

IMPORTANT: This syllabus form should be submitted to OAA (gsbs_academic_affairs@uth.tmc.edu) a week before the start of each semester.

NOTE to STUDENTS: If you need any accommodations related to attending/enrolling in this course, please contact one of the Graduate School's 504 Coordinators, Cheryl Spitzengerger or Natalie Sirisaengtaksin. We ask that you notify GSBS in advance (preferably at least 3 days before the start of the semester) so we can make appropriate arrangements.

<p>Term and Year Fall 2021</p> <p>Course Number and Course Title: GS02 1202: Electronics for Medical Physics</p> <p>Credit Hours: 2</p> <p>Meeting Location: MD Anderson Cancer Center</p> <p>Building/Room#: Virtual</p> <p>WebEx/Zoom Link: by invitation</p>	<p>Program Required Course: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Approval Code: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>(If yes, the Course Director or the Course Designee will provide the approval code.)</p> <p>Audit Permitted: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Classes Begin: August 31, 2021</p> <p>Classes End: December 7, 2021</p> <p>Final Exam Week: December 13-17, 2021</p>
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Class Meeting Schedule

Day	Time
Tuesdays	9:00AM - 10:00AM
Thursdays	9:00AM - 10:00AM

<p>Course Director</p> <p>Name and Degree: Xinming Liu, Ph.D.</p> <p>Title: Professor</p> <p>Department: Imaging Physics</p> <p>Institution: <input type="checkbox"/> UTH <input checked="" type="checkbox"/> MDACC</p> <p>Email Address: xliu@mdanderson.org</p> <p>Contact Number: (713)745-2834</p> <p>Course Co-Director/s: (if any)</p> <p>Name and Degree:</p> <p>Title:</p> <p>Department:</p> <p>Institution: <input type="checkbox"/> UTH <input type="checkbox"/> MDACC</p> <p>Email Address:</p> <p>Contact Number:</p> <p>NOTE: Office hours are available by request. Please email me to arrange a time to meet.</p>	<p>Instructor/s (Use additional page as needed)</p> <ol style="list-style-type: none"> 1. Jim Bankson, Ph.D. Name and Degree Institution: MDACC Email Address : jbankson@mdanderson.org 2. Richard Bouchard, Ph.D. Name and Degree Institution: MDACC Email Address : RRBouchard@mdanderson.org 3. Xinming Liu, Ph.D. Name and Degree Institution: MDACC Email Address xliu@mdanderson.org 4. Ramesh Tailor, Ph.D. Name and Degree Institution: MDACC Email Address: rtailor@mdanderson.org
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<p>Teaching Assistant: (if any)</p> <p>Name and Email Address</p> <p>Name and Email Address</p>	<p>Cont. Instructor/s</p> <p>5.</p> <p>Name and Degree</p> <p>Institution:</p> <p>Email Address</p>
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Course description: GS02-1202 Electronics for Medical Physicists covers the topics in electric elements, DC & AC circuits, basis of semiconductor components and working principle, integrated circuits, basic analog electronics and digital logic and their applications for non-EE majors.

Textbook/Supplemental Reading Materials (if any)

- Textbook: Electrical Engineering Principles & Applications, Allan Hambley, Prentice-Hall
- Supplemental Reading Materials: The Art of Electronics, Paul Horowitz and Winfield Hill, Cambridge
- Supplemental Reading Materials: Basic Electronics for Scientists, James Brophy, McGraw-Hill
- Supplemental Reading Material: The Essential Physics of Medical Imaging (Bushberg) Chapter 12: Ultrasound

Course Objective/s:

Upon successful completion of this course, students will

learn DC/AC components, DC/AC circuits, analysis and applications; types of semiconductor components and working principles; analog and digital circuits and applications. Students will also learn how to build basic electronic circuits and the operation of testing equipment.

Specific Learning Objectives:

1. Understand DC component, voltage, current, and power; Kirchoff's law; node analysis; mesh analysis.
2. Understand AC components, complex impedance, and frequency response; AC voltage, current, and power analysis.
3. Understand types of semiconductor components and working principles – diode, transistor, integrated circuit; op-amps circuits and applications.
4. Understand Boolean logic, logical operators, coding schemes; digital combinational circuits; digital sequential circuits.
5. Applications in medical physics; computer-based instrumentation systems.

Grading System: Letter Grade (A-F) Pass/Fail

Student Assessment and Grading Criteria : (May include the following:)

Homework (15 %)	Description
Quiz (10 %)	Description
Presentation (%)	Description
Midterm Exams (30 %)	Description Consists of two midterm exams, Exam 1 and Exam 2, 15% each
Final Exam (25 %)	Description
Workshop or Breakout-Session (20 %)	Description Consists of 3 labs, in-person and/or virtual
Participation and/or Attendance (%)	Description

CLASS SCHEDULE

Day/Date	Duration (Hr)	Lecture Topic	Lecturer/s
8/31	1	DC voltage, current, and power; resistors; Kirchoff's law	Dr. Bankson
9/2, 7, 9	3	DC Circuit and Analysis	Dr. Bankson
9/14, 16	1	Reactive Elements	Dr. Bankson
9/21, 23, 28	3	AC Circuits and Analysis & Applications	Dr. Bankson
9/30	2	Lab 1: Lab Equipment & Safety; Resonance	Dr. Bankson
10/5	1	Transformers	Dr. Bankson
10/7	2	Exam 1: DC/AC Circuits and Analysis	Dr. Bankson

10/12, 14	2	Introduction to Diodes and Diode Circuits	Dr. Liu
10/19, 21	2	Amplifiers & Op-Amps and applications	Dr. Liu
10/26	2	Lab 2: Rectification, Operational Amplifiers	Dr. Liu
10/28, 11/2	2	Transistors	Dr. Liu
11/4, 9	2	Introduction to Digital Electronics	Dr. Liu
11/11	2	Exam 2: Diodes & Rectification, Amplifiers, and Transis	Dr. Liu
11/16, 18, 23	3	Analog & Digital Signals; transducers; noise; RF basics	Dr. Liu
11/30	2	Lab 3: RF Properties of Nuclear Imaging Systems	Dr. Taylor

NOTE: Provide other class information as needed.

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12/2	1	Applications: Electronics of Ultrasound	Dr. Bouchard
12/7	1	Applications: Electronics of MRI	Dr. Bankson
12/9		No class	
12/14	1	Course Review	Drs. Bankson & Liu
12/16	2	FINAL EXAM: 9:00 – 11:00AM	Dr. Liu

GRADES DUE DATE: December 21, 2021