This is a SouthArk Master Syllabus. The course syllabus distributed by the instructor may include additional requirements, must be followed by the student in the given term, and is considered to supersede the Master Syllabus.

Course Number
RADT 2313

Course Title
Radiation Biology

Course Description
Prerequisite: RADT 2202. Basics of radiation biology. Emphasis on genetic and somatic effects of radiation and the need for radiation protection.

College Mission
South Arkansas Community College promotes excellence in learning, teaching, and service; provides lifelong educational opportunities; and serves as a cultural, intellectual, and economic resource for the community.

College Wide Student Learner Outcomes

☒Critical Thinking ☒Responsibility ☒Communication

ACTS Course☐ **Program Course ☒**

ACTS Outcomes

Program Outcomes
1. Students will be clinically competent.
2. Students will demonstrate professionalism.
3. Students will demonstrate effective communication skills.
4. Students will use critical thinking skills.
5. The program will graduate entry-level technologists.

Course Outcomes

#	Course Outcomes	Unit Outcomes/ Competencies	Program Outcomes	Critical Thinking	Communication	Responsibility	Assessment
1	Students will apply proper technical factors. (1-3)	57, 68	1, 4	CT 5		R5	Inverse Square Law problems on exams
2	Students will adhere to attendance policy		2			R5	Document attendance

Unit Outcomes/ Competencies
1. Differentiate between ionic and covalent bonds.
2. Describe principles of cellular biology.
3. Identify sources of electromagnetic and particulate ionizing radiations.
4. Discriminate between direct and indirect ionizing radiation.
5. Discriminate between the direct and indirect effects of radiation.
6. Identify sources of radiation exposure.
7. Describe radiation-induced chemical reactions and potential biologic damage.
8. Evaluate factors influencing radiobiologic/biophysical events at the cellular and subcellular level.
9. Identify methods to measure radiation response.
10. Describe physical, chemical and biologic factors influencing radiation response of cells and tissues.
11. Explain factors influencing radiosensitivity.
12. Recognize the clinical significance of lethal dose (LD).
13. Identify specific cells from most radiosensitive to least radiosensitive.
14. Employ dose response curves to study the relationship between radiation dose levels and the degree of biologic response.

15. Examine effects of limited vs. total body exposure.
16. Relate short-term and long-term effects as a consequence of high and low radiation doses.
17. Differentiate between somatic and genetic radiation effects and discuss specific diseases or syndromes associated with them.
18. Discuss stochastic (probabilistic) and non-stochastic (deterministic) effects.
19. Discuss embryo and fetal effects of radiation exposure.
20. Discuss risk estimates for radiation-induced malignancies.
21. Discuss acute radiation syndrome.
22. Identify and justify the need to minimize unnecessary radiation exposure of humans.
23. Distinguish between somatic and genetic radiation effects.
24. Differentiate between the stochastic (probabilistic) and nonstochastic (deterministic) effects of radiation exposure.
25. Explain the objectives of a radiation protection program.
26. Define radiation and radioactivity units of measurement.
27. Identify effective dose limits (EDL) for occupational and non-occupational radiation exposure.
28. Describe the ALARA concept.
29. Identify the basis for occupational exposure limits.
30. Distinguish between perceived risk and comparable risk.
31. Describe the concept of negligible individual dose (NID).
32. Identify ionizing radiation sources from natural and man-made sources.
33. Comply with legal and ethical radiation protection responsibilities of radiation workers.
34. Describe the relationship between irradiated area and effective dose.
35. Describe the theory and operation of radiation detection devices.
36. Identify appropriate applications and limitations for each radiation detection device.
37. Describe how isoexposure curves are used for radiation protection.
38. Identify performance standards for beam-limiting devices.
39. Describe procedures used to verify performance standards for equipment and indicate potential consequences if the performance standards fail.
40. Describe the operation of various interlocking systems for equipment and indicate potential consequences of interlock system failure.
41. Identify conditions and locations evaluated in an area survey for radiation protection.
42. Distinguish between controlled and non-controlled areas and list acceptable exposure levels.
43. Describe “Radiation Area” signs and identify appropriate placement sites.
44. Describe the function of federal, state and local regulations governing radiation protection practices.
45. Describe the requirements for and responsibilities of a radiation safety officer.
46. Express the need and importance of personnel monitoring for radiation workers.
47. Describe personnel monitoring devices, including applications, advantages and limitations for each device.
48. Interpret personnel monitoring reports.
49. Compare values for individual effective dose limits for occupational radiation exposures (annual and lifetime).
50. Identify anatomical structures that are considered critical for potential late effects of whole body irradiation exposure.
51. Identify dose equivalent limits for the embryo and fetus in occupationally exposed women.
52. Distinguish between primary and secondary radiation barriers.
53. Demonstrate how the operation of various x-ray and ancillary equipment influences radiation safety and describe the potential consequences of equipment failure.
54. Perform calculations of exposure with varying time, distance and shielding.
55. Discuss the relationship between workload, energy, HVL, TVL, use factor and shielding design.
56. Identify emergency procedures to be followed during failures of x-ray equipment.
57. Demonstrate how time, distance and shielding can be manipulated to keep radiation exposures to a minimum.
58. Explain the relationship of beam-limiting devices to patient radiation protection.
59. Discuss added and inherent filtration in terms of the effect on patient dosage.
60. Explain the purpose and importance of patient shielding.
61. Identify various types of patient shielding and state the advantages and disadvantages of each type.
62. Use the appropriate method of shielding for a given radiographic procedure.
63. Explain the relationship of exposure factors to patient dosage.
64. Explain how patient position affects dose to radiosensitive organs.
65. Identify the appropriate image receptor that will result in an optimum diagnostic image with the minimum radiation exposure to the patient.
66. Select the immobilization techniques used to eliminate voluntary motion.
67. Describe the minimum source-to-tabletop distances for fixed and mobile fluoroscopic devices.
68. Apply safety factors for the patient (and others) in the room during mobile radiographic procedures.

Assessment Description(s)
Evaluated using exams similar to ARRT exams.

Materials and Technological Requirements
Workbook for Radiation Protection in Medical Radiography Edition: 7 Statkiewicz Sherer ISBN: 9780323222167 Mosby's Radiography Online Radiation Protection in Medical Radiography (Access Code) Edition: 7th ISBN: 9780323222198 Radiation Protection in Medical Radiography (P) Edition: 7TH ISBN: 9780323172202

Class Attendance Policy
Students are expected to attend all classes in which they are enrolled. If a student is absent from a class session, it is the student's responsibility to make arrangements to complete or make up any work missed. No make-up work for missed classes will be allowed without the approval of the instructor. Students who enroll late must assume all responsibility for work missed. Classes not attended as a result of late enrollment may be counted toward excessive absences. Students not attending the entire class period may be counted absent for that period. An instructor may drop students with a grade of "WE" if students have been absent for an excessive number of days. Warning letters will be sent to the students advising them of the consequences of nonattendance and urging them to contact their instructors immediately. Excessive absences are defined as follows:

Regular Semester

Courses which meet once a week	2 absences
Courses that meet twice per week	3 absences
Courses that meet four times per week	5 absences

Summer Session

Courses that meet four times per week in a five week session	3 absences
Courses which meet two evenings per week in a 10 week session	3 absences

Students enrolled in special programs or individualized instruction should contact their program director/instructor regarding specific attendance requirements for the program/course. Some of the selective-admission, health-science programs have specific criteria regarding attendance. Students are encouraged to refer to program policies in these matters.

Jury Duty/Military/Official School Function
Scheduled absences are those that occur due to college-related activities or as a result of summons to jury duty or military duty. Classes missed as a result of scheduled absences will not be counted as excessive absences if the instructor is notified and provided documentation prior to the absence(s). Make-up work for scheduled absences will be at the discretion of the instructor.

In all instances, documentation must be provided to the instructor within 24 hours of receipt. Documentation should come from an appropriate party on letterhead or other official stationery with a signature and contact information. Documentation should list the corresponding dates of the leave.

Medical leave
For medical-related absences, documentation must include written notice from the treating medical professional documenting time needed off related to medical reasons and time student may resume classes. The medical reason does not need to be listed on the documentation; the documentation must include only that there is a medical reason, the amount of time the student needs to be absent, and the time the student should be able to return to classes. Students who elect to work at home while on excused leave must meet with their instructors to make arrangements to do so. Working on coursework while on medical leave is not a requirement but can be requested by students. If students request that they be allowed to work at home while on an excused leave, the instructor will make every reasonable effort to ensure that the student is able to do so.

For students who have a medical condition necessitating time off or accommodation:

1) They may work at home on assignments if they choose to if on medical leave approved by a medical professional
2) Receive appropriate accommodations related to coursework (i.e., excused from labs with potentially harmful chemicals, have a larger desk, etc.)
3) Resume their studies where they left off once they return to classes
4) Be allowed to make up any missed work related to medical leave
5) Receive incompletes on their transcripts until coursework is completed, according to the incomplete grade contract.
6) Be given a reasonable time frame in which to complete missed coursework

Academic Honesty Policy

Students enrolled at South Arkansas Community College are expected at all times to uphold standards of integrity. Students are expected to perform honestly and to work in every way possible to eliminate academic dishonesty. Academic dishonesty includes cheating and plagiarism, which are defined as follows:

- Cheating is an attempt to deceive the instructor in his/her effort to evaluate fairly an academic exercise. Cheating includes copying another student's homework, class work, or required project (in whole or in part) and/or presenting another's work as the student's own. Cheating also includes giving, receiving, offering, and/or soliciting information on a quiz, test, or examination.

- Plagiarism is the copying of any published work such as books, magazines, audiovisual programs, electronic media, and films or copying the theme or manuscript of another student. It is plagiarism when one uses direct quotations without proper credit or when one uses the ideas of another without giving proper credit. When three or more consecutive words are borrowed, the borrowing should be recognized by the use of quotation marks and proper parenthetical and bibliographic notations.

If, upon investigation, the instructor determines that the student is guilty of cheating or plagiarism, the following penalties will apply:

- The student will receive a penalty of no less than a zero on the work in question.
- The instructor will submit a written report of the incident to the Vice President for Learning
- The Vice President for Learning will determine whether further disciplinary action will be taken.
- All decisions may be appealed for review through the college's Academic Appeals procedure.

Equal Opportunity-Affirmative Action Statement
South Arkansas Community College does not discriminate on the basis of age, race, color, creed, gender, religion, marital status, veteran's status, national origin, disability, or sexual orientation in making decisions regarding employment, student admission, or other functions, operations, or activities.

Library Services
Library Homepage: http://southark.libguides.com/homepage Library Contact: LibraryStaff@southark.edu or 870.864.7115

Procedures to Accommodate Students with Disabilities:
If you need reasonable accommodations because of a disability, please report this to the Vice President of Student Services with proper documentation. . VPSS Contact: 870.875.7262

The Early Alert System
In an effort to ensure student retention and success, South Arkansas Community College employs an Early Alert System to identify and support at-risk students as soon as possible in a given semester. The intent of Early Alert is to provide this assistance while there is still time to address behaviors or issues that have the potential of preventing students from completing their courses and degree plans. Students referred through the Early Alert System will be required to work on a corrective action plan with their student advising coach and to include attendance accountability and mandatory academic tutoring either in the academic division or in the Testing and Learning Center (TLC).

Once the Student Advising Coach has met with the referred student, and again when the student has met the prescribed corrective actions, the coach will update the Early Alert System so that the instructor is kept informed of the progress in resolving issues.

Behavioral Review Team
At South Arkansas Community College (SouthArk), we are committed to proactive leadership in student wellbeing and campus safety. By focusing on prevention and early intervention with campus situations that involve any person experiencing distress or engaging in harmful or disruptive behaviors, the BRT will serve as the coordinating hub of existing resources to develop intervention and support strategies and offer case management. Students, faculty, staff, and campus guests are encouraged to report any person on campus who is a concern. BRT Contact: 870.875.7262 BRT@southark.edu

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