

COURSE TITLE BLACKBOARD SITE	MCS 4613 – Computer Networks Fall 2012 – http://my.ltu.edu and select CRN 2161
INSTRUCTOR	Mohammed El-Bathy Adjunct Faculty at Math & Computer Science Department Office hours by appointment
SCHEDULE	August 29, 2012 – December 21, 2012 Refer to http://www.ltu.edu/registrars_office/calendar_final_exam.index.asp for the last date to withdraw and other important registration related information.
LEVEL/HOURS PREREQUISITE	Graduate or Undergraduate Degree / 03 credit hours <u>Admission / prerequisite requirements:</u> Undergraduate level MCS 1142 – Introduction to C. Undergraduate level MCS 1514 – Computer Science 1 Undergraduate level MCS 2514 – Computer Science 2 Undergraduate level MCS 3663 – Computer Architecture and Assembly Language.
	Kurose, Ross – Computer Networking: A Top-Down Approach – Sixth Edition , Publisher: Pearson - Addison-Wesley ISBN: 978-0-13-285620-1 Available for online purchase through LTU Bookstore at: http://lawrence-tech1.bkstore.com/bkstore/TextbookSelection.do?st=489
ADDITIONAL RESOURCES	LTU Online student resources: http://www.ltu.edu/ltuonline/
TECHNICAL SUPPORT	Technical support for using Blackboard is provided by the Helpdesk, 248.204.2330 or helpdesk@ltu.edu . Send the Help Desk a form detailing any issues by clicking here http://tinyurl.com/3yqrvne .

COURSE SCHEDULE FOR TRADITIONAL SEMESTER COURSES

This fully online course begins with a partial week online course orientation period to familiarize yourself with the online learning environment and to meet online or via the phone with your instructor. Each subsequent week starts on a Monday and ends on a Sunday.

Dates	Modules	Topics / Readings	Instructional Activities
<u>Prior to Semester Start</u> Aug. 29 – Sept. 02	Module 0	<ul style="list-style-type: none"> • Online Learning Orientation • Course Orientation • Overview of textbook 	<ul style="list-style-type: none"> • Course orientation • Instructor conversation • Read Chapter one (1)
<u>Week of</u> Sept. 03 – Sept. 09	Module 1	<u>Computer Network & Internet:</u> <ul style="list-style-type: none"> • What is the Internet • The Network Edge • The Network Core 	<ul style="list-style-type: none"> • Read Chapter 1.1 – 1.3 • Review Lecture Presentations • Practice Self Review # 1 • Bb Discussion # 1 - start
<u>Week of</u> Sept. 10 – Sept 16	Module 2	<u>Computer Network & Internet:</u> <ul style="list-style-type: none"> • Delay, Loss, and Throughput • Protocol Layers & Their Service Models • Network Under Attack • History of Computer Networking & the Internet 	<ul style="list-style-type: none"> • Read Chapter 1.4 – 1.8 • Review Lecture Presentations • Practice Self Review # 2 • Bb Discussion # 1 – end • Lab One - start
<u>Week of</u> Sept. 17 – Sept 23	Module 3	<u>Application Layer:</u> <ul style="list-style-type: none"> • Principles of Network Applications • The Web and HTTP 	<ul style="list-style-type: none"> • Read Chapter 2.1 – 2.2 • Review Lecture Presentations • Practice Self Review # 3 • Bb Discussion # 2 – start • Lab One - due
<u>Week of</u> Sept. 24 – Sept 30	Module 4	<u>Application Layer:</u> <ul style="list-style-type: none"> • File Transfer: FTP • Electronic Mail in the Internet • DNS – The Internet's Directory Server 	<ul style="list-style-type: none"> • Read Chapter 2.3 - 2.5 • Review Lecture Presentations • Practice Self Review # 4 • Bb Discussion # 2 – end • Lab Two - start
<u>Week of</u> Oct. 01 – Oct. 07	Module 5	<u>Application Layer:</u> <ul style="list-style-type: none"> • Peer-to-Peer Applications • Socket Programming with TCP. • Socket Programming with UDP. 	<ul style="list-style-type: none"> • Read Chapter 2.6- 2.8 • Review Lecture Presentations • Practice Self Review # 5 • Bb Discussion # 3 – start • Lab Two - Due
<u>Week of</u> Oct. 08 – Oct. 14	Module 6	<u>Transport Layer:</u> <ul style="list-style-type: none"> • Transport Layer Services • Multiplexing and Demultiplexing • Connectionless Transport: UDP 	<ul style="list-style-type: none"> • Read Chapter 3.1 – 3.3 • Review Lecture Presentations • Practice Self Review # 6 • Bb Discussion # 3 – end • Lab Three - start

Dates	Modules	Topics / Readings	Instructional Activities
<u>Week of</u> Oct. 15 – Oct. 21	Module 7	<u>Transport Layer:</u> <ul style="list-style-type: none"> Principles of Reliable Data Transfer Pipelined Reliable Data Transfer Go-Back-N (GBN) Selective Repeat (SR) 	<ul style="list-style-type: none"> Read Chapter 3.4 Review Lecture Presentations Practice Self Review # 7 Bb Discussion # 4 – start Lab Three - Due
<u>Week of</u> Oct. 22 – Oct. 28	Module 8	<u>Transport Layer:</u> <ul style="list-style-type: none"> Connection-oriented Transport TCP Segment Structure Reliable Data Transfer Flow Control TCP Connection Management 	<ul style="list-style-type: none"> Read Chapter 3.5 Review Lecture Presentations Practice Self Review # 8 Bb Discussion # 4 – end Lab Four - start
<u>Week of</u> Oct. 29 – Nov. 04	Module 9	<u>Transport Layer:</u> <ul style="list-style-type: none"> Causes & Costs of Congestion Approaches to Congestion Control ATM ABR Congestion Control TCP Congestion Control 	<ul style="list-style-type: none"> Read Chapter 3.6 – 3.8 Review Lecture Presentations Practice Self Review # 9 Bb Discussion # 5 – start Lab Four - Due
<u>Week of</u> Nov. 05 – Nov. 11	Module 10	<u>Network Layer:</u> <ul style="list-style-type: none"> Forwarding and Routing Virtual-Circuit Networks What's inside Router 	<ul style="list-style-type: none"> Read Chapter 4.1 – 4.3 Review Lecture Presentations Practice Self Review # 10 Bb Discussion # 5 - end Programming Problem 1 - out
<u>Week of</u> Nov. 12 – Nov. 18	Module 11	<u>Network Layer:</u> <ul style="list-style-type: none"> The Internet Protocol (IP) Datagram Format IPv4 Addressing Internet Control Message Protocol (ICMP) 	<ul style="list-style-type: none"> Read Chapter 4.4 Review Lecture Presentations Practice Self Review # 11 Bb Discussion # 6 – start Programming Problem 1 - Due
<u>Week of</u> Nov. 19 – Nov. 25	Module 12	<u>Network Layer:</u> <ul style="list-style-type: none"> Routing Algorithms Simulating CPU Random Logic Control Unit Micro programmed Control Unit 	<ul style="list-style-type: none"> Read Chapter 4.5 – 4.8 Review Lecture Presentations Practice Self Review # 12 Bb Discussion # 6 – end Programming Problem 2 - out
<u>Week of</u> Nov. 26 – Dec. 02	Module 13	<u>The Link Layer:</u> <ul style="list-style-type: none"> Services Error Detection & Correction Techniques Multiple Access Links and Protocols 	<ul style="list-style-type: none"> Read Chapter 5.1 - 5.3 Review Lecture Presentations Practice Self Review 13 Bb Discussion #7 – start Programming Problem 2 - Due
<u>Week of</u> Dec. 03 – Dec. 09	Module 14	<u>The Link Layer:</u> <ul style="list-style-type: none"> Switched Local Area Networks Link Virtualization Data Center Networking 	<ul style="list-style-type: none"> Read Chapter 5.4 – 5.8 Review Lecture Presentations Practice Self Review # 14 Bb Discussion # 7 - end Programming Problem 3 – out

Dates	Modules	Topics / Readings	Instructional Activities
<u>Week of</u> Dec. 10 – Dec. 16	Module 15	<u>Wireless & Mobile Networks:</u> <ul style="list-style-type: none"> Wireless Links & Network Characteristics & their resources WiFi: 802.11 Architecture Cellular Internet Architecture 	<ul style="list-style-type: none"> Read Chapter 6.1 -6.4 Review Lecture Presentations Practice Self Review # 15 Programming Problem 3 – Due
<u>Week of</u> Dec. 17 – Dec. 21	Final Exams	• End of Course	• Course Evaluation

STUDENT EVALUATION

The course has **(7)** seven Blackboard Discussions, **(3)** three Programming Assignments, **(4)** LAB Assignments, **(1)** one Midterm exam, and a **(1)** Final Exam. For practice and testing your understanding, The Course also includes Self-Review Exercise for each Module for practice. These Self-Review Exercises are **UNGRADED** activities. Letter grades are awarded based on the total number of points achieved. Points are deducted for late assignments.

Assignments	Total Points	Weight
7 Online Discussions – 40 pts each	280	28%
3 Programming Problems – 100 pts each	300	30%
4 Lab Assignments – 50 pts each	200	20%
1 Mid Term	100	10%
1 Final Exam	120	12%
Total Points	1000	100%

Class Points	Letter Grade
96% and above	A
90% – 95.99%	A-
87% – 89.99%	B+
83% – 86.99%	B
80% – 82.99%	B-
77% – 79.99%	C+
73% – 76.99%	C
70% – 72.99%	C-
61% – 70.99%	D (Undergrad Only)
60.99% and below	E

Note: Grades lower than a “B” fall below the LTU graduate standard

EDUCATIONAL GOALS

Computer Networks course focuses on the fundamental of computer network structures, architectures, and protocols that underpin the array of computerized-network technologies.

topics covered include Principles of Network Applications; Web Applications; Peer-to-Peers Applications; Transport-Layer Services; Multiplexing and Demultiplexing; Principles of Reliable Data Transfer; Connection-Oriented Transport; Principles of Congestion Control; Virtual Circuit and Datagram networks, Internet Protocol; Router and Routing Algorithms; Routing in the Internet; Broadcast and Multicast Routing; Link Layer Services; Error-Detection and –Correction Techniques; Multiple Access Links and Protocols; Switched LAN; Wireless Network Links and Characteristics; Cellular Internet Access; Mobility Management; Mobile IP; and case studies.

STUDENT LEARNING OBJECTIVES / OUTCOMES

Upon successful completion of *Computer Architecture and programming course*, student will be able to:

1. Describe what a network and the Internet are.
2. Identify and discuss the characteristics of the different types of networks (PAN, LAN, MAN, WAN, and internet).
3. Define what a protocol is and explain why standards are important for protocols.
4. Examine the services provided by each layer of the Internet network protocol stack.
5. Describe the HTTP, FTP, SMTP, POP3, and DNS protocols and their corresponding associated applications (the web, file transfer, e-mail, and DNS)
6. Describe the Peer-to-Peer architecture and how it is used in many applications
7. Examine How socket API can be used to build network applications
8. Build Internet applications using sockets for connection-oriented (TCP) and connectionless (UDP) end-to-end transport services.
9. Describe the services that a transport layer protocol can provide to the network applications.
10. Examine the services provided by each layer of the Internet.
11. Examine several congestion-control mechanisms including DCCP, SCTO, and TFRC.
12. Discuss how a hierarchical organization of the Internet has made it possible to scale to millions of user
13. Analyze the underlying principles of Routing Algorithms.
14. Compare and contrast several routing algorithms including Link state (LS), Distance-Vector (DV), Autonomous System (AS1, As2, AS3), RIP, OSPF, BGP, Broadcast (Uncontrolled, Controlled Flooding, Spanning Tree), and Multicast Routing Algorithms.
15. Examine Link-layer – its services, the principles underlying its operation, and a number of important specific protocols that uses these principles.
16. Examine Error-Detection and –Correction techniques, multiple access protocols, link-layer addressing, virtualization (VLANs), and the construction of extended switched LANs and data center network
17. Identify and discuss approaches for coordinating access to a broadcast channel including channel partitioning approaches (TDM, FDM), random access approaches (the Aloha protocols and CSMA protocols), and taking turns approaches (polling and token passing)
18. Identify and discuss many protocols that are needed to fetch a simple web page.
19. Discuss the pieces of a wireless network that can be combined to form different wireless networks
20. State the wireless network characteristics.
21. Understand the challenges posed by the wireless nature of the communication links of wireless networks and by the mobility that these wireless links enable.
22. .Examine the link-level aspects of the IEEE 802.11 (WiFi) wireless LAN standard, two IEEE 802.15 personal area networks (Bluetooth and Zigbee, and 3G and 4G cellular Internet access.

PREREQUISITE SKILLS

- Student must have completed Basic Data Structure.
- Student must be able to write computer programs in C, C++, or Java
- Student must be willing and able to use MS Visual Studio C++ 2008 or 2010 for programming assignments.

INSTRUCTIONAL METHODS AND COURSE ORGANIZATION

Blackboard Learning Environment – Blackboard at my.ltu.edu contains the syllabus, all assignments, reading materials, streaming videos, narrated PowerPoint mini-lectures, podcasts, written lecture notes, chapter quizzes, links to Web resources, and discussion forums. You will submit all assignments via Blackboard, and are expected to participate regularly in discussion topics. Please take time to familiarize yourself with the organization of the Blackboard site. You will want to check the site frequently for announcements reminding you of new resources and upcoming assignments.

Student/Instructor Conversations – Students keep in touch with the instructor via e-mail messages, telephone conference calls, and IM conversations.

Self-Assessments – Pre- and post- self-assessment tools will help students measure their entering skills and progress during the course.

Required Reading – Textbook chapters should be read according to the schedule outlined in the syllabus. Chapters will be discussed online.

Publisher Web Site – A publisher web site at <http://www.wiley.com/college/silberschatz> includes instructional materials, PowerPoint slides, case studies, application exercises, and practice quizzes. You should make use of as many of these resources as you need to be successful.

Assignments – For each module, assignments will be posted on the Blackboard with due dates.

CLASS POLICIES AND EXPECTATIONS

I plan to offer you a valuable learning experience, and expect us to work together to achieve this goal. Here are some general expectations regarding this course:

- Each student has a LTU email account. If you wish to use a different email address for this course, please **change your email address in Blackboard under “Blackboard Tools”, then “Personal Information”** and send an email to me to store your email address in my directory.
- Readings, discussion forum participation, and written assignments must be completed according to the class schedule. It is important to contact the instructor as needed to discuss personal needs regarding course requirements and assignments.
- It is essential that all students actively contribute to the course objectives through their experiences and working knowledge.
- All assignments must be submitted on schedule, via Blackboard, and using Microsoft Office compatible software. If you need to submit an assignment via email, contact the instructor in advance.
- Assignments must be completed to an adequate standard to obtain a passing grade. Requirements for each assignment are detailed in this syllabus.
- Be prepared to log into Blackboard at least once each day. Please focus your online correspondence within the appropriate Blackboard discussion forums, so that your colleagues may learn from you.
- At midterm and at the end of the course, you will be invited to participate in a University evaluation of this course. Your feedback is important to the University, to LTU Online, and to me as an instructor, and I strongly encourage your participation in the evaluation process.

It is important for you as students to know what to expect from me as your instructor:

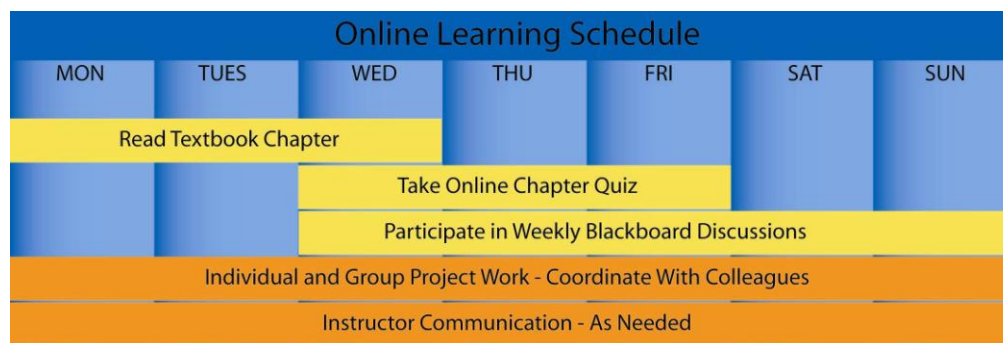
- I will be available to you via e-mail and Wimba classroom.
- I will promptly reply to your messages.
- I will maintain the Blackboard web site with current materials, and will resolve any content-related problems promptly as they are reported to me.
- I will send out a weekly e-mail update to all class members to guide upcoming work and remind you of assignment due dates.
- I will return all assignments to you promptly, and will include individualized comments and suggestions with each assignment.
- I will hold our personal written or verbal communications in confidence. I will not post any of your assignments for viewing by the class without requesting your approval in advance.
- I will treat all members of the class fairly, and will do my best to accommodate individual learning styles and special needs.
- If any of these points need clarification, or should special circumstances arise that require my assistance, please contact me so that we may discuss and resolve the matter.

PRACTICAL GUIDELINES FOR CLASS LOAD EXPECTATIONS

A three-credit course generally requires 10-12 hours per week of time commitment. Here are some practical guidelines to help schedule your time commitments for this online course:

- A 14-week semester (the Summer semester is compressed into 10 weeks) would require at least 140 hours of time commitment to successfully complete all readings, activities, assignments, and texts as described in this syllabus.
- You should reserve at least 6 hours per week to read the required textbook chapters and resources, participate in online discussions, review presentation materials, and work through online quizzes. This effort will total at least 84 hours over the course of the semester.
- You should organize your remaining time to roughly correspond with the point value of each major assignment. This means that you should plan to spend at least:
 - 8-9 hours preparing your case study review;
 - 24-40 hours working with your group on the three parts of your semester-long project;
 - 8-9 hours working on the various components of your reflective consolidation (final exam).

These guidelines may not reflect the actual amount of outside time that you – as a unique individual with your own learning style – will need to complete the course requirements. The number of hours each week will vary based on assignment due dates, so please plan ahead to insure that you schedule your academic, work, and personal time effectively. The following graphic may be used to guide you in planning your weekly course work to remain on schedule:



ASSIGNMENT DETAILS

Course assignments and evaluation criteria are detailed below. Please review these requirements carefully. See the section Academic Resources / Assessment Guidelines for information about assessment of written and oral presentations.

Details for all assignments are shown below. Please note that you should not submit any assignments to the Blackboard “Digital Drop Box.” All assignments are submitted using the Blackboard “Assignments” or “SafeAssign” function. Some assignments are also posted to the Blackboard Discussion Forum for student comments.

Assignments

Overview

This course features several Self-Review Exercises, Class Discussion, Lab Assignment and Programming Problems/Projects activities.

Self-Review Exercises:

Each module contains self-review exercise that addresses important operating systems concepts. These exercises are ungraded activities; they are designed to enable you to test your knowledge, get immediate feedback and gauge your understanding of material. These exercises also help prepare you for the quizzes and exams. Some of the self-review exercises cannot be answered only from the material presented in their corresponding modules; these are additional teaching and learning opportunities.

Class Discussions:

- Class discussions are a fundamental part of individual student work (other individual work might include worksheets, essays, web assignments, etc.).
- Class discussions are intended to mimic discussions that take place in a brick and mortar classroom. Therefore, students are almost always expected to post a substantial initial response and to reply to contributions from other students and the instructor.
- **Your post and responses must be substantial and innovative contribution to the discussion**
- The minimum expectation for each Class Discussion is to post **one** quality Main Post and at least **two** quality-responses to others (others include your classmates and/or me).
- I will read each of your posts in these areas and will provide you with open-ended/ exploratory/ expanding responses.
- It's important that you to participate in each Class Discussion and Teamwork forum. Always proofread and spell check your posts.
- There are **seven (7)** Bb discussions in the area of operating system. Each Class Discussion assignment is worth a total of 40 points (4% of the final grade). Earn up to 20 points for each initial post and up to 10 points for each response, depending on quality).

Lab Assignment:

- There are **four (4)** Lab assignments and they are worth a total of 200 points (20% of the final grade.)
- Each Lab assignment is **50 points (5%)** of the final grade).

Programming Assignments:

- Emphasize the concepts presented in the course using Java, Win32 APIs, or POSIX

- There will be **three (3)** programming Assignments.
- Each programming assignment is worth of total of **100 points (10%** of the final grade):

Assignments' Due Dates

- Blackboard Discussions:

Homework	Published Date	Due Date	Grade Points	Grade Weight
Blackboard Discussion # 1	Beginning of Module # 01	End of Module # 02	40 pts	4%
Blackboard Discussion # 2	Beginning of Module # 03	End of Module # 04	40 pts	4%
Blackboard Discussion # 3	Beginning of Module # 05	End of Module # 06	40 pts	4%
Blackboard Discussion # 4	Beginning of Module # 07	End of Module # 08	40 pts	4%
Blackboard Discussion # 5	Beginning of Module # 09	End of Module # 10	40 pts	4%
Blackboard Discussion # 6	Beginning of Module # 11	End of Module # 12	40 pts	4%
Blackboard Discussion # 7	Beginning of Module # 13	End of Module # 14	40 pts	4%
TOTAL			280 pts	28%

- Programming Project Assignments:

Programming Assignment	Published Date	Due Date	Grade Points	Grade Weight
First Program	Beginning of Module # 10	End of Module # 11	100 pts	10%
Second Program	Beginning of Module # 12	End of Module # 13	100 pts	10%
Third Program	Beginning of Module # 14	End of Module # 15	100 pts	10%
TOTAL			300 pts	30%

- Lab Assignments

Programming Assignment	Published Date	Due Date	Grade Points	Grade Weight
Lab One	Beginning of Module # 02	End of Module # 03	50 pts	5%
Lab Two	Beginning of Module # 04	End of Module # 05	50 pts	5%
Lab Three	Beginning of Module # 06	End of Module # 06	50 pts	5%
Lab Four	Beginning of Module # 07	End of Module # 08	50 pts	5%
TOTAL			200 pts	20%

Deliverables and Evaluation:

- Essays must be formatted according to APA Document formatting protocol and organized according to "How to Organize your Essay" document (listed under Course Information.)
- Teamwork/Essays/case studies are submitted via Bb. Word, Excel or Journal format is preferred; however I will accept text (txt, rtf).

- Programming Problem assignments are submitted by zipping the Visual Studio project folder (after deleting the debug folder) and submitting via Bb assignments.

SYLLABUS ADDENDA

Please see the LTU Online “Current Students” web site <http://www.ltu.edu/ltuonline/> for comprehensive information about Lawrence Tech’s academic services, library services, student services, and academic integrity standards. The content of this web site is explicitly included in these syllabus requirements.

The LTU Online “Current Students” web site also includes grading rubrics used by your instructor to evaluate written assignments, discussion forum participation, and group assignments. Please note that the SafeAssign anti-plagiarism product will be used for written assignments submitted for this course. Please see the instructions included on the [eHelp web site](#) regarding the use of the SafeAssign product.

Undergraduates: Leadership Transcripts

The leadership transcript enables students to track co-curricular activities that are undertaken above and beyond the requirements of the LTU curriculum. The leadership transcript serves students by enhancing the leadership portfolio; providing the opportunity for a transcript of distinction; enhancing their resumes; and assisting in articulating leadership experience. It can be accessed by logging on to Banner Web and clicking the Student and Financial Aid tab. Leadership Activities is located at the bottom of the list.