

MTU BE 4775 / BE 5775 - Medical Devices - Fall 2014

Instructors:

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MWF, 12:05 – 12:55 PM, EERC Room 501

Course Outline:

This is a one semester introductory course on medical devices. Course consists of two main components:

A. Lecture Component:

- I. Part 1: Lectures 03 – 12: Introduction to various medical devices,
- II. Part 2: Lectures 13 – 23: General issues common to many medical devices, and
- III. Part 3: Lectures 24 – 32: Contemporary technologies and trends.

B. Case Studies: Students will form groups and each group will study a given case.

Note to students who are signed up to BE 5775:

BE 5775 students will be asked to prepare a term paper and give a presentation on the analysis of a medical device. The contents of the paper as well as the particular device to be analyzed will be chosen by the student but must be approved by one of the course instructors before the end of the third week (19 September 2014).

BE 4775 Grading:

Exam 1: 20 %
Exam 2: 20 %
Case Study: 15 %
Homework: 15 %
Final Exam: 30 %

BE 5775 Grading:

Exam 1: 15 %
Exam 2: 15 %
Case Study: 15 %
Homework: 15 %
Final Exam: 20 %
Term paper: 20 %

Week 01	
LECTURE 01 ON 03 SEP 2014 WED	Course Outline, Expectations, Structure
Week 02	
LECTURE 02 ON 08 SEP 2014 MON	Introduction of the five case studies
LECTURE 03 ON 10 SEP 2014 WED	Diagnostic Devices – Imaging Systems (MRI, CT)
LECTURE 04 ON 12 SEP 2014 FRI	<i>In vitro</i> diagnostics (ELISA, mass spect)
Week 03	
LECTURE 05 ON 15 SEP 2014 MON	Extracorporeal therapeutic devices (hemodialysis, drug pumps)
LECTURE 06 ON 17 SEP 2014 WED	Implantable therapeutic devices (stimulators)
LECTURE 07 ON 19 SEP 2014 FRI	Recorders and monitors (Cath lab tools)
Week 04	
LECTURE 08 ON 22 SEP 2014 MON	Surgical tools (Endoscopes, respirators)
LECTURE 09 ON 24 SEP 2014 WED	Surgical robots (daVinci)
LECTURE 10 ON 26 SEP 2014 FRI	Radiation Systems (Gamma knife)
Week 05	
LECTURE 11 ON 29 SEP 2014 MON	Dental (Ultrasound) and Ophthalmic devices
LECTURE 12 ON 01 OCT 2014 WED	<i>Review before exam # 1</i>
EXAM 1 ON 03 OCT 2014 FRI	
Week 06	
LECTURE 13 ON 06 OCT 2014 MON	Safety
LECTURE 14 ON 08 OCT 2014 WED	Device reliability
LECTURE 15 ON 10 OCT 2014 FRI	Traceability
Week 07	
LECTURE 16 ON 13 OCT 2014 MON	Data transmission (compression) and protection (coding)
LECTURE 17 ON 15 OCT 2014 WED	Preclinical testing (animal studies) - Guest lecturer: Renee Gerhart
LECTURE 18 ON 17 OCT 2014 FRI	Clinical trials (Prospective & Retrospective) - Guest lecturer: Luc Mongeon
Week 08	
LECTURE 19 ON 20 OCT 2014 MON	Quality Assurance - Guest lecturer: Matt Bergan
LECTURE 20 ON 22 OCT 2014 WED	Compliance with Standards - Guest lecturer: Dan Bloomberg
LECTURE 21 ON 24 OCT 2014 FRI	Regulatory pathways - Guest lecturer: Janice Kruse
Week 09	
LECTURE 22 ON 27 OCT 2014 MON	Post market surveillance - Guest lecturer: Martyn Smith
LECTURE 23 ON 29 OCT 2014 WED	<i>Review before exam # 2</i>
EXAM 2 ON 31 OCT 2014 FRI	
Week 10	
LECTURE 24 ON 03 NOV 2014 MON	Technologies for patient isolation (electrical and optical)
LECTURE 25 ON 05 NOV 2014 WED	Technologies for sterilization (EtO and e-beam)
LECTURE 26 ON 07 NOV 2014 FRI	Artificial organs (Bionic pancreas)
Week 11	
LECTURE 27 ON 10 NOV 2014 MON	Software design (firmware)
LECTURE 28 ON 12 NOV 2014 WED	Electronic medical records
LECTURE 29 ON 14 NOV 2014 FRI	Remote monitoring / telehealth

Week 12

LECTURE 30 ON 17 NOV 2014 MON Current trends: Cost pressures
LECTURE 31 ON 19 NOV 2014 WED Current trends: Intellectual property
LECTURE 32 ON 20 NOV 2014 FRI Current trends: Affordable care act

Thanksgiving Recess

Week 13

01 DEC 2014 MON Graduate Student Presentation of Medical Device # 1
03 DEC 2014 WED Graduate Student Presentation of Medical Device # 2
05 DEC 2014 FRI Graduate Student Presentation of Medical Device # 3

Week 14

08 DEC 2014 MON Graduate Student Presentation of Medical Device # 4
10 DEC 2014 WED Graduate Student Presentation of Medical Device # 5
12 DEC 2014 FRI *Review before the final exam*

Final Exam (Comprehensive)