



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

LAST REVIEW: 2008-2009

(i.e. 2003-2004)

NEXT REVIEW: 2013-2014

(i.e. 2008-2009)

STATUS: A

(A, I, D)

COURSE TITLE: Radiobiology

COMMON COURSE NUMBER: RAT2241

CREDIT HOURS: 2

CONTACT HOUR BREAKDOWN

(per 16 week term)

CLOCK HOURS:

(Voc. Course ONLY)

Lecture: 32

Lab:

Clinic:

Other:

PREREQUISITE(S): RAT2021

COREQUISITE(S): RAT2022

COURSE DESCRIPTION : A study of the sequence of events following the absorption of energy from ionizing radiation. Factors influencing radiation effects, tissue sensitivity, tolerance, and clinical applications are considered.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s):

Area

General Education Requirements – Associate in Science Degree (AS), meets Area(s):

Area

General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s):

Area

UNIT TITLES

1. Physical basis of radiobiology
2. The cell and malignant cell
3. Effect of ionizing radiation on cells
4. Cell survival curves
5. Response of cancer to irradiation
6. Fractionation
7. Whole body radiation syndromes
8. Altering radiation reactions with modifiers
9. Maximum permissible doses

ASSESSMENT:

Please provide a brief description (250 characters maximum) that details how students will be assessed on the course outcomes.

Assignments, comprehensive/cumulative unit exams, comprehensive/cumulative final exams

***** Complete the following only if course is seeking general education status *****



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Common Course Number: RAT2241

UNITS

Unit 1 Physical basis of radiobiology

General Outcome:

1.0 The student shall: be able to discuss the transfer of energy to tissues.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 1.1 Define linear energy transfer**
- 1.2 Discuss direct and indirect absorbed doses.**
- 1.3 Explain relative biologic effectiveness**



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UNITS

Unit 2 The cell and malignant cells

General Outcome:

- 2.0 The student shall: be able to explain the cell structure, comparing normal and malignant cells.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1 Discuss the structure of a cell.
- 2.2 Explain DNA and EA
- 2.3 Discuss mitosis
- 2.4 Discuss meiosis
- 2.5 Explain mitotic activity



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UNITS

Unit 3 Effect of ionizing radiation on cells.

General Outcome:

3.0 The student shall: be able to explain the effect of ionizing radiation on cells.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 3.1 Compare direct and indirect action of radiation**
- 3.2 Define free radicals**
- 3.3 Differentiate between reproductive, genetic and lytic cell deaths**
- 3.4 Explain mutations**
- 3.5 Discuss mitotic decay**



Common Course Number: RAT2241

UNITS

Unit 4 Cell survival curves

General Outcome:

4.0 The student shall: be able to explain a cell survival curve.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1 Explain the research of Puck and Marcus**
- 4.2 Discuss the shoulder portion of the survival curve.**
- 4.3 Define the effect of high LET radiation on survival curves.**
- 4.4 Explain mean lethal dose.**
- 4.5 Define the quasi-threshold dose**



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UNITS

Unit 5 Response of cancer to irradiation

General Outcome:

5.0 The student shall: be able to explain the different factors affecting the response of cancer to radiation.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1 Discuss radio sensitivity**
- 5.2 Explain radioresponsiveness**
- 5.3 Define radio resistance**
- 5.4 Discuss radiocurability**
- 5.5 Explain the oxygen effect including high LET radiation.**



Common Course Number: RAT2241

UNITS

Unit 6 Fractionation

General Outcome:

- 6.0 The student shall: be able to explain the biological effect of different fractionations.**

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 6.1 Explain the four “R’s”; repair, reoxygenation, redistribution and repopulation**
- 6.2 Discuss the abscopal effect.**
- 6.3 Define the therapeutic ratio**
- 6.4 Compare the use of NSD and TFD calculation methods**
- 6.5 Define REM**



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UNITS

Unit 7 Whole body radiation syndromes

General Outcome:

7.0 The student shall: be able to explain the effects of whole body irradiation.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 7.1 Define median lethal dose (LD50/30)**
- 7.2 Describe acute radiation syndromes (radiation sickness)**
- 7.3 Compare the prodromal, latent, and manifest, recovery or death stages of the acute radiation syndromes.**



Common Course Number: RAT2241

UNITS

Unit 8 Altering radiation reaction with modifiers

General Outcome:

8.0 The student shall: be able to discuss the use of physical, chemical and physiologic modifiers with radiation.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 8.1 Discuss radio protectors**
- 8.2 Explain radiosensitizers.**
- 8.3 Explain the differences between physical, chemical and physiologic modifiers.**



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UNITS

Unit 9 Maximum permissible doses

General Outcome:

- 9.0 The student shall: be able to discuss the maximum permissible doses as they relate to radiation therapy treatment.**

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 9.1 Discuss the tolerance doses of human organs as related to TD 515.**
- 9.2 Explain TD 5/5.**
- 9.3 Compare radiation reactions in relationship to volume of treatment**
- 9.4 Compare radiation reactions in relationship to length of treatment field.**