ECE 5843
MEDICAL IMAGING SYSTEMS
(Fall 2018)

9:30AM-12:20PM

Wednesdays

Room 1020, Stephenson Research Technology Center

Instructor: Hong Liu, Ph.D.
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Office Hours:

Wednesday & Thursday: **1:30PM - 3:00PM**

Course Objective:

This is a graduate level course. Undergraduate senior can also take the course. The course focuses on the fundamental principles of medical image formation, image acquisition and image quality evaluation. Important medical imaging modalities, such as radiography, fluoroscopy, CT, ultrasound, MRI, nuclear medicine cameras will be introduced. Clinical applications and limitations of each imaging modality will be analyzed.

For engineering students in all disciplines, this course will provide an essential understanding of medical imaging and its applications.

Textbook:

J.T. Bushberg, J.A. Seibert, E.M. Leidholdt, Jr., J.M. Boone, *The Essential Physics of Medical Imaging*, *3rd* Edition, Lippincott Williams & Wilkins, Baltimore, 2012

Reference Book:

Albert Macovski, *Medical Imaging Systems*, Prentice Hall, New Jersey, 1983

Methods of Achieving the Goals

- Classroom lectures
- Equipment demonstrations
- Home works
- In class discussion and examinations
- **Reading, reading, reading**

Assessment Methods Used

There will be 2 in-class examinations and 1 final examination. All examinations will be close-books and close-notes.

- Two in-class examinations: 20% × 2 = 40%
- Final examination: 40%
- Homework: 20%

Policy for Homework:

Homeworks will be assigned and collected by due date. Homeworks may be discussed with others, and any published material may be used for reference in working on these problems. However, any work collected by the TA or instructor should reflect your own understanding. Reading the text is very important and required.

Late Policy for Homeworks:

- On time: full credit
- Late by one week: 50% credit
- Late by two weeks or more: 25% credit
- Waiver of late penalty is possible only if for a good reason—talk to instructor/TA.

Reasonable Accommodation Policy: Any student in this course who has a disability that may prevent the full demonstration of his or her abilities should contact the professor personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities. Please also refer to http://www.ou.edu/drc.html

Religious Holidays: It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required class work that may fall on religious holidays.

Adjustments for Pregnancy/Childbirth Related Issues: Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact me as soon as possible to discuss. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. Please see www.ou.edu/content/eoo/faqs/pregnancy-faqs.html for commonly asked questions.

Title IX Resources: For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on-call 24.7, counseling services, mutual no contact orders, scheduling adjustments and disciplinary sanctions against the perpetrator. Please contact the Sexual Misconduct Office 405-325-2215 (8-5, M-F) or OU Advocates 405-615-0013 (24.7) to learn more or to report an incident.

Academic Misconduct: The Gallogly College of Engineering takes a very dim view of students who violate OU Student Code by cheating. Academic misconduct in this class will not be tolerated. Violators will be reported to the Dean's Office and appropriate action will be taken.

Academic Integrity: Please also refer to http://integrity.ou.edu

Course and Instructor Evaluation: The Gallogly College of Engineering utilizes student ratings as one of the bases for evaluating the teaching effectiveness of each of its faculty members. The results of these ratings are important data used in the process of awarding tenure, making promotions, and giving salary increases. In addition, the faculty members use the evaluation feedback to improve their own teaching effectiveness and programs use the data to assess achievement of a set of learning outcomes. The original request for the use of these forms came from students, and it is students who eventually benefit most from their use. Please take this task seriously, evaluate courses on-line, and respond as honestly and precisely as possible, both to the machine-scored items and to the open-ended questions. We appreciate your feedback.

Website: http://eval.ou.edu

Schedule

ECE 5843, Medical Imaging Systems, Fall, 2018

Week	Date	Topic	Homework /due date	Reading (Textbook)
Week-1	08-22-18	Background; Source-considerations; Interaction with Matter	#01 / 08-29-18	Chapters 1&2&3 Chapter 6 (171~190)
Week-2	08-29-18	Image Quality MTF Exercise	#02 / 09-05-18	Chapter 4 (60~92)
Week-3	09-05-18	Projection Radiography Equipment Demonstration	#03 / 09-12-18	Chapter 7 (207~214),(230~237) Chapter 8 (238~263)
Week-4	09-12-18	Fluoroscopy Digital Fluoroscopy /DSA CR & Digital Radiography	#04 / 09-19-18	Chapter 9 Handout Chapter 7 (214~230) Chapter 8 (263~281)
Week-5	09-19-18	**Review* (9:30-10:20AM)** **Quiz-1 (10:30AM-12:20PM)**		

Week	Date	Topic	Homework /due date	Reading (Textbook)
Week-6	09-26-18	CT	#05 / 10-03-18	Chapter 10
Week-7	10-03-18	NM	#06 / 10-10-18	Chapter 15 (579~582); Chapter 17 (643~660); Chapter 18 (674~682); Chapter 19 (SPECT, PET, PET/CT)
Week-8	10-10-18	Ultrasound	#07 / 10-17-18	Chapter 14

Week	Date	Topic	Homework /due date	Reading (Textbook)
Week-9	10-17-18	**Review* (9:30-10:20AM)** **Quiz-2 (10:30AM-12:20PM)**		
Week-10	10-24-18	MRI	#08/ 10-31-18	Chapter 12
Week-11	10-31-18	Image Quality SNR, Subjective Evaluation	#09 / 11-07-18	Chapter 4 (87~94) Handout
Week-12	11-07-18	ROC Analysis	#10/ 11-14-18	Handout
Week-13	11-14-18	Summary: Clinical Applications	#11/ 11-28-18	Handout
Week-14	11-21-18	**Thanksgiving Holiday**		
Week-15	11-28-18	Advanced Topics	#12 / 12-05-18	Handout
Week-16	12-05-18	**Final Examination (9:30AM-12:00PM)**		

*Questions and answers on homework problems