Radiation and Cancer Biology Lecture Series for Residents
University of Mississippi Department of Radiation Oncology

2023 – 2024

The purpose of this course is to increase your knowledge of the principles of molecular, cancer and radiation biology underlying the practice of radiation oncology. The syllabus will follow the content outline established by the American Board of Radiology for the following topic areas:

- the molecular biology of cancer and basic tumor biology
- the response to radiation at the molecular and cellular levels
- the radiation responses of normal and malignant tissues
- clinical radiation biology
- hereditary effects and radiation carcinogenesis
- radiation safety and protection standards

***Most of the time, the class will meet weekly on Tuesdays at 8:00-9:00am (Central time) from late August, 2023 through late April, 2024 (see schedule for exact dates). However, every 6-7 weeks, longer, 4 hour "marathon" sessions will be inserted on Mondays and Wednesdays from* 12:00-4:00pm.** This will allow the entire 40 lecture-hour course plus some problem-solving sessions to be completed within a single academic year.

Two Best Textbooks (recommended by the ABR as "primary resources"):

EJ Hall and AJ Giaccia. *Radiobiology for the Radiologist, Eighth Edition*. Wolters Kluer, Philadelphia, 2019. ISBN: 978-1496335418.

M Joiner and A van der Kogel, editors. *Basic Clinical Radiobiology, Fifth Edition*. Taylor & Francis (CRC Press), London, 2019. ISBN: 978-1444179637.

Accessing the Lectures:

Attendees can connect to the Zoom meeting as a group if your facility has "Zoom room" capability (e.g., SIP or H.323).

OR, attendees can connect to the Zoom meeting individually, which affords flexibility to access the lecture from any device or location, and is suitable for those who do not have reliable access to a Zoom room system (above) or are otherwise unable to attend a group session. *Please use your own name during the meeting so that the instructor can keep track of attendance.*

OR, if neither of the above is an option, course participants can also access recordings of the lectures that will be made available for distribution and viewing after the fact. *Note that the recordings may 1-2 weeks to be compiled and edited.*

Radiation and Cancer Biology Lecture Series for Residents
University of Mississippi Department of Radiation Oncology

2023 – 2024

The Zoom meeting number, password and direct link are indicated below. ***Please keep this information for use in accessing subsequent lectures, and do not share it with anyone outside of your department***.

Dr. Zeman's Zoom meeting number: **644 810 4981**
Passcode: **708410**
Direct invite link: **https://zoom.us/j/6448104981?pwd=ZUJyU3ZidjhVdEJqZmFBd00vZnVKdz09**

Note that the high sensitivity of room or device microphones is such that even small noises (eating, drinking, shuffling papers, etc.) can be disruptive for both the instructor and attendees. The instructor will mute all microphones upon entry into the meeting, and requests that you ***PLEASE keep them muted except when asking questions or engaging in discussion***. Whenever possible, questions should be asked audibly rather than by using the chat function. Conversely, attendees can wait until the end of the class to ask questions or else email questions to the instructor after the fact.

Occasionally, glitches do occur in Zoom, e.g., screen delays or freezes, lost connections and/or audio dropouts. Please notify the instructor if this persists for more than a minute or two, in which case it may be necessary for one or both parties to quit and restart the meeting. This can be communicated audibly, by using the chat function or, if necessary, by contacting Dr. Zeman on her cell phone: 919-967-1902.

Accessing the Course Handout Materials and Lecture Videos:

Digital handout materials and videos for course attendees can be obtained from a web-based repository at https://umississippi.rawdataservices.education/. In most cases, handouts will be made available no later than the day before the planned lecture, and videos within two weeks after the lecture.

These lecture materials, along with the lecture videos, are considered the intellectual property of the course instructor and should not be shared with ANYONE outside of your department, nor should the download links be provided to non-course attendees.

Radiation and Cancer Biology Lecture Series for Residents
University of Mississippi Department of Radiation Oncology

2023 – 2024

Lecture Topics

The topics covered in this course will be delivered in the following order, building from the physics and chemistry of radiation interactions with matter through molecular, subcellular and cellular radiation effects, normal tissue and tumor radiation effects and finally to clinical radiobiology topics.

Because many of these topics take more than one contact-hour to cover, it can be difficult to assign exact dates to particular topics. As such, a list of lecture *dates* follows this list of lecture *topics*.

Molecular and Cellular Radiation and Cancer Biology:

Topic 01. Introduction to Radiation and Cancer Biology *(1.5 contact hours)*
Topic 02. Radiation Chemistry *(1 hour)*
Topic 03. DNA Damage Response and DNA Repair *(2 hours)*
Topic 04. Genetic, Mutagenic, Cytogenetic and Epigenetic Effects *(1.5 hours)*
Topic 05. Mechanisms of Cell Death *(2 hours)*
Topic 06. Cell Survival and Tissue Dose Response Curves *(2 hours)*
Topic 07. Sublethal and Potentially Lethal Damage Recovery *(1 hour)*
Topic 08. Cell Cycle Regulation and Radiation Effects *(1.25 hours)*
Topic 09. LET, RBE and High LET Radiotherapy *(2 hours)*
Topic 10. Radiation Carcinogenesis, Risk Assessment and Safety *(2 hours)*

Clinical/Translational Radiation and Cancer Biology:

Topic 11. The Oxygen Effect and Tumor Hypoxia *(2 hours)*
Topic 12. Radiosensitizers, Radioprotectors and Bioreductive Drugs *(1.5 hours)*
Topic 13. Tumor Angiogenesis and Metastasis *(1.5 hours)*
Topic 14. Immuno-Oncology *(1.5 hours)*
Topic 15. Mechanisms of Drug Resistance *(1.5 hours)*
Topic 16. Normal and Tumor Cell Kinetics *(1.25 hours)*
Topic 17. Early and Late Effects in Normal Tissues *(1.5 hours)*
Topic 18. Normal Tissue Tolerance *(2 hours)*
Topic 19. The Four R's of Radiotherapy *(2 hours)*
Topic 20. The Linear-Quadratic Isoeffect Model *(2 hours)*

Radiation and Cancer Biology Lecture Series for Residents
University of Mississippi Department of Radiation Oncology

2023 – 2024

Lecture Dates

2023

Tuesday, August 29, 8:00-9:00am *(Central time)*
Tuesday, September 5, 8:00-9:00am
Tuesday, September 12, 8:00-9:00am
Tuesday, September 19, 8:00-9:00am
Tuesday, September 26, 8:00-9:00am
Tuesday, October 3 - NO CLASS (ASTRO week)
Tuesday, October 10, 8:00-9:00am

Monday, October 16, 12:00-4:00pm
Wednesday, October 18, 12:00-4:00pm

Tuesday, October 24, 8:00-9:00am
Tuesday, October 31, 8:00-9:00am
Tuesday, November 7, 8:00-9:00am
Tuesday, November 14, 8:00-9:00am
Tuesday, November 21 - NO CLASS (Thanksgiving week)
Tuesday, November 28, 8:00-9:00am
Tuesday, December 5, 8:00-9:00am

Monday, December 11, 12:00-4:00pm
Wednesday, December 13, 12:00-4:00pm

Tuesday, December 19 - NO CLASS (Dr. Zeman away)
Tuesday, December 26 - NO CLASS (Christmas week)

2024

Tuesday, January 2, 8:00-9:00am
Tuesday, January 9, 8:00-9:00am
Tuesday, January 16, 8:00-9:00am
Tuesday, January 23, 8:00-9:00am
Tuesday, January 30, 8:00-9:00am

Monday, February 5, 12:00-4:00pm
Wednesday, February 7, 12:00-4:00pm

Tuesday, February 13, 8:00-9:00am
Tuesday, February 20, 8:00-9:00am
Tuesday, February 28, 8:00-9:00am
Tuesday, March 5 - NO CLASS (Dr. Zeman away)

Radiation and Cancer Biology Lecture Series for Residents
University of Mississippi Department of Radiation Oncology

2023 – 2024

Tuesday, March 12, 8:00-9:00am
Tuesday, March 19, 8:00-9:00am

Monday, March 25, 12:00-4:00pm
Wednesday, March 27, 12:00-4:00pm

Tuesday, April 2, 8:00-9:00am
Tuesday, April 9 - NO CLASS (Dr. Zeman away)
Tuesday, April 16, 8:00-9:00am
Tuesday, April 23, 8:00-9:00am
Tuesday, April 30, 8:00-9:00am

Tuesday, May 7, 8:00-9:00am <*makeup date, as needed*>