

Radiation and Cancer Biology Course
Radiation Oncology Residency Program
Duke University, University of North Carolina, and North Carolina State University
2008-2009

Instructors: David G. Kirsch, M.D., Ph.D., Associate Professor, Duke University
Elaine M. Zeman, Ph.D., Associate Professor, University of North Carolina

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

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

The class will meet on Mondays and Tuesdays, 4:30 PM, from September 8, 2008 through March/April, 2009. Classes will last from 60 to 90 minutes, and will be held jointly at Duke, UNC and NC State through teleconferencing and web-based access.

Instructors for Selected Topics

- David Brizel, M.D., Professor, Duke University Medical Center, Department of Radiation Oncology
- Mark Dewhirst, D.V.M., Ph.D., Professor, Duke University Medical Center, Department of Radiation Oncology
- Kathryn Held, Ph.D., Associate Professor, Harvard University/Massachusetts General Hospital, Department of Radiation Oncology
- Henning Willers, M.D., Assistant Professor, Harvard University/Massachusetts General Hospital, Department of Radiation Oncology
- Ellen Jones, M.D., Associate Professor, Duke University Medical Center, Department of Radiation Oncology
- Simon Powell, Ph.D., Visiting Professor from Memorial Sloan Kettering Cancer Center

Textbook:

Radiobiology for the Radiologist, 6th Ed., by Hall and Giaccia
Lippincott Williams & Wilkins 2006

Other Recommended Texts:

The Basic Science of Oncology, 4th Ed., by Tannock, Hill, Bristow and Harrington
McGraw-Hill, 2005

Basic Clinical Radiobiology, 3rd Ed., by Steel
Arnold, 2002

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Contact Information:

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To meet with Dr. Kirsch, contact Ms. Hoppenworth to schedule an appointment.

To meet with Dr. Zeman, contact her directly by phone or e-mail to schedule an appointment.

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Tentative Schedule

Day	Date	Topic	Instructor
M	September 8	Overview of Cancer Biology: Hallmarks of Cancer	Kirsch
T	September 9	Molecular Oncology: Techniques and Concepts	Kirsch
M	September 15	Oncogenes and Tumor Suppressor Genes	Kirsch
T	September 16	Cell Death: Apoptosis, Mitotic Catastrophe and Senescence	Kirsch
M	September 22	No Class—ASTRO/RRS Meeting	—
T	September 23	No Class—ASTRO/RRS Meeting	—
M	September 29	Tumor Angiogenesis	Dewhirst
T	September 30	Metastasis	Dewhirst
M	October 6	Molecular Biology of the Mammalian Cell Cycle	Kirsch
T	October 7	Gene and Molecular Therapies	Kirsch
M	October 13	Radiation Chemistry	Zeman
T	October 14	DNA Repair	Powell
M	October 20	DNA Damage Signal Transduction	Kirsch
T	October 21	Test I	Kirsch/Zeman
M	October 27	Genetic, Mutagenic, Cytogenetic and Epigenetic Effects—I	Zeman
T	October 28	No Class—UNC Research Conference	—
M	November 3	Genetic, Mutagenic, Cytogenetic and Epigenetic Effects—II	Zeman
T	November 4	<i>In Vitro</i> Survival Curves	Zeman
M	November 10	<i>In Vivo</i> Survival Curves	Zeman
T	November 11	Sublethal and Potentially Lethal Damage Recovery	Held
M	November 17	RBE and LET Effects; High LET Radiotherapy	Zeman
T	November 18	Radiobiology of the Mammalian Cell Cycle	Zeman
M	November 24	No Class—Thanksgiving Break	—
T	November 25	No Class—UNC Research Conference	—
M	December 1	Transformation, Carcinogenesis and Risk Assessment—I	Zeman
T	December 2	Transformation, Carcinogenesis and Risk Assessment—II	Zeman
M	December 8	The Oxygen Effect: Chemistry and Biology	Zeman
T	December 9	Radiosensitizers, Radioprotectors and Bioreductive Drugs	Zeman
M	December 15	Test II	Kirsch/Zeman
T	December 16	No Class—UNC Research Conference	—
M	December 22	No Class (Christmas week)	—
T	December 23	No Class (Christmas week)	—
M	December 29	No Class (New Year's week)	—
T	December 30	No Class (New Year's week)	—
M	January 12	Early and Late Effects	Zeman
T	January 13	Normal and Tumor Cell Kinetics—I	Zeman
M	January 19	No Class (MLK Holiday)	—
T	January 20	Normal and Tumor Cell Kinetics—II	Zeman
M	January 26	Cytokines and Normal Tissue Injury	Vujaskovic
T	January 27	No Class—UNC Research Conference	—
M	February 2	Volume Effects and Retreatment Tolerance	Zeman
T	February 3	Dose Rate and Dose Fractionation Effects	Zeman
M	February 9	The 4-6 "R's" of Radiotherapy	Willers
T	February 10	History of Modern Dose-Time Relationships	Zeman
M	February 16	The alpha/beta Isoeffect Model—I	Zeman
T	February 17	The alpha/beta Isoeffect Model—II	Zeman
M	February 23	alpha/beta Isoeffect Model Problem Set	Zeman & Kirsch
T	February 24	No Class—UNC Research Conference	—
M	March 2	Theoretical Basis for Radiation and Chemotherapy Interactions	Brizel
T	March 3	Experimental Chemotherapy: Drug Resistance	Duke Faculty
M	March 9	No Class—Prep Time for ACR In-Training Exam	—

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Day	Date	Topic	Instructor
T	March 10	No Class—Prep Time for ACR In-Training Exam	—
M	March 16	Hyperthermia	Jones
	March 17	Photodynamic and Immuno-Therapies	Zeman
T			
M	March 23	Text III	
T	March 24	Class (<i>if needed</i>)	
M	March 30	Class (<i>if needed</i>)	
T	March 31	No Class—UNC Research Conference	—
M	April 6	Class (<i>if needed</i>)	
T	April 7	Class (<i>if needed</i>)	
M	April 13	Class (<i>if needed</i>)	
T	April 14	Class (<i>if needed</i>)	

Re-start main course again September 2010; a couple of orientation lectures for new residents in July 2009 and July 2010, plus selected other teaching activities during the off year.