ENGINEERING TECHNOLOGY (ENT)

ENT 581 RENEWABLE DISTRIBUTED GENERATIONAND STORAGE
3, 2/1
Prerequisites: ENT 331 Electric Circuits or equivalent, and ENT 671 Power Systems Analysis I or equivalent, or instructor's permission. This course introduces renewable and efficient electric power systems. It encourages self-teaching by providing numerous practical examples requiring quantitative analysis. Topics include historical, regulatory, and utility industry perspectives of the electric system as well as most of the electricity, thermodynamics, and engineering economics background needed to understand new power technologies.

ENT 582 SMART GRID FROM SYSTEMS PERSPECTIVE
3, 2/1
Prerequisites: ENT 331 Electric Circuits or equivalent, and ENT 671 Power Systems Analysis or equivalent, or instructor's permission. A comprehensive understanding of smart grid is needed for stakeholders to enable them to develop systems prospective of Smart Grid and its technologies, increase modeling of Smart Grid from multiple perspectives, to increase economic understanding and decision making around current and future technologies, to integrate the role of policy and politics in the advancement of Smart Grid over time, to understand how to educate others in Smart Grid, and to analyze basic subsystems of the Smart Grid.

ENT 590 INDEPENDENT STUDY
1-3, 0/0

ENT 591 OPERATIONS AND MANAGEMENT OF MODERN GRID
3, 3/0
Prerequisites: Instructor's permission. This course introduces and explains operations of electric utilities including generation, transmission, distribution, and consumption of electric power, defines system operations and their drivers; discusses impact of deregulation and impact of smart grid technologies on systems operations; introduces concepts of business of system operations, and discusses various management systems used by modern utilities.

ENT 622 MACHINE LEARNING FOR MATERIALS SCIENCE IN CLEAN ENERGY
3, 3/0
Prerequisite: ENT 621 or instructor permission. Cover broad guidelines and best practices regarding obtaining and treatment of data in materials science and device physics related directly to Clean Energy. Feature engineering, model training, validation, evaluation and comparison. Include interactive Jupyter notebooks with example Python code to demonstrate important concepts, workflows, and best practices in the field. Offered every spring.

ENT 671 POWER SYSTEMS ANALYSIS I
3, 2/3
Prerequisites: Undergraduate degree in engineering, engineering technology, or related field. Basic elements of power systems. Energy sources. Balanced three-phase circuits. Power factor correction. Voltage regulation. Transmission line modeling. Per-unit system. Balanced fault analysis. Load flow analysis using numerical methods. Electric power distribution economics.

ENT 672 POWER SYSTEMS ANALYSIS II
3, 2/3
Prerequisites: ENT 671 Power Systems Analysis I. Calculate electric demand of a power system. Solve line faults using symmetrical components. Use equal area criterion to solve simple stability problems. System protection. Electromechanical and numeric relays and their applications. Voltage quality and reliability. Design of a power distribution system for industrial facility.