DEGREES, CERTIFICATES, AND TRANSFER PREPARATION INFORMATION

PHOTOVOLTAIC INSTALLATION (SOLAR ENERGY INSTALLATION)

Solar energy systems are being installed in growing numbers at businesses and private residences. This growing demand is expected to increase the need for many new jobs and business opportunities in solar photovoltaic and thermal system design and installation, energy efficiency auditing, and Zero Net Energy (ZNE) homes and buildings. The program is designed to provide students with both the hands-on skills and the broader contextual knowledge necessary to gain successful employment in the burgeoning alternative energy industry. Students who complete this program will be qualified for jobs in a variety of different capacities including: PV installation, repairs, maintenance, solar design, and energy efficient auditing. With additional education and/or experience, students could pursue employment with one of the many public institutions working on alternative energy policy and ZNE homes, and/or could potentially start their own energy audit, energy management, solar design, or solar installation company.

This program prepares students to take the NABCEP (North American Board of Certified Energy Practitioners) Associate Exam and — with adequate job experience — the NABCEP Professional exam.

Programs Offered

- Associate Degree
  - Solar Photovoltaic and Energy Efficiency
- Certificate of Achievement
  - Solar Photovoltaic Installation
- Department Certificates
  - Basic Solar Photovoltaic Installation

Associate Degree Requirements

An Associate degree is granted upon successful completion of a program of study with a minimum grade point average (GPA) of 2.0 (C) in degree applicable coursework and a minimum of **60 degree applicable semester units**, including:

- Completion of the area of emphasis with a grade of C or higher in each course, or with a P if the course was taken on a Pass/No Pass basis, and the P is equal to a C or higher;
- Completion of one of the following general education patterns: SMC GE or Cal-GETC;
- Completion of the SMC Global Citizenship graduation requirement.

Certificate of Achievement Requirements

A Certificate of Achievement is granted upon successful completion of a program of study with a minimum overall grade point average (GPA) of 2.0 (C) and a **designated minimum number of units**, including:

- Completion of the area of emphasis with a grade of C or higher in each course, or with a P if the course was taken on a Pass/No Pass basis, and the P is equal to a C or higher;
- Completion of at least 50% of area of emphasis units at Santa Monica College. Department Chairs have the discretion to waive the 50% minimum units required at SMC to meet the major or area of emphasis. All major coursework must be completed with a "C" or better grade.

Department Certificate Requirements

A Department Certificate is granted upon successful completion of a program of study with a **designated minimum number of units**, including:

- Completion of the area of emphasis with a grade of C or higher in each course, or with a P if the course was taken on a Pass/No Pass basis, and the P is equal to a C or higher;
- Completion of at least 50% of area of emphasis units at Santa Monica College. Department Chairs have the discretion to waive the 50% minimum units required at SMC to meet the major or area of emphasis. All major coursework must be completed with a "C" or better grade.

Note: Department Certificates are not noted on student transcripts. Students must submit a petition to the relevant academic department to be awarded a Department Certificate.

Catalog Rights

A student may satisfy the requirements of a degree that were in effect at any time of the student's ***continuous*** enrollment. Continuous enrollment means attendance in at least one semester (Fall or Spring) in each academic year.

Solar Photovoltaic and Energy Efficiency, Associate Degree

Program Learning Outcomes: Upon completion of the program, students will demonstrate proficiency in basic terminology (solar radiation, solar irradiance, solar insolation, solar constant, solstice, equinox, solar altitude angle, solar azimuth angle, solar incidence angle) Students will be able to explain how a solar cell converts sunlight into electrical power and distinguish between PV cells, modules, panels and arrays. Students will be able to identify the five key electrical output parameters for PV modules using manufacturers' literature (Voc, Isc, Vmp, Imp, and Pmp) and label points on a current-voltage (I-V) curve, as well as identify and apply regulatory codes when conducting energy assessments and/or site visits. Students will be able to recognize and identify local and state energy efficiency requirements/incentives for new and existing buildings; conduct Energy Utilization Analysis; and recognize mechanics and engineering of energy systems, including HVAC, lighting, and renewable energy systems.

Area of Emphasis: (18 units)

Required Photovoltaic Courses: (5 units)
PV 11, Introduction to Solar Photovoltaics (3)
PV 12, Photovoltaic Installation Exam Preparation (2)
Required Energy Efficiency Courses: (7 units)
ENERGY 1, Introduction to Energy Efficiency (3)
ENERGY 2, Residential Building Science (3)
ENERGY 90A, Energy Efficiency Internship (1)
Required Computer-Based Courses: (3 units)
ARC 21, Digital Communication 2 *(formerly INTARC 28A/INTARC 35)* (3)
or
GEOG 20, Introduction to Geographic Information Systems *(same as GIS 20)* (3)
or
GIS 20, Introduction to Geographic Information Systems *(same as GEOG 20)* (3)
Required Support Courses; Select 1 course from the following: (3 units)
BIOL 9, Environmental Biology (3)

BUS 63, Principles of Entrepreneurship (3)
ENVRN 7, Introduction to Environmental Studies *(same as GEOG 7)* (3)
ENVRN 20, Environmental Ethics *(same as PHILOS 20)* (3)
ENVRN 22, Environmental Politics and Policies *(same as POL SC 22)* (3)
ENVRN 40, Environmental Psychology *(same as PSYCH 40)* (3)
GEOG 7, Introduction to Environmental Studies *(same as ENVRN 7)* (3)
PHILOS 20, Environmental Ethics *(same as ENVRN 20)* (3)
POL SC 22, Environmental Politics and Policies *(same as ENVRN 22)* (3)
PSYCH 40, Environmental Psychology *(same as ENVRN 40)* (3)

Solar Photovoltaic Installation, Certificate of Achievement

Solar energy systems are being installed in large numbers by utilities, businesses, and homes. This growing demand is increasing the need for many skilled workers in photovoltaic (PV) installation, PV design, and solar sales. This program provides students with both the hands-on skills and the broader contextual knowledge necessary to gain successful employment in the solar industry. Students who complete this program will be qualified for jobs in a variety of different capacities including: PV installation, repairs, maintenance, mid-to-upper level solar design, and sales. With additional education and/or experience, students could pursue employment with one of the many public institutions working on alternative energy policy and zero net energy (ZNE) homes, and/or could potentially start their own solar installation company.

This program prepares students to take the NABCEP (North American Board of Certified Energy Practitioners) Associate Exam and — with adequate job experience — the NABCEP Professional exam.

Program Learning Outcomes: Upon completion of the program, students will demonstrate proficiency in basic terminology (solar radiation, solar irradiance, solar insolation, solar constant, solstice, equinox, solar altitude angle, solar azimuth angle, solar incidence angle, semiconductor, circuit, inverter). Students will be able to explain how a solar cell converts sunlight into electrical power and how power is conditioned for use in buildings. Students will be able to identify the five key electrical output parameters for the I-V curve. Student will have achieved a mastery of basic computer-based systems that either assist in design of solar production equipment (computer aided design or CAD) or aid in geographic analysis of renewable resources (geographic information systems or GIS). Students will be able to apply appropriate regulatory codes when conducting energy efficiency requirements for new and existing buildings. Student will be proficient in conducting an energy utilization index (EUI) analysis. Students will be able to recognize the physical properties that consume or produce energy in residential and commercial energy systems, including HVAC, lighting, and renewable energy systems.

Area of Emphasis: (14 units)

Required Photovoltaic Courses: (5 units)
PV 11, Introduction to Solar Photovoltaics (3)
PV 12, Photovoltaic Installation Exam Preparation (2)
Required Energy Efficiency Course: (3 units)
ENERGY 1, Introduction to Energy Efficiency (3)
Required Computer-Based Courses: (3 units)
ARC 21, Digital Communication 2 *(formerly INTARC 28A/INTARC 35)* (3)
or
GEOG 20, Introduction to Geographic Information Systems *(same as GIS 20)* (3)
or
GIS 20, Introduction to Geographic Information Systems *(same as GEOG 20)* (3)
Required Support Courses; Select 1 course from the following: (3 units)
BIOL 9, Environmental Biology (3)
BUS 63, Principles of Entrepreneurship (3)
ENVRN 7, Introduction to Environmental Studies *(same as GEOG 7)* (3)
ENVRN 20, Environmental Ethics *(same as PHILOS 20)* (3)
ENVRN 22, Environmental Politics and Policies *(same as POL SC 22)* (3)
ENVRN 40, Environmental Psychology *(same as PSYCH 40)* (3)
GEOG 7, Introduction to Environmental Studies *(same as ENVRN 7)* (3)
PHILOS 20, Environmental Ethics *(same as ENVRN 20)* (3)
POL SC 22, Environmental Politics and Policies *(same as ENVRN 22)* (3)
PSYCH 40, Environmental Psychology *(same as ENVRN 40)* (3)

Basic Solar Photovoltaic Installation, Department Certificate

This program offers courses in basic solar photovoltaic systems and an introduction to energy and energy efficiency principles. The required courses are intended to prepare students for entry-level positions in the home energy services sector, including site analysis of solar electric systems, basic energy auditing, and calculation of energy use intensities. Students will also be prepared to help property owners reduce and manage power demand and energy consumption. The program provides a foundation for further study and preparation for the North American Board of Certified Energy Practitioner (NABCEP) Associate exam.

This program, along with further study, would prepare students for careers related to Zero Net Energy (ZNE) homes, green buildings, or for design- and/or sales-related positions in and related to the energy efficiency, renewable energy, and the solar power industry.

Program Learning Outcomes: Upon completion of the program, students will demonstrate proficiency in basic terminology (solar radiation, solar irradiance, solar insolation, solar constant, solstice, equinox, solar altitude angle, solar azimuth angle, semiconductor, circuit, inverter). Students will be able to explain how a solar cell converts sunlight into electrical power and how power is conditioned for use in buildings. Students will be proficient in conducting an energy utilization index (EUI) analysis. Students will be able to identify the salient concerns related to safe and efficient energy use in the built environment and the issues that threaten the ecological conditions on the planet related to energy production and use.

Area of Emphasis: (8 units)

Required Introductory Photovoltaic Courses: (8 units)
PV 11, Introduction to Solar Photovoltaics (3)
PV 12, Photovoltaic Installation Exam Preparation (2)
ENERGY 1, Introduction to Energy Efficiency (3)