CS4121 Data Communications & Computer Networks I, Section A

Department of Computer Science
College of Arts and Sciences
Valdosta State University

Semester Fall 2017

Class TR, 5:00pm – 6:15pm, 2115 Nevins Hall

Hours of Credits 3.0

Prerequisite CS3101 and CS3410, each with a grade of "C" or better.

Course Description

This course aims at building a firm foundation of data communications and computer networks for students. Students are exposed to the *big picture* of networks we draw in this course that allows them to see how the various parts/layers of the network work individually, and fit into one whole. A thorough understanding of concepts and mechanisms underlying general telecommunications and networking is believed to be essential for students to be able to learn and grasp knowledge about other advanced and specific technologies and architectures.

This course covers basic networking concepts, models, and protocols, important applications, end-to-end data transmission control, packet switching networks, Local Area Networks, and data communication mechanisms.

Learning Outcomes

1. Describe and explain delay and loss in Packet-Switched Networks. Mathematically and logically analyze computer networking protocols that are built on such principles. Complete hands-on experiments that put such principles in practice.
2. Describe and explain the networking protocol layers and their service models. Mathematically and logically analyze computer networking protocols that are built on such principles. Complete hands-on experiments that put such principles in practice.
3. Describe and explain the fundamental computer networking principles of reliable data transfer, congestion control, and flow control. Mathematically and logically analyze computer networking protocols that are built on

such principles. Complete hands-on experiments that put such principles in practice.

4. Describe and explain networking principles on both the data plane and the control plane. Mathematically and logically analyze computer networking protocols that are built on such principles. Complete hands-on experiments that put such principles in practice.
5. Describe and explain LAN and Ethernet with emphases on error detection and multiple access control. Mathematically and logically analyze computer networking protocols that are built on such principles. Complete hands-on experiments that put such principles in practice.

Instructor	Dr. Zhiguang Xu
Office	2113, Nevins Hall
Office Hours	9:00am – 12:00pm and 2:00pm – 4:00pm Wednesday (or by appointment)
Phone	229-333-5783
Web Page	https://vsu.view.usg.edu/
Email	zxu@valdosta.edu (We primarily communicate through emails and other tools within BlazeVIEW after classes. **So do NOT write to my Valdosta address directly unless in emergency cases.)**

Textbook

Computer Networking, A Top-Down Approach, 7th edition
By James F. Kurose, and Keith W. Ross
Publisher: Addison-Wesley
ISBN: 0132856204

Note: The 6th edition of the Kurose & Ross book is also acceptable. However, should you choose to use this old edition, you will be responsible for the content mapping.

GENI hands-on activities

In additional to regular quizzes and assignments, students will also practice and reinforce networking knowledge they've learned in this class through hands-on activities using the GENI framework, "*an open infrastructure for at-scale networking and distributed systems research and education that spans the US*".

Course Coverage

Chapter 1 Computer Networks and the Internet

- The Network Edge
- The Network Core
- Delay, Loss, and Throughput in Packet-Switched Networks
- Protocol Layers and Their Service Models
- …

Chapter 2 Application Layer

- Principles of Application Layer Protocols
- The Web and HTTP
- File Transfer: FTP
- Electronic Mail in the Internet
- DNS – the Internet's Directory Service
- …

Chapter 3 Transport Layer

- Multiplexing and Demultiplexing
- Principles of Reliable Data Transfer
- Connection-Oriented Transport: TCP
- Principles of Congestion Control
- TCP Congestion Control
- …

Chapter 4 Network Layer: Data Plane

- Virtual Circuit and Datagram Networks
- What's Inside a Router
- The Internet Protocol (IP)
- Generalized Forwarding and SDN
- …

Chapter 5 Network Layer: Control Plane

- Routing Algorithms: LS and DV

- Routing in the Internet: OSPF, BGP
- The SDN Control Plane and the OpenFlow protocol
- …

Chapter 6 Link Layer and Local Area Networks

- Error-Detection and –Correction Techniques
- Multiple Access Protocols
- Ethernet
- Link-Layer Switches
- …

Grading Policy

Your grade will be calculated based on numerous unevenly-weighted activities:

- **in-class work** including quizzes and GENI labs (50%)
- **take-home assignments** including problem-solving/analytical questions, programming components, and GENI experiments (50%).

Notice that in-class quizzes won't be announced ahead of time. No make-up quiz if you miss any.

There is no comprehensive final.

The materials in the book can be categorized into the following three portions: those subjects that I elaborate and fully discuss in class; those subjects that you are asked to go over yourselves before and/or after class; and those that I would skip explicitly due to time constraints. Questions in the quizzes and assignments come from the first two categories only.

Grading scale:

Final Grade	*Credit*
A	90-100 (including 90)
B	80-89 (including 80)
C	70-79 (including 70)
D	60-69 (including 60)
F	0-59

Course Policy

For the sake of the efficiency of the class, please observe the following rules:

- Late take-home assignments will NOT be accepted. You must turn them in by the beginning of the class on the due date.
- Problems and/or disagreement concerning your grade on class work, if any, must be resolved within TWO weeks after the graded work is turned back to the students. No change will be made to the grade any more after such two-week window, for whatever reason.
- NO makeup assignments/quizzes/labs/tests in this course.
- Program code that do not compile = Zero score.
- Answers that do not come with sufficient justifications = Zero score.
- Absolutely NO cheating on assignments, quizzes, and labs. It can result in total dismissal from VSU.

Attendance and Absence

- You are expected for every scheduled class meeting (i.e. be on time and stay for the full class period).

Statements

Title IX Statement: Valdosta State University (VSU) is committed to creating a diverse and inclusive work and learning environment free from discrimination and harassment. VSU is dedicated to creating an environment where all campus community members feel valued, respected, and included. Valdosta State University prohibits discrimination on the basis of race, color, ethnicity, national origin, sex (including pregnancy status, sexual harassment and sexual violence), sexual orientation, gender identity, religion, age, national origin, disability, genetic information, or veteran status, in the University's programs and activities as required by applicable laws and regulations such as Title IX. The individual designated with responsibility for coordination of compliance efforts and receipt of inquiries concerning nondiscrimination policies is the University's Title IX Coordinator: Maggie Viverette, Director of the Office of Social Equity, titleix@valosta.edu, 1208 N. Patterson St., Valdosta State University, Valdosta, Georgia 31608, 229-333-5463.

Access Statement: Students with disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The Access Office is located in Farbar Hall. The phone numbers are 229-245-2498 (V), 229-375-5871 (VP) and 229-219-1348 (TTY). For more information, please visit VSU's Access Office or email: access@valdosta.edu.

Important Dates

August 14:	First Class Day
September 4:	Labor Day Holiday
October 5:	Fall Midterm

(A.K.A. Last day to withdraw. Please pay special attention to the "LIMIT ON COURSE WITHDRAWALS" policy. See details at https://www.valdosta.edu/academics/academic-affairs/advising/five-course-withdrawal-policy-faq.php)

October 9 ~ 10:	Fall Break
November 22 ~ 24:	Thanksgiving Holidays
December 4:	Last Class Day