

CONSENT AGENDA PROPOSALS

- Chair Kjeseth directed attention to today's Consent Agenda handout for approval by the College Curriculum Committee.
- The handout included eight Health Sciences and Athletics division course reviews which included one course with a revision to the catalog description.

- The handout also included twenty-seven Industry and Technology division recommendations course reviews which included new courses, course reviews and reactivations with revisions to prerequisites, title and number, catalog descriptions, recommended preparation, and descriptive title.
- Chair Kjeseth then called for a motion to approve the recommended actions on the Consent Agenda proposals. M. Lipe moved, V. Rapp seconded, and the motion carried.

ADJOURNMENT

Chair Kjeseth asked for a motion to adjourn the meeting. M. Lipe moved, V. Lloyd seconded, and the motion carried. The meeting was adjourned at 3:42 p.m.

EL CAMINO COLLEGE
COLLEGE CURRICULUM COMMITTEE

Proposed Curriculum Changes
September 22, 2009

HEALTH SCIENCES AND ATHLETICS DIVISION

COURSE REVIEW

1. Respiratory Care 170 – Introduction to the Respiratory Care Sciences and the Profession
2. Respiratory Care 172 – Fundamentals of Cardiopulmonary Physiology and Pharmacology in Respiratory Care
3. Respiratory Care 174 – Introduction to Respiratory Care Equipment and Patient Care Procedures
4. Respiratory Care 280 – Respiratory Care of the Critically Ill Patient II
5. Respiratory Care 282 – Fundamentals of Perinatal and Pediatric Respiratory Care
6. Respiratory Care 284 – Respiratory Care of the Critically Ill Patient III
7. Respiratory Care 286 – Fundamentals of Pulmonary Rehabilitation and Home Respiratory Care

COURSE REVIEW; CHANGE IN CATALOG DESCRIPTION

1. Respiratory Care 288 – Fundamentals of Pulmonary Function Testing
   Current Status/Proposed Change
   This course will review the fundamental procedures and equipment used to measure pulmonary function in non-symptomatic populations and in populations of people with chronic pulmonary diseases. ~~Operation, calibration, and quality control of arterial blood analysis and respiratory~~ Experience with exhaled air data collection will be provided through hands-on ~~experience~~ procedures at the college and at health service organizations' diagnostic laboratories. Skills to be learned will include performance of ~~arterial blood gas analysis,~~ public health screening and diagnostic pulmonary function testing.

   Recommendation:
   This course will review the fundamental procedures and equipment used to measure pulmonary function in non-symptomatic populations and in populations of people with chronic pulmonary diseases. Experience with exhaled air data collection will be provided through hands-on procedures at the college and at health service organizations' diagnostic laboratories. Skills to be learned will include performance of public health screening and diagnostic pulmonary function testing.

INDUSTRY AND TECHNOLOGY DIVISION

COURSE REVIEW

1. Electronics and Computer Hardware Technology 124 – Operational Amplifiers and Linear Integrated Circuits
2. Fashion 24abc – Tailoring
3. Fashion 26B – Basic Dress Design through Draping Process
4. Fire and Emergency Technology 6 – Building Construction for Fire Protection
5. Fire and Emergency Technology 8 – Fire Service Hydraulics
6. Fire and Emergency Technology 9 – Fire Apparatus and Equipment
7. Fire and Emergency Technology 10 – Hazardous Materials
8. Fire and Emergency Technology 11 – Arson Detection and Control
9. Fire and Emergency Technology 14 – Applied Science for Fire Protection
10. Fire and Emergency Technology 19 – Fire Service Entrance Preparation
11. Fire and Emergency Technology 20 – Fire Protection Equipment and Systems

NEW COURSES

1. Administration of Justice 106 – Criminal Justice Recruitment and Selection
   Units: 3 Lecture: 3 hours Faculty Load: 20.00%
   Credit, degree applicable; Letter grade; Transfer CSU
   This course presents an overview of the criminal justice recruitment and selection process, and provides opportunities to gain knowledge and skills that will enable them to be more successful at passing the various testing phases in a criminal justice testing and background investigation process. Instruction begins with the application phase, then addresses the various steps in the hiring process including: the written examination, oral interview, written and oral psychological exams, polygraph exam, physical agility test and background investigation.

2. Electronics and Computer Hardware Technology 146ab – CompTIA Network+ Certification Preparation for Computer Hardware Systems
   Units: 4 Lecture: 3 hours Lab: 4 hours Faculty Load: 40.000%
   Prerequisite: one semester of Electronics and Computer Hardware Technology 144ab with a minimum grade of C
   Credit, degree applicable; Letter grade, Credit/No Credit; Transfer CSU
   This course is designed for the student pursuing a career as a computer service technician. Students will develop the skills and knowledge required for passing the CompTIA Network+ Certification exam. Topics include set up configuration and troubleshooting of networking hardware devices. Other areas explored include networking topology, cabling, wireless devices, network standards, protocols and security.

3. Electronics and Computer Hardware Technology 148ab – CompTIA Security+ Certification Preparation for Computer Hardware Systems
   Units: 4 Lecture: 3 hours Lab: 4 hours Faculty Load: 40.000%
   Prerequisite: one semester of Electronics and Computer Hardware Technology 146ab with a minimum grade of C
   Credit, degree applicable; Letter grade, Credit/No Credit; Transfer CSU
   This course is designed for the student pursuing a career as a computer service technician. Students will develop the skills and knowledge required for passing the CompTIA Security+ Certification exam. Topics include information security, system threats and risks, protecting systems, network vulnerabilities, network defenses, wireless network security, security audits and policies, cryptographic methods, and the basics of computer forensics.

4. Environmental Technology 1 – Sustainable Energy and Renewable Building Sciences and Technologies
   Units: 3 Lecture: 3 hours Faculty Load: 20.000%
   Credit, degree applicable; Letter grade; Transfer CSU
   This course is designed to prepare students to survey and evaluate new sustainable alternatives to current building and energy uses within their environment. A concentration on "Green Regenerative" Sciences and Technologies will be emphasized. Areas of concentration will include: Green Building Design and site selection, energy efficient designs and construction techniques, Photovoltaic (PV) systems, solar thermal systems, wind energy, fuel cells, solid waste management, water conservation, and building energy rating systems.

COURSE REVIEW; CHANGE IN CATALOG DESCRIPTION

1. Electronics and Computer Hardware Technology 122 – Semiconductor Circuits II
   Current Status/Proposed Change
   This course ~~is intended to give~~ gives the student ~~a more thorough~~ an advanced background in solid-state devices such as transistors, ~~FETs (Field Effect Transistors) and SCRs (Silicon Controlled Rectifiers)~~ Field Effect Transistors (FETs) and Silicon Controlled Rectifiers (SCRs). Practical laboratory experience similar to ~~those employed in the electronics industry are~~ circuitry used in the electronics industry is included. ~~Laboratory experimentation results are predicted with computer simulation.~~

   Recommendation:
   This course gives the student an advanced background in solid-state devices such as transistors, Field Effect Transistors (FETs) and Silicon Controlled Rectifiers (SCRs). Practical laboratory experience similar to circuitry used in the electronics industry is included.

2. Electronics and Computer Hardware Technology 130 – Digital Systems and Computer Logic I
   Current Status/Proposed Change
   This is an introductory course in digital logic circuit theory and practice ~~as it is~~ used in contemporary computer, control, instrumentation and security systems. The course begins with the development of simple digital elements, which are combined in increasingly complex functions to perform higher-level logic functions. The laboratory exercises give the student the opportunity to verify the ideas presented in lecture, and explore the capabilities and limitations of commonly used logic circuits.

   Recommendation:
   This is an introductory course in digital logic circuit theory and practice used in contemporary computer, control, instrumentation and security systems. The course begins with the development of simple digital elements, which are combined in increasingly complex functions to perform higher-level logic functions. The laboratory exercises give the student the opportunity to verify the ideas presented in lecture, and explore the capabilities and limitations of commonly used logic circuits.

3. Fashion 20 – Textiles
   Current Status/Proposed Change
   This introductory course covers characteristics of textiles for ~~Fashion Design~~ fashion design majors. Students are introduced to: various fibers, yarn types, fabrication, coloring, printing and finishing methods. Selection, use and care of textiles are emphasized.

   ~~Note: Same as Family and Consumer Studies 20 and Interior Design 20.~~

   Recommendation:
   This introductory course covers characteristics of textiles for fashion design majors. Students are introduced to: various fibers, yarn types, fabrication, coloring, printing and finishing methods. Selection, use and care of textiles are emphasized.

4. Fire and Emergency Technology 4 – Fire Company Organization and Management
   Current Status/Proposed Change
   This course is designed to review fire department organization and offer instruction in the organization, management and supervision of fire companies. Areas of discussion include the relationship of the company officer to the organizational structure as well as responsibilities ~~with regard~~ related to personnel supervision, evaluation, discipline and training, communication, fire apparatus and equipment maintenance, fire prevention, incident response and command, strategy and tactics, and records and reports.

Recommendation:
This course is designed to review fire department organization and offer instruction in the organization, management and supervision of fire companies. Areas of discussion include the relationship of the company officer to the organizational structure, as well as responsibilities related to personnel supervision; evaluation; discipline and training; communication; fire apparatus and equipment; maintenance; fire prevention; incident response and command; strategy and tactics; and records and reports.

5. Fire and Emergency Technology 7 – Fire Protection Engineering
Current Status/Proposed Change
This course in fire protection engineering introduces hydraulic~~s~~ laws as applied to fire protection; the application of fire protection engineering; ~~calculating~~ the calculation of fire protection demands in buildings~~,~~; and the application of building components and approved fire protection systems.

Recommendation:
This course in fire protection engineering introduces hydraulic laws as applied to fire protection; the application of fire protection engineering; the calculation of fire protection demands in buildings; and the application of building components and approved fire protection systems.

6. Fire and Emergency Technology 142abcd – Basic Emergency Medical Technician Recertification
Current Status/Proposed Change
This is a refresher course for those in need of recertification as a Basic Emergency Medical Technician (EMT). This course is designed to present the student with updated and new technology in the areas of emergency pre-hospital care.

Recommendation:
This is a refresher course for those in need of recertification as a Basic Emergency Medical Technician (EMT). This course is designed to present the student with updated and new technology in the areas of emergency pre-hospital care.

COURSE REVIEW; CHANGES IN NUMBER, CATALOG DESCRIPTION

1. Electronics and Computer Hardware Technology 140 – Computer Systems and Hardware Technology I
Current Status/Proposed Change
Electronics and Computer Hardware Technology ~~140~~ 140ab – Computer Systems and Hardware Technology I
This course provides a general study of computer hardware systems and ~~their~~ underlying operating technologies. Topics covered include an overview of microprocessor-based computer systems, binary and hexadecimal numbering

systems, computer system hardware components and peripherals, operating systems, basic hardware failures, and test and verification of proper computer systems operation. ~~Students work in teams to develop analytical skills and techniques.~~

Note: Letter grade or P/NP option.

Recommendation:
Electronics and Computer Hardware Technology 140ab – Computer Systems and Hardware Technology I
This course provides a general study of computer hardware systems and underlying operating technologies. Topics covered include an overview of microprocessor-based computer systems, binary and hexadecimal numbering systems, computer system hardware components and peripherals, operating systems, basic hardware failures, and test and verification of proper computer systems operation.

COURSE REVIEW; CHANGES IN CONDITIONS OF ENROLLMENT (Prerequisite, Corequisite, Recommended Preparation, or Enrollment Limitation), NUMBER, CATALOG DESCRIPTION

1. Electronics and Computer Hardware Technology 142 – Computer Systems and Hardware Technologies II
   Current Status/Proposed Change
   Electronics and Computer Hardware Technology ~~142~~ 142ab – Computer Systems and Hardware Technologies II
   Prerequisite: Electronics and Computer Hardware Technology ~~140~~ 140ab with a minimum grade of C
   This course provides a comprehensive study of advanced computer hardware systems and ~~their~~ associated technologies. Topics will include an in-depth analysis of microprocessor-based architectures and ~~their~~ related computer hardware system components and peripheral devices. Installation and configuration of the system hardware, advanced hardware and software integration skills.~~,~~ ~~including conflict~~ Conflict resolution, troubleshooting and optimization strategies will be taught.

   Note: Letter grade or P/NP option.

   Recommendation:
   Electronics and Computer Hardware Technology 142ab – Computer Systems and Hardware Technologies II
   Prerequisite: Electronics and Computer Hardware Technology 140ab with a minimum grade of C
   This course provides a comprehensive study of advanced computer hardware systems and associated technologies. Topics will include an in-depth analysis of

microprocessor-based architectures and related computer hardware system components and peripheral devices. Installation and configuration of the system hardware, advanced hardware and software integration skills. Conflict resolution, troubleshooting and optimization strategies will be taught.

Note: Letter grade or P/NP option.

2. Electronics and Computer Hardware Technology 191 – Introduction to Microprocessors and Interfacing
Current Status/Proposed Change
Electronics and Computer Hardware Technology ~~191~~ 191ab – Introduction to Microprocessors and Interfacing
Prerequisite: ~~Electronics and Computer Hardware Technology 120 with a minimum grade of C~~ Electronics and Computer Hardware Technology 11 or Electronics and Computer Hardware Technology 130 with a minimum grade of C or equivalent electronics background
~~Recommended Preparation: Electronics and Computer Hardware Technology 130 and 140~~
This course is an introduction to industrial microprocessors ~~(micro-controllers)~~ and microcontrollers as they relate to industrial and consumer equipment. Included are the fundamentals of assembly language, use of software to simulate hardware, digital and analog interfacing, data storage, and trouble shooting.

Recommendation:
Electronics and Computer Hardware Technology 191ab – Introduction to Microprocessors and Interfacing
Prerequisite: Electronics and Computer Hardware Technology 11 or Electronics and Computer Hardware Technology 130 with a minimum grade of C or equivalent electronics background
This course is an introduction to industrial microprocessors and microcontrollers as they relate to industrial and consumer equipment. Included are the fundamentals of assembly language, use of software to simulate hardware, digital and analog interfacing, data storage, and trouble shooting.

COURSE REVIEW; CHANGES IN CONDITIONS OF ENROLLMENT (Prerequisite, Corequisite, Recommended Preparation, or Enrollment Limitation), NUMBER, DESCRIPTIVE TITLE, CATALOG DESCRIPTION

1. Electronics and Computer Hardware Technology 144 – A+ Certification Preparation for Computer Hardware Systems
Current Status/Proposed Change
Electronics and Computer Hardware Technology ~~144~~ 144ab – CompTIA A+ Certification Preparation for Computer Hardware Systems

Prerequisite: Electronics and Computer Hardware Technology ~~140~~ 140ab with a minimum grade of C
~~Recommended Preparation: Computer Information Systems 40 or equivalent~~
This course is designed for the student pursuing a career as a computer service technician. Students will develop the skills and knowledge required for passing the CompTIA A+ Certification~~: Core~~ Hardware exam. Topics covered include safety, basics of electricity and electronics, microcomputer hardware and components, ~~CMOS (Complementary Metal Oxide Semiconductor)~~ Complementary Metal Oxide Semiconductor (CMOS) settings, printers, portable systems and network hardware.

Note: Letter grade or P/NP option.

Recommendation:
Electronics and Computer Hardware Technology 144ab – CompTIA A+ Certification Preparation for Computer Hardware Systems
Prerequisite: Electronics and Computer Hardware Technology 140ab with a minimum grade of C
This course is designed for the student pursuing a career as a computer service technician. Students will develop the skills and knowledge required for passing the CompTIA A+ Certification Hardware exam. Topics covered include safety, basics of electricity and electronics, microcomputer hardware and components, Complementary Metal Oxide Semiconductor (CMOS) settings, operating systems, printers, portable systems and network hardware.

Note: Letter grade or P/NP option.

COURSE REVIEW; CHANGES IN CONDITIONS OF ENROLLMENT (Prerequisite, Corequisite, Recommended Preparation, or Enrollment Limitation), CATALOG DESCRIPTION

1. Fashion 23 – Fitting and Alterations
   Current Status/Proposed Change
   Prerequisite: one semester of Fashion 10ab with a minimum grade of C or equivalent
   This course teaches alteration and repair of Ready-to-Wear (RTW) clothing and commercial patterns to conform to body contours by analysis of problem areas, ~~and by~~ using ~~principles and methods of~~ sewing techniques for the dressmaker, tailor, ~~and~~ or home sewer.

   Recommendation:
   Prerequisite: one semester of Fashion 10ab with a minimum grade of C or equivalent

This course teaches alteration and repair of Ready-to-Wear (RTW) clothing and commercial patterns to conform to body contours by analysis of problem areas, using sewing techniques for the dressmaker, tailor, or home sewer.

REACTIVATE COURSE; COURSE REVIEW; CHANGES IN DESCRIPTIVE TITLE, FACULTY LOAD, LECTURE/LAB HOURS, TRANSFER STATUS, CATALOG DESCRIPTION

1. Air Conditioning and Refrigeration 20 – Solar Energy Applications
   Current Status/Proposed Change
   Air Conditioning and Refrigeration 20 – Solar Energy Applications-Photovoltaics and Solar Thermal
   Faculty Load: ~~33.333~~ 20.000
   Hours Lecture: ~~2~~ 3 Hours Lab: ~~4~~ 0
   Transfer CSU: ~~No~~ Yes
   ~~An~~ This is an introductory course ~~to the field of solar heating and air conditioning~~ in solar thermal and Photovoltaics (PVs). ~~Lectures relate to~~ Topics covered include solar components, passive solar systems~~,~~ ~~and~~ active solar systems~~.~~, solar hot water and solar electricity. Students will learn solar history, how solar panels work, changing Direct Current (DC) voltage to Alternating Current (AC) voltage, applications of the National Electric Codes (NEC) codes and best solar locations and energy savings.
   ~~Shop practice includes the installation and efficiency testing of hydronic and air solar systems.~~

   Recommendation:
   Air Conditioning and Refrigeration 20 – Solar Energy Applications-Photovoltaics and Solar Thermal
   Faculty Load: 20.000
   Hours Lecture: 3
   Transfer CSU: Yes
   This is an introductory course in solar thermal and Photovoltaics (PVs). Topics covered include solar components, passive solar systems, active solar systems, solar hot water and solar electricity. Students will learn solar history, how solar panels work, changing Direct Current (DC) voltage to Alternating Current (AC) voltage, applications of the National Electric Codes (NEC) codes and best solar locations and energy savings.