MOHAWK VALLEY COMMUNITY COLLEGE

UTICA AND ROME, NEW YORK

COURSE OUTLINE

Introduction to Solar Voltaic Systems

FM248

CATALOG DESCRIPTION:

FM 248 Introduction to Solar Voltaic Systems C-3, P-3

This course addresses the installation of residential and commercial photovoltaic (PV) systems. It covers the principles of PV electricity and its effective incorporation into stand alone or utility-connected electrical systems. Topics include solar radiation; array orientation; components and system configurations; system sizing and design; and mechanical and electrical installation..

Student learning outcomes:

Upon completion of this course, the student will be able to:

* Evaluate systems design for PV installations
* Develop a complete PV system for industrial use.
* Plan a site survey
* Determine the best PV style system for customer’s application
* Interface with local codes department prior to installation
* Determine best utility connection for customer

DETAILED COURSE OUTLINE:

1. Introduction to Photovoltaic Systems (Chapter 1) (3 period)
2. Photovoltaics
3. PV Applications
4. PV Industry
5. Solar Energy Technologies

# 2. Solar Radiation (3 period)

1. Solar Radiation
2. The sun
3. Sun-Earth Relationships
4. Array Orientations
5. Solar Radiation Data Sets
6. Estimating Array Performance

# 3. Site Surveys and Preplanning (3 period)

1. Site Surveys and Preplanning
2. Preliminary Assessment
3. Preparing Proposals
4. Installation Planning

# 4. System Components and Configurations (3 period)

1. Components
2. Electrical Energy sources
3. PV System Configurations

# 5. Cells, Modules & Arrays (3 period)

1. Photovoltaic Cells
2. Current-Voltage (I-V) Curves
3. Device Response

# 6. Batteries (3 period)

1. Batteries & Principles
2. Battery Types
3. Battery Systems

# 7. Charge Controllers (3 period)

1. Charge Controller Features
2. Charge Controller Types
3. Charge Controller Setpoints
4. Charge Controller Applications

# 8. Inverters (3 period)

1. AC Power
2. Inverters
3. Power Conditioning Units
4. Inverter Features & Specifications

# 9. System Sizing (3 period)

1. Sizing Methodologies
2. Sizing Calculations
3. Passive Design Strategy
4. Building Envelope
5. Internal Load Reduction
6. Electrical Power Systems

# 10. Mechanical Integration

(3 period)

1. Mechanical Considerations
2. Array Mounting Systems
3. Mechanical Integration

# 11. Electrical Integration

(3 period)

1. NEC Code
2. Overcurrent Protection
3. Disconnects
4. Grounding
5. Conductors & Wiring Methods

# 12. Utility Connection

(3 period)

1. Distributed generation
2. Utility Interconnection Policies

# 13 Permitting & Inspection

(3periods)

1. Building Codes & Regulations
2. Permitting
3. Inspection

# 14 Economic Analysis

(4 periods)

1. Incentives
2. Cost Analysis