



*Electrical Engineering Online  
Online Syllabus  
Last updated July 2021*

**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 2024**

**Prerequisites: ESE 306**

**Instructor name: Thomas Robertazzi**

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

[Thomas.Robertazzi@stonybrook.edu](mailto:Thomas.Robertazzi@stonybrook.edu) , cell: 631-379-1449, Any day before 8pm EDT/EST  
(Phone does not have texting)

**Office hours: Any day including weekend before 8 PM call me at 631 379 1449.**

**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.**



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

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

[C] (optional) **Planning Telecommunication Networks, 1<sup>st</sup> ed** by Thomas Robertazzi, 1999.

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

#### Course Delivery Mode and Structure:

This is a *physical course*, if a physical course is canceled it will be delivered in the Brightspace learning management system (LMS). Students must be mindful of all course expectations, deliverables and due dates.

#### How We Will Communicate:

For course related questions and personal/private issues, email or call me directly any day before 7 PM (631-379-1449). **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 especially class cancelations.** 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, queueing theory and problems can be found in chapter 3 and error codes and routing are discussed in chapter 4 of the (main text) Networking and Computation book. We will also cover the first half of the chapter on machine learning for networking in the Networking and Computation text.

## Part 3: Course Schedule

Dates/Week	Module	Learning Objectives	Topic	Videos/Readings	Assessment
Week 1 8/26/21	Module 1	<ul style="list-style-type: none"> <li>-Students will be able to apply probability theory to networking problems.</li> <li>-Students will be able to solve fundamental networking probability problems.</li> </ul>	Probability Review and Performance Evaluation	Reading: -NC: CH 2.1-2.4 Video: -Probability	HWK 1 <b>Due 9/4/24</b>
Week 2 9/2 Labor Day				HWK 2 <b>Due 9/8</b>	
Week 3 9/9	Modules 2 & 3	<ul style="list-style-type: none"> <li>- Students will be able to solve basic Hamming and CRC coding and line code and networking coding problems.</li> <li>- Students can complete Dijkstra and Ford Fulkerson shortest path routing problems.</li> </ul>	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 <b>Due 9/15</b>
Week 4 9/16				Video: Routing	HWK 4 <b>Due 9/22</b>
Week 5 9/23	Module 4	<ul style="list-style-type: none"> <li>- Students can solve basic queueing theory problems including mean value analysis, negative customer models and stochastic Petri networks.</li> </ul>	Queueing Theory	Reading: -NC: CH 3.1-3.3, 3.5-3.7, 3.8	Portfolio 1 on hwk topics <b>Due 9/29</b>
Week 6 9/30				Video: Queueing Theory	
Week 7 10/7	Module 5	<ul style="list-style-type: none"> <li>- Students will describe how machine learning works and the basic types of machine learning</li> </ul>	Machine Learning for Networking	Reading: -NC: CH 7.1-7.2.6	Online Exam 1 during class time <b>On 10/7</b>
Week 8 10/14				Video: Machine Learning for Networking	Portfolio 2 on queueing. <b>Due 10/20</b>

Week 9 10/21	Module 6	- 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	Reading: 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	Project 1 <b>Due 10/27</b>
Week 10 10/28					
Week 11 11/4					Project 2 <b>Due 11/10</b>
Week 12 11/11					Portfolio 3 <b>on Machine Learning 11/17</b>
Week 13 11/18					
Week 14 11/25					Online Exam 2 during class time (qualitative) On 11/25/24
Week 13 and 14 12/2	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)	

<b>Part 4: Grading, Attendance, and Late Work Policies</b>
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**Assessment and Grading:**

**All submissions are to Brightspace. Assignment grades and feedback can be viewed there.**

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

Activity/Assignment	Points	
Exam 1 & 2, Three Portfolios (at 12 points each)	60	
Home works (four hwks at 5 points each)	20	
Projects (two at 10 points each)	20	
Total	100	

**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.

**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 three portfolios in the course. Students create their own problems and solutions. Create 3 problems and solutions for each portfolio. The first portfolio should present a sampling of the types of problems from the four homeworks (probability, error codes and routing). The second portfolio on queueing theory, requires mathematical questions and solutions. The third portfolio 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](mailto: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](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.