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 accommodation related to attending/enrolling in this course, please contact the Graduate School's 504 Coordinator Natalie Sirisaengtaksin, PhD. 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.

Term and Year: **Fall 2026** Course Number and Course Title: **GS02 1202: Electronics for Medical Physicists** **Credit Hours: 2** **Prerequisites:** Undergraduate electronics course covering basics of analog and digital circuits, or Consent of instructor Meeting Location: **MD Anderson Cancer Center** Building/Room#: **FCT14.5059**	**Program Required Course: Yes** **Approval Code: Yes** **(If yes,** the Course Director or the Course Designee will provide the approval code.) **Audit Permitted: Yes** Classes Begin: **August 31, 2026** Classes End: **December 11, 2026** Final Exam Week: **December 14-18, 2026**

Class Meeting Schedule

Day	Time
Tuesdays **Thursdays**	**9:30AM – 10:30AM** **1:00PM – 2:00 PM**

Course Director Name and Degree: **Xinming Liu, PhD** Title: **Professor** Department: **Imaging Physics** Institution*:* **MDACC** Email Address: XLiu@mdanderson.org Contact Number: (713)745-2834 **NOTE:** Office hours are available by request. Please email me to arrange a time to meet. **Teaching Assistant**: **N/A** Name and Email Address	**Instructors** 1. **Jim Bankson, PhD** Institution: MDACC Email Address: JBankson@mdanderson.org 2. **Richard Bouchard, PhD** Institution: MDACC Email Address: RRBouchard@mdanderson.org 3. **Xinming Liu, PhD** Institution: MDACC Email Address: XLiu@mdanderson.org 4. **Ramesh Tailor, PhD** Institution: MDACC Email Address: RTailor@mdanderson.org

	5. **George Zhao, PhD** Institution: MDACC Email Address: ZZhao@mdanderson.org

Course Description:

This 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

- 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.

Student responsibilities and expectations:

Students are expected to complete all assigned reading material (lecture materials from prior years, reviews and related research literature assigned by instructors) prior to class. While you may work and discuss all

course materials and assignments in groups, all writing assignments must be your own. Whenever relevant, specific guidelines will be provided on whether using AI-generated content is permitted. Plagiarism and failure to properly cite scientific literature and other sources will not be tolerated and are grounds for dismissal from the course and further GSBS disciplinary action. Cheating or engaging in unethical behavior during examinations will be grounds for dismissal from the course without credit and further GSBS disciplinary action.

Grading System: **Letter Grade (A-F)**

Student Assessment and Grading Criteria:

Percentage	Description
Homework (15 %)	
Quiz (10%)	In-classroom
Midterm Exams (30%)	Consists of two midterms exams 15% each
Final Exam (25%)	
Workshop or Breakout-Session (20%)	Consists of three hands-on lab sessions, 2 hours each

CLASS SCHEDULE

Date	Duration (Hour(s) taught by lecturer)	Lecture Topic	Lecturer/s
9/1	1	DC voltage, current, and power; resistors; Kirchoff's law	Dr. Liu
9/3, 9/8, 9/10	3	DC Circuit and Analysis	Dr. Liu
9/15, 9/17	2	Reactive Elements	Dr. Liu
9/22, 9/24, 9/29	3	AC Circuits, Analysis & Applications	Dr. Liu
10/1	2	Lab 1: Lab Equipment & Safety; Resonance: 2-3 groups	Dr. Liu
10/6	1	Transformers	Dr. Liu
10/8	2	Exam 1: DC/AC Circuits and Analysis	Dr. Liu
10/13, 10/15	2	Introduction to Diodes and Diode Circuits	Dr. Liu
10/20, 10/22	2	Amplifiers & Op-Amps and Applications	Dr. Liu
10/27	2	Lab 2: Rectification, Op-Amplifiers (2-3 groups)	Dr. Liu
10/29, 11/3	2	Transistors	Dr. Liu

11/5, 11/10	**2**	**Introduction to Digital Electronics**	**Dr. Liu**
11/12	**2**	**Exam 2: Diodes, Rectification, Amps & Transformers**	**Dr. Liu**
11/17, 1/19, 11/24	**3**	**Analog/Digital signals; Transducers/Noise, RF basics**	**Dr. Liu**
12/1	**2**	**Lab 3: RF Properties of Nuclear Imaging Systems**	**Dr. Tailor & Dr. Zhao**
12/3	**1**	**Applications: Electronics of Ultrasound**	**Dr. Bouchard**
12/8	**1**	**Applications: Electronics of MRI**	**Dr. Bankson**
12/10	**1**	**Course review**	**Dr. Liu**
12/17	**2**	**FINAL EXAM: 9:00AM – 11:00AM**	**Dr. Liu**
Total contact hours	**36**	*** * ***	

XL/jal-07.17.26