Montgomery County Community College
RAD 103
Radiation Protection and Biology
2-2-0

COURSE DESCRIPTION:
This course is designed to present an overview of the basic principles of radiation protection and the principles of the interaction of radiation with living organisms. Included in this course are the various methods of protecting the radiographer, patient and others from unnecessary radiation exposure and limitation devices used to limit exposure. Factors affecting biological responses are presented including acute and chronic effects of radiation. Basic principles regarding exposure will be discussed. Radiation health and safety requirements of federal and state agencies will also be incorporated.

PREREQUISITE(S):
All fourth semester courses in the Radiography Program of Study

CO-REQUISITE(S):
All fifth semester courses in the Radiography Program

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

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
1. Explain the concept of "As Low as Reasonably Achievable" (ALARA) and the objectives of a radiation protection program.	Lecture/Discussion Case Study Computer Technology Written Experiences Student Presentations Assigned Readings DVD/Videotapes	Exam Questions Class Discussion
2. Identify sources and methods to measure radiation exposure.	Lecture/Discussion Case Study Computer Technology Written Experiences Student Presentations Assigned Readings DVD/Videotapes	Exam Questions Class Discussion
3. Identify the basis for occupational exposure limits.	Lecture/Discussion Case Study Computer Technology Written Experiences Student Presentations Assigned Readings DVD/Videotapes	Exam Questions Class Discussion

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
4. Describe the principles of cellular biology related to the physical, chemical and biological factors influencing radiation response of cells and tissues.	Lecture/Discussion Case Study Computer Technology Written Experiences Student Presentations Assigned Readings DVD/Videotapes	Exam Questions Class Discussion
5. Calculate dose equivalent limits with reference to the latest NCRP reports.	Lecture/Discussion Case Study Computer Technology Written Experiences Student Presentations Assigned Readings DVD/Videotapes	Exam Questions Class Discussion
6. Interpret personnel monitoring reports.	Lecture/Discussion Case Study Computer Technology Written Experiences Student Presentations Assigned Readings DVD/Videotapes	Exam Questions Class Discussion
7. Differentiate between somatic and genetic radiation effects and discuss specific associated diseases or syndromes.	Lecture/Discussion Case Study Computer Technology Written Experiences Student Presentations Assigned Readings DVD/Videotapes	Exam Questions Class Discussion
8. Research, retrieve and critically evaluate relevant information and discriminate between credible and non-credible sources.	Lecture/Discussion Case Study Computer Technology Written Experiences Student Presentations Assigned Readings DVD/Videotapes	Research Paper Class Discussion

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria*.

SEQUENCE OF TOPICS:

1. Introduction
2. Units, Detection and Measurement
3. Sources of Medical Radiation Exposure

4. Review Cell Biology and Biophysical Events
5. Radiation Effects
6. Radiosensitivity and Response
    a. Law of Bergonie and Tribondeau
    b. Cell survival
    c. Systemic response to radiation
    d. Radiation dose response curves
    e. Total body acute and late effects of radiation
    f. Risk estimates
7. Patient Protection
8. Legal and Ethical Responsibilities
9. Personnel Monitoring and Application of Radiation Safety
10. Surveys, Regulatory/Advisory Agencies and Regulations

LEARNING MATERIALS:

Required Texts:

Carroll, Quinn, B. (2018). *Radiography in the Digital Age* (3rd Edition).Springfield, IL: Charles C. Thomas Publisher

Carroll, Quinn, B. (2018). *Student Workbook for Radiography in the Digital Age* (3rd Edition).Springfield, IL: Charles C. Thomas Publisher

Other Resources located in the Radiography Classroom and/or College Library:

NCRP Reports. National Council on Radiation Protection and Measurements. Bethesda, MD.

Statkiewicz-Sherer, M.A., Visconti, P.J., Ritenour, E.R. (2006). *Radiation Protection in Medical Radiography* (5th ed.). St. Louis, MO: C.V. Mosby.

Statkiewicz-Sherer, M.A., Visconti, P.J., Ritenour, E.R. (2006). *Workbook Radiation Protection in Medical Radiography* (5th ed.). St. Louis, MO: C.V. Mosby.

Selman, Joseph. (2000). *The Fundamentals of Imaging Physics and Radiobiology* (9th ed.). Springfield, IL: Charles C. Thomas.

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

COURSE APPROVAL:

Prepared by: Cheryl L. Weiss, M.S., R.T. and Dr. Victoria Bastecki-Perez — Date: 12/2002

Revised by: Debra Poelhuis, M.S., R.T. — Date: 11/2008

Board of Trustees Presentation — Date: 12/2008

VPAA/Provost Compliance Verification: Dr. John C. Flynn, Jr. — Date: 12/16/2008

Revised by: Debra Poelhuis, R.T., M.S. — Date: 10/26/2012

VPAA/Provost or designee Compliance Verification: Victoria L. Bastecki-Perez, Ed.D. — Date: 10/26/2012

Revised by: Cheryl L. DiLanzo, M.S., R.T. Date: 10/28/2016
VPAA/Provost or designee Compliance Verification: Date: 10/28/2016

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.