RADT A100: RADIOLOGIC PHYSICS

Item	Value
Curriculum Committee Approval Date	11/04/2020
Top Code	122500 - Radiologic Technology
Units	2 Total Units
Hours	36 Total Hours (Lecture Hours 36)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)

Course Description

The fundamentals of radiation and radiological physics. Operation of medical radiographic X-ray units. Study of the effects of radiation in humans. Introduction to health-physics instrumentation. ADVISORY: Proficiency in math skills up to intermediate algebra. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Identify and describe the function of the components of the x-ray circuit and x-ray production.
2. Explain the basic effects of radiation on the human body

Course Objectives

- 1. Define the physical concept of energy and basic structure of matter
- 2. Know the basic principles of electricity, magnetism, and electromagnetism
- 3. Understand the principles in the operation of generators and motors
- 4. Explain the principles of X-ray production
- 5. Identify the functioning parts of X-ray equipment
- 6. Explain the biological effects of radiation of humans
- 7. Identify health physics instruments and for which purpose each is intended
- 8. Understand the basic principles of quality control
- 9. Identify the radiation shielding structural regulations and requirements
- I SCAN SKILLS IDENTIFICATION
- I. 1. Competencies
- I. 2. Foundation Skills

Lecture Content

Introduction and orientation to the course and the facilities. Historical overview of X-ray Electromagnetic spectrum Properties of radiation Introduction to X-ray rooms and basic equipment Basic atomic structure/ electrostatics/energy/matter Units of measurement Fundamental units Derived units SI units Physical concept of energy Work/force Law of conservation Structure of matter Subdivisions Electrical nature Periodic table Chemical behavior Electrostatics Methods of electrification Laws of electrostatics Electromagnetism Nature of electromagnetism Induction Electric generators and motors, high voltage production and rectification Generators Essential features AC and DC Motors Principles Types of electric motors Production and control of high voltage Transformers Autotransformers Rectification n bsp; Methods of rectification Diodes X-ray circuit rectification Roentgen rays, interaction of x-rays with matter and humans Nature of X-ray Sources X-ray tube construction Conditions necessary Types and properties Ionizing radiation and matter Energy levels Types of interactions Importance Detection Radiation dosimetry Roentgen RAD REM X-ray tubes, rectifiers, and X-ray circuits Radiographic tubes Parts and function Tube life/rating charts Rectifiers Solid state diodes Rectifier failure X-ray circuits Parts/function Power sources/meters Control panels Radiation protection/interactions Biological damage potential and medical radiation exposure Probability of photon interactions Attenuation 4 processes Radiation quantities, units and limits. Historical evolution of quantity units Exposure Absorbed dose Equivalent Traditional and SI units/conversion factors Limits for exposure Regulatory agencies Legal dose limits ALARA concept Protection philosophy Biological effects and basic cell biology. Basic cell components Organic/inorganic Chemical interactions Structure and function Mitosis Meiosis Radiation biology Ionization Linear energy transfer Relative biological effectiveness Molecular, cellular effects Radio sensitivity Health effects of low-level radiation dose Somatic dose indicators Bone marrow Thyroid and skin Genetic dose indicators/GSD Radiobiological injury Cellular amplification Latent period Determinants of biological effect Dose-effect curve Carcinogenic Cataractogenic Quality Assurance (QA) and Quality Control (QC) QA provi sions/ administration equipment/maintenance education Overall QA program Manuals QC test / QC records

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)

Instructional Techniques

Lecture and application of ideas Video and demonstration Online/Hybrid

Reading Assignments

Some short essay questions in examination or quiz format; Multiple response questions on short and long quizzes/tests.

Writing Assignments

Some short essay questions in examination or quiz format

Out-of-class Assignments

Between 2 - 4 hours of reading and other assignments outside of the classroom each week. Weekly disucssion board

Demonstration of Critical Thinking

Periodic quizzes Written examinations Attendance and participation in lecture

Required Writing, Problem Solving, Skills Demonstration

Some short essay questions in examination or quiz format

Eligible Disciplines

Radiological technology: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required Statkiewicz, Mary.. Radiation Protection in Medical Radiography., ed. St. Louis: Mosby, 2014 2. Required Bushong, S.. Radiologic Science for Technologists, latest ed. St. Louis: Elsevier/Mosby, 2015

Other Resources

1. Computer Instructional Programs