

INTRODUCTION TO RADIATION PROTECTION TECHNOLOGY

Revised:
12/01/11

<u>C - L - CR</u>
1 - 0 - 1

COURSE NUMBER: RPT 101
MEETING TIMES: ONLINE
CLASSROOM: ONLINE
INSTRUCTOR: CHRISTOPHER STOUT (704-471-5624)
OFFICE: E-40

PREREQUISITE(S): None

CO-REQUISITE(S): None

COURSE DESCRIPTION This course provides a study of the radiation protection profession to include career paths, opportunities and challenges, description of roles and responsibilities and job requirements for the radiation protection technician, and description of the culture of the nuclear industry.

COURSE OUTCOMES Students should be able to demonstrate:

1. Rationality, logic and coherence through critical thinking;
2. Their ability to express themselves effectively in quantitative and qualitative terms;
3. The scientific method of inquiry;
4. Their ability to access, retrieve, synthesize and evaluate information.

TEXTBOOK(S): N/A

REFERENCE(S): Duke Energy Organizational Charts
Duke Energy Radiation Protection Technician Job Qualifications and Job Description
Nuclear Regulatory Commission NUREG-1600, Rev.1 NRC Enforcement Policy

OTHER REQUIRED MATERIALS, TOOLS, AND EQUIPMENT: Students need a notebook, paper, pens and highlighters. Personal protective equipment (PPE) such as hard hat, safety glasses and ear plugs will be provided by Duke Energy during the field trip exercise.

METHOD OF INSTRUCTION: Concepts will be taught by lecture and discussion, audio-visual materials, field trip to Duke Energy Nuclear Station(s), quizzes and a final exam.

GRADING SYSTEM:

90	-	100	=	A
80	-	89	=	B
70	-	79	=	C
60	-	69	=	D
Below	-	60	=	F

GRADE CALCULATION METHOD:

5 Quizzes of Equal Weight	25%
Field Trip (1)	25%
Comprehensive Final Exam	50%
	= 100%

All written assignments (homework, labs, exams, etc.) will be graded and offered for review by students within one week of submission.

ATTENDANCE POLICY: The student is responsible for punctual and regular attendance in all classes, laboratories, clinical, practical internships, field trips, and other

class activities. The College does not grant excused absences; therefore, students are urged to reserve their absences for emergencies. **When illness or other emergencies occur, the student is responsible for notifying instructors and completing work missed.**

During the first 75% of the course a student may initiate withdrawal and receive a grade of a W. A student cannot initiate a withdrawal during the last 25% of the course.

The student is tardy if not in class at the time the class is scheduled to begin and is admitted to class at the discretion of the instructor. If late, please enter the class discreetly. **No student will be admitted following distribution of exam materials.**

Instructors maintain attendance records. However, it is the student's responsibility to withdraw from a course. A student enrolling in and attending at least one course session remains enrolled until the student initiates a withdrawal.

Absences for Religious Holidays: Students who are absent from class in order to observe religious holidays are responsible for the content of any activities missed and for the completion of assignments occurring during the period of absence. Students who anticipate their observance of religious holidays will cause them to be absent from class and do not wish such absences to penalize their status in class should adhere to the following guidelines:

1. Observance of religious holidays resulting in three or fewer consecutive absences: Discuss the situation with the instructor and provide written notice at least one week prior to the absence(s). Develop (in writing) an instructor-approved plan which outlines the make up of activities and assignments.
2. Observances of religious holidays resulting in four or more consecutive absences: Discuss the situation with the instructor and provide the instructor with written notice within the first 10 days of the academic term. Develop an instructor-approved plan which outlines the make up of activities and assignments.

ACADEMIC CONDUCT:

ACADEMIC DISHONESTY: Students are expected to uphold the integrity of the College's standard of conduct, specifically in regards to academic honesty. All forms of academic dishonesty including, but not limited to, cheating on assignments/tests, plagiarism, collusion, and falsification of information will call for disciplinary action. Disciplinary action imposed may include one or more of the following: written reprimand, loss of credit for assignment/test, termination from course, and probation, suspension, or expulsion from the College. For further explanation of this and other conduct codes, please refer to the Student Handbook.

CELLULAR PHONES AND PAGERS/BEEPERS: Cellular phones, pagers and beepers are not permitted to be turned on or used within the classroom. Use of these devices during classroom time will be considered a violation of the student code as it relates to "disruptive behavior."

CLASS/LAB PROCEDURES:

See instructor's handout.

ACCOMMODATIONS:

Students who need special accommodations in this class because of a documented disability should notify Student Disability Services by calling (864) 592-4818, toll-free 1-800-922-3679; via email through the SCC web

site at www.sccsc.edu/resources/disabilities; or by visiting the office located in the East Building Room 30-B on the SCC Central campus. Contacting Student Disability Services early in the semester gives the College an opportunity to provide necessary support services and appropriate accommodations.

**COURSE
COMPETENCIES &
OBJECTIVES:**

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

- I. Describe the significance of nuclear power in generating electricity.
 1. Describe the scope and impact of nuclear generation on a national scale.
 2. Describe the scope and impact of Duke Energy's nuclear capacity on a regional scale.
 3. Recognize the potential for the construction of the second generation of nuclear power plants in the United States.

- II. Describe the function of external regulators in the Nuclear Power Industry.
 1. Define the role of the Nuclear Regulatory Commission (NRC).
 2. Define the role of the Institute of Nuclear Power Operations (INPO).
 3. Define the role of the American Nuclear Insurers group (ANI).
 4. Define the role of the Nuclear Energy Institute (NEI).
 5. Define the role of the International Commission on Radiation Protection (ICRP).
 6. Define the role of National Council on Radiation Protection and Measurements (NCRP).

- III. Recognize the infrastructure of Duke Energy Corporation.
 1. Identify the principal players in the corporate hierarchy.
 2. Identify the reporting relationships of the Radiation Protection Manager at the Nuclear Site.
 3. Identify the major disciplines within the Radiation Protection Organization.

- IV. Describe the functions of the Radiation Protection Organization.
 1. Define the term radiation protection.
 2. Define the roles and responsibilities of the Surveillance and Control group (S&C).
 3. Define the roles and responsibilities of the Respiratory and Instrument Control group (RIC).
 4. Define the roles and responsibilities of the Compliance group.
 5. Define the roles and responsibilities of the Dosimetry and Records group (DRC).
 6. Define the roles and responsibilities of the ALARA (As Low As Reasonably Achievable) group.
 7. Define the roles and responsibilities of the Radioactive Materials Control group (RMC).
 8. Define the roles and responsibilities of the Staff Scientists group.
 9. Define the roles and responsibilities of the Emergency Response Organization (ERO).

- V. Recognize the various cultures that exist at Duke Energy Nuclear Power plants.
 1. Define nuclear safety.
 2. Define industrial safety.
 3. Define radiological safety.

4. Define rule-based performance.
 5. Define continuous quality improvement.
 6. Identify methods employed for positive reinforcement.
 7. Identify the six tools for human performance.
 8. Define the TELL ME program.
- VI. Describe the basic principle of nuclear generation of electricity.
1. Identify the major components in a pressurized water reactor primary coolant system.
 2. Explain the major function of the major components of the reactor coolant system.
 3. Define the nuclear fission process.
- VII. Recognize the major sources of radiation exposure in the nuclear environment and the potential health effects of exposure to ionizing radiation.
1. Define ionizing radiation.
 2. Define contamination.
 3. Identify external sources of radiation.
 4. Identify plant generated sources of radiation.
 5. Define source term.
 6. Identify the average amount of radiation exposure a Duke radiation worker receives on an annual basis.
 7. Distinguish between stochastic and non-stochastic effects of ionizing radiation.
 8. List three methods to minimize exposure to ionizing radiation using the ALARA principle.
 9. Describe how engineering controls are used to minimize exposure to ionizing radiation.
- VIII. Recognize methods to detect and measure ionizing radiation.
1. Identify the use of various portable survey instruments.
 2. Identify the use of fixed counting instruments.
 3. Identify the use of personnel whole body counters.
 4. Identify the use of personnel Dosimetry.
- IX. Recognize the components of the Radiation Protection training program.
1. Describe the courses required for the Associate Degree in Radiation Protection Technology
 2. Recognize the course progression for the second year of study.
 3. Define On-the-Job training (OJT).
 4. Define Task Performance Evaluation (TPE).
 5. Describe Duke Energy's expectation for life-long learning.
- X. Describe the possible career progressions with Duke Energy.
1. Define the progression steps for a radiation protection technician.
 2. Describe the progression steps through the management chain.
 3. Describe the progression steps as a staff scientist.
 4. Describe the opportunities that exist in the corporate office.
 5. Describe the opportunities that exist in other departments or other groups in the Company.
- XI. Recognize the job requirements for a radiation protection technician at Duke Energy.
1. Describe the job qualifications for a radiation protection technician.
 2. Describe the physical demand guidelines for a radiation protection technician.
 3. Describe the work hours during innage periods and refueling

- outages.
 - 4. Describe the basic principle of Duke Energy's business ethics.
 - 5. Describe the significance of the Nuclear Regulatory Commission's policy on enforcement actions against an individual.
 - 6. Describe the basic policy regarding fitness for duty.
 - 7. Describe the random drug screening policy.
- XII. Describe the requirements for nuclear station unescorted access/security clearance.
- 1. Explain the basic premise behind the personal history questionnaire.
 - 2. Explain the basic premise behind finger printing employees.
 - 3. Explain the basic premise for taking the MMPI (Minnesota Multiphasic Personality Inventory).
 - 4. Explain the basic premise for the pre-access drug screen.
 - 5. Explain the basic components of plant access training (PAT) and radiation worker training (RWT).
- XIII. Describe the Duke Energy policy on investing in the development of its employees.
- 1. Identify the expense appropriated by Duke for RPT internships.
 - 2. Describe Duke's policy on payment of wages during continuing training.
 - 3. Describe Duke's policy on individual development plans (IDP) for employees.