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: Computer Communications

Course catalog # and section: ESE 346

Credit hours: 3

Semester: Fall 2023

Prerequisites: ESE 306

Instructor name: Thomas Robertazzi

Instructor's Stony Brook email, phone number, and time zone:
Thomas.Robertazzi@stonybrook.edu **, home: 631-281-9331, Any day before 8pm EDT/EST (Phone does not have texting)**

Office hours: Any day including weekend before 8 PM call me at 631 281 9331.

TA Information:

Course Description: Basic theory and technology of computer communications. Introduction to performance evaluation, error codes and routing algorithms. Other topics include machine learning, queueing theory, network planning, Ethernet, wireless networks including LTE and 5G, fiber optic networking, software defined networking, networking on chips, space networks, data centers, grids and clouds, and network security.

Required Course Textbook and Materials:

Note – Prof. Robertazzi has written a number of books with somewhat similar sounding titles, please get the two specified below.

(A) (required) Networking and Computation: Technology, Modeling and Performance, 2nd ed. by Thomas Robertazzi and Li Shi, 2020. Publisher: Springer (www.springer.com). (Abbreviated: NC) ISBN 978-3-030-36703-9.

(B) (recommended) Introduction to Computer Networking, 2017, 1st ed by Thomas Robertazzi, 2017. Publisher: Springer (www.springer.com). (Abbreviated: ICN) ISBN 978-3-319-53102-1.

[C] (optional) Planning Telecommunication Networks, 1ˢᵗ ed by Thomas Robertazzi, 1999.

   Publisher: IEEE Press/Wiley, (Abbreviated PTN) ISBN 9780780-347021.

Course Delivery Mode and Structure:
This is an *online course, delivered in the Brightspace learning management system (LMS).* Students must be mindful of all course expectations, deliverables and due dates, especially because the online portion of the course requires significant time management. All assignments and course interactions will utilize internet technologies

How We Will Communicate:
For course related questions and personal/private issues, email or call me directly any day before 8 PM (631-281-9331). **Please allow between 24 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 Brightspace. 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.

Part 2: Course Learning Objectives and Assessments

Upon completion of the course, students will have:

- An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgement to draw conclusions.
- An ability to acquire and apply new knowledge as needed using appropriate learning strategies.

How to Succeed in this Course:

- Complete all assigned readings in the course
- For the probability, routing, error code and queueing problems, do as many problems for practice as you can, only looking at the solutions when you finish the problem. Problems can be found on the old exams on Brightspace and in the chapter text and end of chapter problems. Worked out probability problems can also be found in chapter 2 of the Networking and Computation book. For the qualitative material, read the first half of the chapter on machine learning in the Networking and Computation text and the chapters in the Introduction to Computer Networking book.
- How much time should students devote to an online course? Time on task information, see NY State Education Department: http://www.nysed.gov/college-university-evaluation/distance-education-program-policies

Part 3: Course Schedule					
Dates/Week	Module	Learning Objectives	Topic	Videos/Readings	Assessment
Week 1 8/28/21	Module 1	-Students will be able to apply probability theory to networking problems. -Students will be able to solve fundamental networking probability problems.	Probability Review and Performance Evaluation	Reading: -NC: CH 2.1-2.4 Video: -Probability	HWK 1 **Due 9/5/22**
Week 2 9/4 Labor Day					HWK 2 **Due 9/10**
Week 3 9/11	Modules 2 & 3	- Students will be able to solve basic Hamming and CRC coding and line code and networking coding problems. - Students can complete Dijkstra and Ford Fulkerson shortest path routing problems.	Algorithms: Error Codes, Line Codes, Network Coding, Routing	Reading: -NC: CH 4.1, 4.2, 4.4, 4.5, 4.6, 4.7 Video: Error codes	HWK 3 **Due 9/17**
Week 4 9/18				Video: Routing	HWK 4 **Due 9/24**
Week 5 9/25	Module 4	- Students can solve basic queueing theory problems including mean value analysis, negative customer models and stochastic Petri networks.	Queueing Theory	Reading: -NC: CH 3.1-3.3, 3.5-3.7, 3.8	Project 1 **Due 10/1**
Week 6 10/2				Video: Queueing Theory	
Week 7 10/9	Module 5	- Students will describe how machine learning works and the basic types of machine learning	Machine Learning for Networking	Reading: -NC: CH 7.1-7.2.6	Exam 1 during class time **On 10/9**
Week 8 10/16				Video: Machine Learning for Networking	Portfolio 1 On queueing. **Due 10/15**
Week 9	Module 6			Reading:	Paper

		- Students will be able to explain current technology and issues	-IEEE Local Area and Wireless Network Standards (Ethernet, Wifi 802.11, Bluetooth 802.15, cellular LTE) -Infiniband, MPLS and Fiber Optic Networking (including SONET and WDM) - Software Defined Networks. Networks on Chips -Space Networking -Grids, Clouds and Data Centers - AES and Quantum Cryptography	Introduction to Computer Networking, read appropriate chapter as each is covered in videos. Videos: Introduction to Networking Misc Notes: Online teaching notes pdf files folder	Summary 1 **Due 10/29**
10/23					
Week 10					Paper Summary 2 **Due 11/5**
10/30					
Week 11					Project 2 **Due 11/12**
11/6					
Week 12					Portfolio 2 **Machine Learning 11/19**
11/13					
Week 13					Paper Summary 3 **Due 11/26**
11/20					
Week 14					
11/27					
Week 14 and 15 12/4	Module 7	-Students will be able to describe and create linear programming models for network planning problems -Students will be able to describe and use dynamic programming, terminal assignment models and concentrator models for networking planning problems	Network Planning	Videos and Planning Telecommunications Networks book (Reading: 2.1-2.6, 3.1-3.3)	(Qualitative) Exam 2 on whole Course during Class Time **On 12/4/22**

Part 4: Grading, Attendance, and Late Work Policies

Assessment and Grading:

Viewing Grades on Blackboard: Points and feedback for graded activities will be posted to the My Grades tab in the Tools area of Blackboard. *Assignments are graded within 72 hours and will be posted to Blackboard.*

In this course, you will be assessed on the following:

Activity/Assignment	Points	
Exam 1 &2, Two Portfolios (at 12 points each)	48	
Home works	16	
Projects (two at 10 points each)	20	
Paper Summaries (three at 5 points each)	15	
Total	99	

All completed assignments are uploaded to Brightspace.

Home works: There are four home works early in the course. They are the subject of Exam 1.

Essays: For some topic in the Introduction to Computer Networking text you will write a 500 words executive summary on *some paper on the topic published in 2023* that you find interesting. You will write an executive summary style paper**.** Relevant papers can be found on IEEE/IET and Science Direct databases on the library website. Look also on Google Scholar. Last page of your summary should be the first page of the paper with title, date and abstract – do not include the entire paper

Project: One person projects of moderate complexity. Students may consult with each other but must do the projects on their own. Codes of 2 or more students MUST NOT be identical or a reuse of a past semester's code.

Portfolios: There are two portfolios in the course. Students create their own problems and solutions. Create 4 problems and solutions for each portfolio.   The first self-exam on queueing

theory require mathematical questions and solutions, the second on machine learning requires word (non-mathematical) questions and answers.

Exams: These two exams (one in the middle of the semester and one at the end) are held online during class time. **Reserve the time!** The first is on the material of the first four home works. The second is a qualitative exam covering the entire course.   Exams are open book(s), open notes and open computer. Answers should be direct and not overly long. **Your camera must be on for your exam to be graded!**

Old Exams

Several semester's worth of old exams and solutions will be on Blackboard under Course Documents. This is particularly relevant for the first self exam.

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	About 90+
A-	85-89
B+	80-84
B	75-79
B-	70-74
C+	
C	At least 65
C-	
D+	
D	
F	Around 55 or lower

- Additional information
    - Undergraduate Grading System
    - Graduate Grading System

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/