



Stony Brook University

Electrical & Computer Engineering Department

Online Syllabus for EEO 323

Last updated October 21, 2020

Important Note: Every effort will be made to avoid changing the course schedule, but the possibility exists that unforeseen events will make syllabus changes necessary. It is your responsibility to check Blackboard for corrections or updates to the syllabus. Any changes will be clearly noted in course announcements or through Stony Brook email.

Part 1: Course Information

Course title: Electromagnetics

Course catalog # and section: EEO 323

Credit hours: 3

Semester: Spring 2021

Prerequisites: Calculus III, Physics I & II, Circuits

Instructor name: Jayant P. Parekh

Instructor's Stony Brook email, phone number, and time zone:

jayant.parekh@stonybrook.edu/631 632-8399/ Time zone: Eastern Time zone

Office hours: Tu & Th., 10:30 AM to 12:30 PM

A link for visiting the instructor during his pre-announced office hours will be placed on the Blackboard and sent to all the students by email at the beginning of the semester.

Course Description: Fundamentals of electromagnetic fields, Maxwell's Equations, plane waves, reflections. Application to transmission lines, propagation, electromagnetic sensors and transducers. Prerequisites: Courses in circuits, signals, and vector calculus.

Recommended Course Textbook:

“Fundamentals of Applied Electromagnetics (7th Edition)”, F. Ulaby and U. Ravaioli, Pearson 2015. ISBN(10): 0133356817. ISBN(13): 9780133356816

This book is recommended but not required. Extensive class notes including detailed lessons and sample problems with solutions will be provided by the instructor. NOTE: The course is based on the material supplied by the instructor, and the recommended textbook is intended to be used for supplemental reading.

Recommended Readings/Bibliography:

Viewing of Youtube videos on relevant topics is recommended.

Course Delivery Mode and Structure:

This is an asynchronous online course, delivered in the Blackboard learning management system (LMS). Students must be mindful of all course expectations, deliverables and due dates, especially because the online mode of course delivery requires significant time management. All assignments and course interactions will utilize internet technologies. See “Technical Requirements” section for more information. In Blackboard, you will access online lessons, course materials, homeworks and resources. One learning module or more likely a part of it will be covered each week. Recorded Zoom videos will be delivered to the students at least once a week. Students will be required to upload their solution to weekly assigned homeworks on to Blackboard within strict **Eastern Standard Time midnight deadlines** on assigned dates. Students are strongly encouraged to attend virtual Zoom meetings with the instructor during his office hours. Note: some variations may occur.

How We Will Communicate:

Course-related questions should be posted in the General Questions Forum in the course Discussion board. For personal/private issues, email the instructor directly. If you use Blackboard’s **email tool** from the course site, it will automatically include your full name, course name and section when you send me an email. **Please allow between 24-48 hours for an email reply.** Your Stony Brook University email must be used for all University-related communications. You must have an active Stony Brook University email account and access to the Internet. All instructor correspondence will be sent to your SBU email account. **Plan on checking your SBU email account regularly for course-related messages.** To log in to Stony Brook Google Mail, go to <http://www.stonybrook.edu/mycloud> and sign in with your NetID and password.

Regular announcements will be sent from Blackboard. These will be posted in the course site and may or may not be sent by email.

Regular communication is essential in online classes. Logging in once a day, checking the discussion board and participating with your peers ensures that you are able to remain an active member of the class and earn full points for participation.

Technical Requirements:

This course uses Blackboard for the facilitation of communications between faculty and students, submission of assignments, and posting of grades and feedback. The Blackboard course site can be accessed at <https://classroom.suny.edu/>

You are responsible for having a reliable computer and Internet connection throughout the term. **Caution!** You will be at a disadvantage if you attempt to complete all coursework on a

smartphone or tablet. It may not be possible to submit the files required for your homework assignments.

Students should be able to use email, a word processor, spreadsheet program, and presentation software to complete this course successfully.

The following list details a minimum recommended computer set-up and the software packages you will need to have access to, and be able to use:

- PC with Windows 10 or higher (we recommend a 3-year Warranty)
- Macintosh with OS 10.11 or higher (we recommend a 3-year Warranty)
- Intel Core i5 or higher
- 250 GB Hard Drive
- 8 GB RAM
- Latest version of Chrome or Firefox; Mac users may use Chrome or Firefox. (A complete list of supported browsers and operating systems can be found on the My Institution page when you log in to Blackboard.)
- High speed internet connection
- Word processing software (Microsoft Word, Google Docs, etc.)
- Headphones/earbuds and a microphone
- Webcam (recommended)
- Printer (optional)
- Ability to download and install free software applications and plug-ins (note: you must have administrator access to install applications and plug-ins).

Technical Assistance:

If you need technical assistance at any time during the course or to report a problem with Blackboard you can contact the [SUNY Online Help Desk](#)

Part 2: Course Learning Objectives and Assessments

Upon completion of the course, students will have learnt

- about the extensive applications of microwaves that exist in all walks of life which make microwaves the mother of all technologies;
- properties of uniform plane electromagnetic waves (UPEMWs) in bounded and unbounded media;
- transmission lines including Smith Chart, impedance matching, theoretical and Smith Chart solution of transmission line circuit problems;
- Maxwell Equations and their use in solving diverse EM wave propagation problems, including scattering of UPEMWs incident normally as well as obliquely at one or more planar boundaries, perpendicular and parallel polarization configurations, Brewster angle and critical angle phenomena;
- Waveguides, TE and TM modes, cut-off frequencies, resonators.

ABET Student Learning Outcomes

Student Outcomes	% contribution
1 an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	100%
3 an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	
3 an ability to communicate effectively with a range of audiences.	
4 an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	
5 an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	
6 an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.	
7 an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	

How to Succeed in this Course:

- Complete all reading assignments including extensive instructor-prepared lessons, sample problem sets, and recorded videos provided to the students
- Submit your homework solutions within strict submission deadlines
- Ask questions of the instructor in the General Questions Forum in the course Discussion board, at virtual meetings with the instructor at his office hours, and by email. For complex problems which are not easily covered in emails, the student is recommended to visit the instructor at his office hours.
- Study in a timely manner

Part 3: Course Schedule

MODULE	MODULE TOPICS	DATES	HW DUE
1. Important Applications of Microwaves	Introduction to EM waves and microwave technology; illustrating the important applications of microwaves in everyday life and explaining why the microwave technology is the mother of all technologies; applications include am & fm radio, microwave ovens, RFID, radars, wify, Bluetooth, hotspot, IoT	Feb. 1 to Feb. 7	None for Module 1
2. Generic uniform plane waves	Different types of waves including circular water wave on a pond, audible sound wave propagating in wave, waves on a string, acoustic waves in a solid (shear and longitudinal waves, surface acoustic waves), electromagnetic (EM) waves Theory and properties of uniform plane waves (UPWs), amplitude, frequency, wavelength, wavenumber theory and physical meaning of phase and group velocities, Dispersive and non-dispersive waves, standing waves	Feb. 8 to Feb. 21	HW1 due Feb. 18
3. Uniform plane electromagnetic waves (UPEMWs)	Properties of UPEMWs including Poynting vector and propagation in an arbitrary direction, right-handed mutual orthogonality between the directions of the electric field, magnetic field, and direction of propagation, phasors, wave equation	Feb. 22 to Mar 7	HW2 due Feb. 25, HW3 due Mar 4, HW4 due Mar 11
4. Transmission lines	TL as a distributed circuit, TL equations derived by representing an infinitesimal length of a TL in terms of lumped-parameter circuit elements, voltage reflection coefficient Γ , complex Γ plane, Smith Chart, VSWR, impedance transformation, Smith Chart applications, impedance matching using a quarter-wave transformer and a single stub tuner	Mar 8 to Apr 4	HW5 due Mar 18, HW6 & 7 due Mar 25, HW8 & 9 due Apr 1, HW10 due Apr 8
5. Maxwell Equations	Maxwell Equations, wave equation, proof of right-handed orthogonality of the unit vectors \mathbf{i}_E , \mathbf{i}_H and \mathbf{i}_k , UPEMW propagation in a conductive medium, skin effect	Apr 5 to Apr 11	HW 11 due Apr 15
6. UPEMW scattering at the interface plane between two dielectric media	Boundary conditions, scattering of UPEMWs incident normally as well as obliquely at the interface plane between two dielectric media, perpendicular and parallel polarization configurations, Brewster angle, electric field and power reflection and transmission coefficients, equivalent transmission line circuit for finding reflection and transmission coefficients	Apr 12 to April 25	HW 12 due Apr 22
7. Waveguides	EM wave propagation in a rectangular waveguide, TE and TM modes, cut-off frequency, dominant mode, power flow, microwave cavities	April 25 to May 6	HW 13 due Apr 29 HW 14 due May 6

Part 4: Grading, Attendance, and Late Work Policies

Assessment and Grading: At least one homework will be assigned every week. The other grading items are two Term Exams and the Final Exam.

The students will be provided with learning material every week in the form of extensive instructor-prepared lessons and sample problem sets with solved problems, and also a recorded video.

Viewing Grades on Blackboard: Points and feedback for graded activities will be posted to the My Grades tab in the Tools area of Blackboard. The grading of homeworks and exams should be done approximately within one to two weeks from the time of submission.

Grading:

Homeworks:	25%
Term Exam 1	25%
Term Exam 2	25%
Final Exam	25%

Letter Grades:

Final grades assigned for this course will be based on the percentage of total points earned and are assigned as follows:

Letter Grade	Points or Percentage
A	>90%
A-	85 - 90%
B+	75 -84%
B	65 - 74%
B-	55 - 64%
C+	50 - 54%
C	45 - 49%
C-	40 - 44%
D	35 - 40%
F	<35%

Homework Submission Policy: Homeworks are assigned every week, and students are required to upload their solutions on to Blackboard within specified strict deadlines. You will not be able

to submit your solution on to Blackboard beyond the assigned strict deadline. If you fail to submit your homework solution on the Blackboard before the assigned deadline, you may still submit it to the instructor by email provided this submission is before the release of the solution to the homework by the instructor and also there will be a late submission penalty of 30% of the maximum available grade.

No makeup Exams or Homeworks:

There will be no “make-up” exams or homeworks except under absolutely extenuating or exceptional circumstances.

Part 5: University and Course Policies**University Policies:****Student Accessibility Support Center Statement:**

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, 128 ECC Building, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: <https://ehs.stonybrook.edu/programs/fire-safety/emergency-evacuation/evacuation-guide-people-physical-disabilities> and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Important Note: Any form of academic dishonesty, including cheating and plagiarism, will be reported to the Academic Judiciary.

Critical Incident Management:

Stony Brook University expects students to respect the rights, privileges, and property of other

people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Course Policies:**Understand When You May Drop This Course:**

It is the student's responsibility to understand when they need to consider withdrawing from a course. Refer to the Stony Brook Academic Schedule for dates and deadlines for registration: http://www.stonybrook.edu/commcms/registrar/calendars/academic_calendars.

- [Undergraduate Course Load and Course Withdrawal Policy](#)
- [Graduate Course Changes Policy](#)

Incomplete Policy:

Under emergency/special circumstances, students may petition for an incomplete grade. Circumstances must be documented and significant enough to merit an incomplete. If you need to request an incomplete for this course, contact me for approval as far in advance as possible.

Course Materials and Copyright Statement:

Course material accessed from Blackboard, SB Connect, SB Capture or a Stony Brook Course website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder is a violation of the Federal copyright law, as well as a violation of Stony Brook's Academic Integrity.

Online Communication Guidelines and Learning Resources:

Maintain professional conduct both in the classroom and online. The classroom is a professional environment where academic debate and learning take place. I will make every effort to make this environment safe for you to share your opinions, ideas, and beliefs. In return, you are expected to respect the opinions, ideas, and beliefs of other students—both in the face-to-face classroom and online communication. Students have the right and privilege to learn in the class, free from harassment and disruption. The course follows the standards set in the Student Code of Conduct, and students are subject to disciplinary action for violation of that code. If your behavior does not follow the course etiquette standards stated below, the grade you receive for a posting may suffer. I reserve the right to remove any discussion messages that display inappropriate language or content.

Online Etiquette:

- Offensive language or rudeness will not be tolerated. Discuss ideas, not the person.
- Avoid cluttering your messages with excessive emphasis (stars, arrows, exclamations).
- If you are responding to a message, include the relevant part of the original message in your reply, or refer to the original post to avoid confusion;
- Be specific and clear, especially when asking questions.
- Use standard punctuation and capitalization. Using all UPPERCASE characters gives the appearance of shouting and makes the message less legible;
- Remember that not all readers have English as their native language, so make allowances for possible misunderstandings and unintended discourtesies.

Online Classes Require Better Communication:

It is important to remember that we will not have the non-verbal cues that occur in a face-to-face classroom. I cannot see the confused, frustrated, or unhappy expressions on your face if you encounter problems. You MUST communicate with me so that I can help. To make the experience go smoothly, remember that you're responsible for initiating more contact, and being direct, persistent, and vocal when you don't understand something.

My Role as the Instructor:

As the instructor, I will serve as a "guide" in our online classroom. While I will not respond to every post, I will read what is posted, and reply when necessary. Expect instructor posts in the following situations:

- To assist each of you when it comes to making connections between discussion, lectures, and textbook material.
- To fill in important things that may have been missed.
- To re-direct discussion when it gets "out of hand."
- To point out key points or to identify valuable posts.

Part 6: Student Resources

Academic and Major Advising (*undergraduate only*): Have questions about choosing the right course? Contact an advisor today. Phone and emails vary-please see website for additional contact information; website: <https://www.stonybrook.edu/for-students/academic-advising/>

Academic Success and Tutoring Center (*undergraduate only*):
<https://www.stonybrook.edu/tutoring/>

Amazon @ Stony Brook: Order your books before classes begin. Phone: 631-632-9828; email: Bookstore_Liaison@stonybrook.edu; website: <http://www.stonybrook.edu/bookstore/>

Bursar: For help with billing and payment. Phone: 631-632-9316; email: bursar@stonybrook.edu; website: <http://www.stonybrook.edu/bursar/>

Career Center: The Career Center's mission is to support the academic mission of Stony Brook University by educating students about the career decision-making process, helping them plan and attain their career goals, and assisting with their smooth transition to the workplace or further education. Phone: 631-632-6810; email: sbucareercenter@stonybrook.edu; website: <http://www.stonybrook.edu/career-center/>

Counseling and Psychological Services: CAPS staff are available by phone, day or night. <http://studentaffairs.stonybrook.edu/caps/>

Ombuds Office: The Stony Brook University Ombuds Office provides an alternative channel for confidential, impartial, independent and informal dispute resolution services for the entire University community. We provide a safe place to voice your concerns and explore options for productive conflict management and resolution. The Ombuds Office is a source of confidential advice and information about University policies and procedures and helps individuals and groups address university-related conflicts and concerns. <http://www.stonybrook.edu/ombuds/>

Registrar: Having a registration issue? Let them know. Phone: 631-632-6175; email: registrar_office@stonybrook.edu; <http://www.stonybrook.edu/registrar/>

SBU Libraries: access to and help in using databases, ebooks, and other sources for your research.

- Research Guides and Tutorials: <http://guides.library.stonybrook.edu/>
- Getting Help: <https://library.stonybrook.edu/research/ask-a-librarian/>

Student Accessibility Support Center: Students in need of special accommodations should contact SASC. Phone: 631-632-6748; email: sasc@stonybrook.edu; <https://www.stonybrook.edu/sasc/>

Support for Online Learning: <https://www.stonybrook.edu/online/>

Writing Center: Students are able to schedule face-to-face and online appointments. <https://www.stonybrook.edu/writingcenter/>