LABETTE COMMUNITY COLLEGE BRIEF SYLLABUS

SPECIAL NOTE:
This brief syllabus is not intended to be a legal contract. A full syllabus will be distributed to students at the first class session.

TEXT AND SUPPLEMENTARY MATERIALS USED IN THE COURSE (if any):

Please check with the LCC bookstore http://www.labette.edu/bookstore for the required texts for this class.

COURSE NUMBER: RADI 217
COURSE TITLE: RADIATION PROTECTION I
CREDIT HOUR: 2
DEPARTMENT: Radiography
DIVISION: Health Science
PREREQUISITE: RADI 125 Principles of Radiation Physics & Equipment Operation
REVISION DATE: 2012

COURSE DESCRIPTION:
The study of the biological effects of radiation and patient protection. Also included are radiation monitoring and occupational exposure and protection.

COURSE OUTCOMES & COMPETENCIES:
Students who successfully complete this course will without references and with 86% accuracy be able to:

1. Understand the interactions of radiation and matter, the reasons for an effective radiation safety program, and the units of exposure involved.
   • Define biological effects.
   • Define ALARA.
   • Discuss equivalent dose and biological damage.
   • Discuss the probability of photon interaction with matter.
   • Describe the 5 types of interactions between radiation and matter.
   • Define short term somatic effects.
   • Define long term somatic effects.
   • Define dose equivalent.
• Define effective dose.
• Describe the unit of exposure.
• Describe the unit of absorbed dose.
• Describe dose equivalent.
• Describe linear energy transfer.

2. Understand radiation monitoring procedures.
• List the personnel monitoring devices currently available.
• Compare the accuracy of the personnel monitoring devices.
• Describe the information found on a personnel monitoring report.
• Describe the radiation survey instruments for area monitoring.

3. Understand cell biology and explain the effects of radiation on cells.
• Discuss cell structure.
• Differentiate between mitosis and meiosis.
• Differentiate between high and low LET and their effects on cells.
• Describe relative biologic effectiveness.
• Differentiate between direct and indirect molecular effects of irradiation.
• Compare cell radiosensitivity.
• Explain the various radiation dose-response relationship curves.
• Compare somatic and genetic damage factors.
• Explain LD 50/30.
• List the genetic effects of radiation.
• Describe non-stochastic effects.
• Describe stochastic effects.

4. Understand the importance of dose limits for exposure to ionizing radiation.
• State the basis of effective dose limiting systems.
• List the organizations that are responsible for Radiation Protection Standards.
• Discuss the U.S. regulatory agencies.
• Describe a radiation safety program.
• State the objectives of radiation protection.
• Describe the current NCRP regulations regarding occupational doses.

5. Explain patient radiation protection procedures.
• Describe the beam limiting devices used in diagnostic radiology.
• Describe the effects of filtration on patient protection.
• Describe the various protective shielding devices used for patient protection.
• Discuss digital imaging and its effects on patient exposure.
• Describe fluoroscopic procedures and ways that can be used to decrease patient exposure.
• Describe the precautions taken with the pregnant patient.
• Describe the precautions take with the pediatric patient.
6. Understand the management of imaging personnel radiation dose.
   - List the methods that can be used to decrease occupational dose.
   - Describe the various protective structural shields.
   - Describe the protective measures taken during fluoroscopy to reduce exposure to the personnel.
   - Describe the protective measure taken during mobile and C-arm procedures to reduce exposure to the personnel.
   - Describe the effects of distance on personnel exposure.
   - List the radiation absorbent barrier design considerations.

7. Explain the special precautions that must be used when dealing with radioisotopes.
   - Define an isotope.
   - Discuss the radioisotopes used in radiation therapy.
   - Discuss the radioisotopes used in nuclear medicine.
   - Discuss PET and CT and radiation protection procedures.
   - Discuss radiation emergencies and the use of radiation as a terrorist weapon.
   - Review the dose-effect relation after acute whole-body radiation exposure.