RENEWABLE ENERGY (RENG)

RENG 101. Basic Elec Renewable Energy. (4 Credits)
Introductory course covering DC and AC electrical circuits as applied to renewable energy fields, including solar photovoltaics, small wind, micro hydroelectricity, biofuel generators, and standalone power systems (batteries and generators). Fundamental theoretical concepts will be intimately linked to hands-on laboratory exercises that form the basis for subsequent renewable energy courses. Power conditioning components will also be emphasized, including charge controllers, inverters, and diversion loads. Pre or Co-requisite: MATH 102, 123 or 141 4 credits (3 lecture hours and 2 lab hours), fall semester

RENG 102. Renewable Energy Resources. (3 Credits)
A scientific examination of the energy field with emphasis on alternate energy sources; their technology and application will be covered in this course, in addition to present needs and future demands; conventional sources, biomass conversions; wind power; geothermal; solar and nuclear energy. Conservation methods are stressed. Knowledge of intermediate algebra is highly recommended for this course. 3 credits (3 lecture hours), fall and spring semester This course satisfies the Liberal Arts and Sciences requirement and the SUNY General Education Requirement for Natural Science.

RENG 103. Renewable Energy Seminar. (1 Credit)
The course provides the student with an introduction to renewable energy resources and systems, recent socioeconomic renewable energy issues, and career opportunities in the field of renewable energy and sustainability. 1 credit (1 lecture hour per week), fall semester.

RENG 150. Analysis Techniques for Renewable Energy. (1 Credit)
This course provides students with fundamental analysis skills pertinent to the field of renewable energy systems. Course focus is on energy and power conversions, algebraic fractions, logarithmic and exponential power functions, Euclidean graph interpretation, and fundamental statistics, with a strong emphasis on renewable energy system examples. Pre – or Co-requisite: MATH 102, 123 or 141 and RENG 102 1 credit (1 lecture and 1 hr. recitation weekly), spring semester

RENG 221. Introduction to Wind Systems. (3 Credits)
This course provides students with an introduction to wind energy and the impacts of turbulence, frequency distributions, and tower height on the wind resource. Students are engaged with installation, maintenance, and troubleshooting wind system. This course covers the Job Task Analysis for the North American Board of Certified Energy Practitioners (NABCEP) Small Wind Installer examination and fundamental skills for industrial wind technicians. This course has an additional lab fee. Prerequisites: RENG 101 or DTEC 125 or AGEN 125 minimum grade of C. Corequisite: PHYS 107 3 Credits (2 hours lecture, 2 hours laboratory), spring semester

RENG 225. Tower Climbing and Rescue. (2 Credits)
This course is designed to give hands-on experience for those entering the wind turbine or telecommunications industry. Initial focus is on tower climbing standards, terminology of the tower climbing industry, and competent climber expectations and duties. Emphasis will be placed on working safely at heights, teamwork in stressful conditions, and fall protection equipment inspection. Students will be held to the National Association of Tower Erectors Authorized Climber and Competent Climber standards. Prospective students should be aware that this course is physically demanding and requires the willingness to be at heights. Must be able to lift 50 pounds and climb a ladder. This course has an additional lab fee. 2 credits (1 hour of lecture and 2 hours of laboratory), spring semester

RENG 231. Solar Photovoltaic Installation. (3 Credits)
This course provides students with an introduction to solar energy and the impacts of seasonality, aspect, and latitude on solar resources. Students are engaged with system components and design of solar photovoltaic electricity generation in both grid-tied and off-grid systems. This course covers the Job Task Analysis for the North American Board of Certified Energy Practitioners (NABCEP) Solar PV Associate examination. This course has an additional laboratory fee. Prerequisites: RENG 101 or DTEC 125 or AGEN 125, and MATH 102, 123 or 141 minimum grade of C. 3 Credits (2 hours lecture, 2 hours laboratory), fall semester

RENG 240. Introduction to Heat Pumps. (3 Credits)
This course is centered on the installation, operation, and maintenance of geothermal and air-source heat pump systems, while introducing principles of system operation and design. This course has an additional lab fee. Co requisite: RESC 260 - Heating and Energy Systems 3 credit hours (2 hours of lecture and 3 hours of laboratory), spring semester.

RENG 306. Alternative Fuel Vehicles. (2 Credits)
This course explores current and future technology in the automotive industry in the areas of alternative power sources. Alternative vehicles such as hybrid electric, full electric (EVs), biofuels and fuel cell technology will be studied. Students will learn automotive technology necessary to understand the hurdles required to achieve a fully sustainable vehicle. Prior knowledge of automotive technology and internal combustion theory is helpful but not necessary. 2 credits (1 lecture hour and 3 laboratory hours), spring semester

RENG 310. Biomass Energy Resources. (3 Credits)
This course provides students with a technical understanding of biomass energy resources, materials, and production systems. Two broad categories of biomass energy resources are considered: dedicated energy crops and waste streams or coproducts. The primary focus of the course is on the production of dedicated bioenergy sources, including agriculture, forestry and aquaculture feedstocks, and recovery of biomass from waste streams, including agriculture, forestry, municipal and industrial systems. The course also provides an introduction to chemical, biological, and thermal conversion pathways of biomass into useful energy sources and materials. Prerequisites: BIOL or CHEM or ENRM 302 or ENRM 332 and MATH 102, 123 or 141, or permission by the instructor. 3 credits (2 lecture hours, 2 lab hours), fall semester

RENG 311. Biofuels. (3 Credits)
This course provides the student with a scientific and technical understanding of biomass-derived fuels. Feedstock procurement, logistics, processing, and conversion to finished fuel, and fuel quality testing will be explored through lectures ad hands-on field and laboratory activities designed to develop practical skills relevant to both small-scale and commercial biofuels production. Prerequisites: RENG 310, and CHEM as advised 3 credits (2 hours of lecture and 3 hours of laboratory), fall semester

RENG 321. Intro to Micro Hyro Systems. (3 Credits)
This course provides students with an introduction to hydroelectricity and the impacts of head, flow, and fluid dynamics on the useable water resource. Students are engaged with installation, maintenance, and troubleshooting micro hydroelectricity systems (those <10 kW in size). Course focus will be on sizing penstock, mapping the hydro resource, and identifying environmental concerns with small hydro systems. Prerequisites: AGEN 151 and PHYS 107 minimum grade of C. 3 Credits (2 hours lecture, 2 hours laboratory), fall semester

RENG 331. Solar Thermal Systems. (3 Credits)
This course provides students with an overview of solar energy and the impacts of seasonality, aspect, and latitude on solar resources. Students install solar thermal systems and design systems for solar domestic hot water, pool heating, and space heating applications. This course covers the Job Task Analysis for the North American Board of Certified Energy Practitioners (NABCEP) Solar Heating Systems Entry Level examination. This course has an additional lab fee. Prerequisites: RESC 221, RENG 240, or RESC 260 minimum grade of C. 3 Credits (2 hours lecture, 2 hours laboratory), spring semester

RENG 332. Passive Solar Energy Systems. (3 Credits)
Passive solar energy systems are directly related to the sun, site, climate, and materials. They exhibit a special relationship to natural processes which offer the potential for an inexhaustible supply of energy. Passive solar energy systems have few moving parts, require little maintenance, and do not generate thermal pollution. This course will address the fundamental concepts of passive solar theory, and the intentions and application of passive solar energy systems. The purpose and impact of passive solar energy systems, specific to natural heating and cooling, will be address through investigation, exploration, and identification. Through the use of system design techniques, students will study and analyze various systems. Energy/thermal evaluation methods will also be emphasized to determine comfort conditions and the overall performance of various passive solar energy systems. Prerequisite: Junior standing or permission of the instructor. Pre- or co-requisite: MATH 102, CAD 181 or permission of the instructor. 3 credits (3 lecture hours), spring or fall semester.

RENG 335. Solar Photovoltaic System Design. (3 Credits)
The focus of RENG 335 is on siting solar PV systems, National Electrical Code Article 690, roof analysis, wind loading, weight loading, array withdrawal forces, sliding forces, 1- line electrical diagrams, system grounding, off-grid systems, optimizing system efficiency, and troubleshooting. Paperwork necessary for grant funding and New York State local ordinances are also covered. Prerequisite: MATH 102, MATH 123, or MATH 141 and RENG 231. 3 credits (2 hours of lecture and 3 hours of laboratory), fall semester.

RENG 340. Renewable Energy Heat & Cool. (3 Credits)
The focus of RENG 340 is on the design of renewable and clean space heating and cooling systems, which may include biomass heating, solar thermal, and heat pump technologies, as well as integration with conventional systems. Design considerations will include heating and cooling load estimation, equipment sizing and specification, duct sizing and design layout for forced-air systems, hydronic system sizing and layout of heat emitters, and system controls and monitoring. Pre-requisites: RENG 240 3 credits (3 hours lecture), spring semester

RENG 350. Energy Economics & Financing. (3 Credits)
This course will introduce students to the principles of energy economics including the following: energy supply and demand, energy security, energy price regulation, and environmental externalities. Financing topics related to energy efficiency and renewable energy, such as power purchase agreements and leases will be explored. This course will cover the key aspects of renewable energy project motivation and project development. Students will learn the skills needed to both develop a project budget and financially evaluate a renewable energy project. Pre-requisite: MATH 102, MATH 123, or MATH 141, or permission of the instructor 3 credits (3 lecture hours), Spring or Fall semester

RENG 355. Renewable Energy Law & Policy. (3 Credits)
This course will examine the goals, impacts, benefits, and challenges of both federal and state energy laws and policies. Current energy industry examples will be used to illustrate specific policies and strategies pertaining to the implementation of renewable energy systems and technologies. Students will research a specific energy policy or law and analyze and evaluate the implications, benefits, and challenges of implementing the policy or law. 3 credits (3 lecture hours), Spring or Fall semester Prerequisite: Junior standing or permission of the instructor

RENG 420. Wind Energy Development & Analytics. (3 Credits)
The focus of RENG 420 is on siting small wind systems, plotting and analyzing Weibull and Rayleigh wind distribution functions, analyzing wind shear and turbulence data, tip-speed ratios, optimizing turbine-inverter inter-actions for maximum energy production, rotor design, electrical system design, National Electrical Code, and system troubleshooting. Paperwork necessary for grant funding and New York State ordinances are also covered. This course will heavily emphasize the NABCEP requirements for small wind site assessment. Prerequisite: MATH 123 or 141, and RENG 221 3 credits (2 hours of lecture and 3 hours of laboratory), spring semester

RENG 435. Solar Development Engineering. (3 Credits)
Solar Photovoltaics systems are rapidly changing in scope, scale, and development. Advanced Topics is a flexible, leading edge course that mirrors the changes in industry to meet the high demands of this renewable energy job sector. Examples of semester topics include commercial/industrial systems, high voltage DC systems, transformers, utility interconnection, and storage-based micro grids. National electrical code AutoCAD, and the NABCEP examination are integral components of this high-level, project-based course. Prerequisite: RENG 335, minimum grade of C. 3 credits (3 lecture hours) weekly, spring semester.

RENG 450. Advanced Grid Technologies. (3 Credits)
This course focuses on components, systems, economics, and design of advanced electricity grids, with an emphasis on renewable energy technologies. Key topics may include smart grids, energy storage, grid communication and control systems, microgrid design, electricity markets, and renewable energy forecasting. This advanced topics course is intended to shift specific focus as advances in grid technologies continue to evolve. Prerequisite: RENG 335. 3 credits (3 lecture hours), fall semester.

RENG 460. Systems Integration. (3 Credits)
This is a capstone class for the Renewable Energy degree program. Quantitative, technical writing, and presentation skills (oral and written) will be applied to design and propose a renewable energy system for a landowner. Students are expected to perform an energy audit, recommend energy efficiency and conservation measures, assess renewable energy resources available, design a full system consistent with landowner objectives, check for town ordinance regulations, prepare applicable paperwork for incentives and utility interconnection agreement, and conduct a financial analysis for the system. A final written and oral presentation will be graded. Prerequisite: Minimum of two 400-level RENG courses 3 credits (3 lecture hours), fall semester

RENG 480. Renewable Energy Internship Pr. (1 Credit)
This course is designed to prepare students for an internship and assist them with the process of employment and career development in renewable energy. It formalizes internship planning and preparation to ensure that internships are conducted in a professional manner, follow program guidelines, and satisfy the goals and objectives of students, faculty advisors and employers. Students must complete RENG 480 prior to enrolling in RENG 490 - Renewable Energy Internship. Pre-requisites: Junior standing in Renewable Energy B.Tech. 1 credit (1 lecture hours), fall semester

RENG 490. Renewable Energy Internship. (15 Credits)
This course is intended to provide the student with a professional work experience in renewable energy or energy efficiency. This work experience should range from 120 to 600 hours (40 hours per credit) and apply theoretical and technical knowledge in a professional setting. Prior to taking this course, students are required to develop a resume, create goals and objectives of the internship, and seek internship organizations in conjunction with their internship advisor while in RENG 480. To qualify for the internship, the internship sponsor, student, and academic advisor must sign a written contract. Students will be required to prepare and submit interim progress reports, develop and submit a comprehensive written report, and deliver a professional presentation of their internship experience. Prerequisite: RENG 480, enrollment in the Renewable Energy B. Tech. program, and permission from the instructor. 3-15 credits, spring semester.