COURSE TITLE BLACKBOARD SITE	MCS 5703 – Introduction to Distributed Computing **Fall 2012** – http://my.ltu.edu and select CRN **2162**
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 Admission / Prerequisite Requirements: Undergraduate level MCS 1142 – Introduction to C. Undergraduate level MCS 1514 – Computer Science 1 Undergraduate level MCS 2514 – Computer Science 2 Undergraduate level MCS 3653 Computer Architecture **or** Undergraduate level MCS 3663 Computer Architecture & Assembly Lang..**or** Undergraduate level EEE 3233 Microprocessor Undergraduate level MCS 4663 – Operating Systems Undergraduate level MCS 4613 – Computer Networks
REQUIRED TEXT (See Blackboard for additional resources)	Tanenbaum & Van Steen – Distributed Systems: Principles and Paradigms - **Second Edition**. Publisher: Pearson – Prentice Hall. ISBN: 0-13-239227-5 Authors web site http://www.wiley.com/college/silberschatz 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
Prior to Semester Start **Aug. 29 – Sept. 02**	Module 0	• Online Learning Orientation • Course Orientation • Overview of textbook	• Course orientation • Instructor conversation • Individual pre-assessment
Week of **Sept. 03 – Sept. 09**	Module 1	Introduction: • Definition of DS • Making Resources Accessible • Distribution Transparency • Openness • Scalability • Pitfalls	• Read sections 1.1 – 1.2 • Review Lecture Presentations • Practice Self Review # 1 • Bb Discussion # 1
Week of **Sept. 10 – Sept 16**	Module 2	Introduction: • Distributed Computing Systems • Distributed Information Systems • Distributed Pervasive Systems • **Group Formulation**	• Read Sections 1.3 – 1.4 • Review Lecture Presentations • Practice Self Review # 2 • Bb Discussion # 2 • **Essay Out**
Week of **Sept. 17 – Sept 23**	Module 3	Architectures: • Architectural Style • Centralized Architectures • Decentralized Architectures • Hybrid Architectures	• Read sections 2.1 – 2.2 • Review Lecture Presentations • Practice Self Review # 3 • Bb Discussion # 3
Week of **Sept. 24 – Sept 30**	Module 4	Architectures: • Interceptors • Approaches to adaptive Software • Feedback Control Model • System Monitoring • Replication Strategies • Repair Management	• Read sections 2.3 – 2.5 • Review Lecture Presentations • Practice Self Review #4 • Bb Discussion # 4
Week of **Oct. 01 – Oct. 07**	Module 5	Processes: • Introduction to Threads • Threads in Distributed Systems • Role of Virtualization • Architectures of Virtual Machines • Networked User Interfaces • Client-Side Software for Distributed Transparency	• Read Sections 3.1 – 3.3 • Review Lecture Presentations • Practice Self Review #5 • Bb Discussion # 5 • **Programming Problem 1 – Out**
Week of **Oct. 08 – Oct. 14**	Module 6	Processes: • Server Design Issues • Server Clusters • Migration Server Clusters	• Read Sections 3.4 – 3.6 • Review Lecture Presentations • Practice Self Review # 6 • Bb Discussion # 6

Dates	Modules	Topics / Readings	Instructional Activities
		• Approaches to Code Migration • Migration in Heterogeneous Systems	
Week of **Oct. 15 – Oct. 21**	Module 7	Communication: • Fundamentals of Communication • Communication Layered Protocols • Types of Communication • Remote Procedure Call • Basic RPC Operation • Parameter Passing	• Read sections 4.1 – 4.2.3 • Review Lecture Presentations • Practice Self Review # 7 • **Programming Problem 1** – **Due**
Week of **Oct. 22 – Oct. 28**	Module 8	Communication: • Asynchronous RPC • DCE RPC • Transient Communication • Persistent Communication • WebSphere Message-Queuing System	• Read sections4.2.3 – 4.3 • Review Lecture Presentations • Practice Self Review # 8 • **Programming Problem 2 – Out** • **Midterm Exam**
Week of **Oct. 29 – Nov. 04**	Module 9	Communication: • Stream-Oriented Communication • Support for Continuous Media • Streams and Quality of Service • Stream Synchronization • Multicast Communication • Gossip-Based data Dissemination	• Read sections 4.4 – 4.6 • Review Lecture Presentations • Practice Self Review # 9 • Bb Discussion # 7
Week of **Nov. 05 – Nov. 11**	Module 10	Naming: • Names, Identifiers & Addresses • Flat Naming • Simple Solutions. • Home-Based Approaches • Distributed Hash Tables • Hierarchical Approaches	• Read sections 5.1 – 5.2 • Review Lecture Presentations • Practice Self Review # 10 • Bb Discussion # 8
Week of **Nov. 12 – Nov. 18**	Module 11	Naming: • Name Spaces • Name Resolutions. • Name Implementation • The Domain Name Server	• Read section 5.3 • Review Lecture Presentations • Practice Self-Review # 11 • Bb Discussion # 9 • **Programming Problem 2 - Due**
Week of **Nov. 19 – Nov. 25**	Module 12	Naming: • Directory Services • Hierarchical Implementation: LDAP • Decentralized Implementation	• Read sections 5.4 – 5.5 • Review Lecture Presentations • Practice Self Review 12 • Bb Discussion # 10 • **Programming Problem 3 - Out**
Week of **Nov. 26 – Dec. 02**	Module 13	Synchronization: • Clock Synchronization • Physical Clocks • Clock Synchronization Algorithms • Logical Clocks	• Read sections 6.1 - 6.2 • Review Lecture Presentations • Practice Self Review # 13 • Bb Discussion # 11

Dates	Modules	Topics / Readings	Instructional Activities
Week of **Dec. 03 – Dec. 09**	Module 14	Synchronization: • Mutual Exclusion Algorithms • Global Positioning of Nodes • Election Algorithms.	• Read sections 6.3 – 6.4 • Review Lecture Presentations • Practice Self Review #13 • Bb Discussion # 12 • **Essay Due**
Week of **Dec. 10 – Dec. 16**	Module 15	Review all the concepts, theories and implementations of operating systems.	• Review All Chapter • Review All Lecture Presentations • Practice Self Review 14 • **Programming Problem 3** – **Due**
Week of **Dec. 17 – Dec. 21**	**Final Exams**	•**End of Course**	• **Course Evaluation**

STUDENT EVALUATION

The course has **(12)** twelve Blackboard Discussions**, (3)** three Programming Assignments, **(1)** One Essay, **(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
12 Online Discussions – 30 pts each	360	28%
3 Programming Problems – 100 pts each	300	30%
1 Essay	100	10%
1 Mid Term	100	10%
1 Final Exam	140	15%
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

Introduction to distributed Computing *focuses the core concepts that underlie contemporary distributed systems.* It introduces the challenges arising from the construction of distributed systems. It also discusses the cutting edge advanced in computing technologies that are redefining distributed systems, and addresses design considerations, such as performance, fault tolerance, security, modularity, and cost.

Topics covered include Types, Characteristics, and Architectural Styles of Distributed Systems; Self-Management in Distributed Systems; Threads, Virtualization, Client-Server Model; Protocols, Remote Procedure Call, Message-Oriented, Stream-Oriented and multicast Communications; Flat, Structured, and Attribute-Based Naming; Process Synchronization; Physical and Logical Clocks; Mutual Exclusion Algorithms; Election Algorithms; and case studies.

STUDENT LEARNING OBJECTIVES / OUTCOMES

Upon successful completion of *Operating systems course*, student will be able to:

1. Describe the major components of distributed systems and its basic organization.
2. Describe the services a distributed system provides to users, processes and other systems.
3. Explain the various ways of structuring a distributed system.
4. Evaluate the various features and principles of inter process communication including remote procedure calls, message passing.
5. Explain what is meant by (distributed) transparency and give examples of different types of transparency.
6. Define the role of middleware in distributed systems.
7. Explain the functions and the interfaces of file systems.
8. Discuss complexities of process synchronization.
9. Examine several Mutual Exclusion and Election Algorithm.
10. Apply distributed system principles, concepts and algorithms in the design and implementation of a distributed system.
11. Examine, compare and contrast the design and implementation of current distributed computing, information, and pervasive systems.

PREREQUISITE SKILLS

- Student must have completed Basic Data Structure, and Computer Organization courses.
- 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, or NetBeans IDE 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.

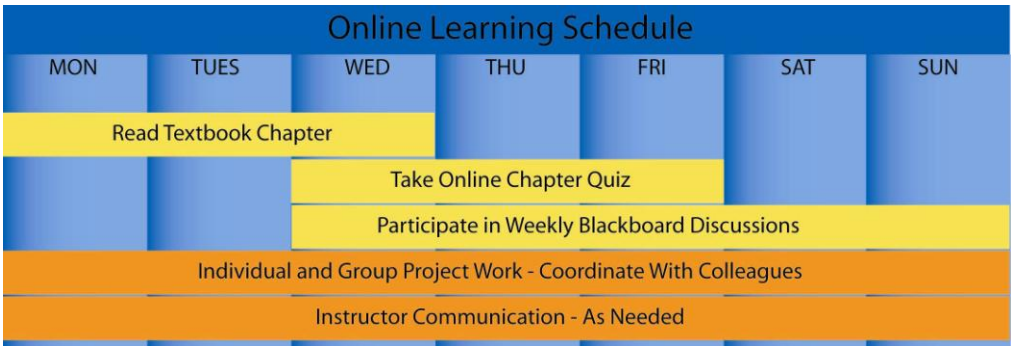
- If any of these points need clarification, or should special circumstances arise that require my assistance, please contact me so that we may discuss and resolve the matter.

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, and Teamwork/Essay/Case Study, Homework, 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 will be (**12**) **twelve** Bb discussions in the area of operating system. Each Class Discussion assignment is worth a total of **30** points (3% of the final grade). Earn up to **16** points for each initial post and up to **7** points for each response, depending on quality).

Teamwork/Essay/Case Study:

- **Your Essay must be substantial and innovative contribution**
- Essays must be formatted according to APA Document formatting protocol and organized according to "How to Organize your Essay" document (listed under Course Information.)
- There will be 1 teamwork/Essay/Case Study activity in the area of operating systems.
- Teamwork/Essay/Case Study assignment is worth a total of 100 points (10% of the final grade.) Earn up to 50 points for your participation/effort and up to 50 points for the deliverable (composition of your document and PowerPoint developed by you and/or your team, depending on quality).

Programming Assignments:

- Emphasize the concepts presented in the course using Java, Win32 APIs, or POSIX
- Simulate processes, threads, shared member and/or process synchronization.
- There will be **3** programming Assignments.
- Each programming assignment is worth of total of **100 points** (**10%** of the final grade):

Assignments' Due Dates

- Essay/Teamwork/case study Activity is published at the beginning of the week of **module 2** and due by the end of the week of **module 14**.

- Blackboard Discussions:

Homework	Published Date	Due Date	Grade Points	Grade Weight
Blackboard Discussion # 1	Beginning of Module # 01	End of Module # 01	30 pts	3%
Blackboard Discussion # 2	Beginning of Module # 02	End of Module # 02	30 pts	3%
Blackboard Discussion # 3	Beginning of Module # 03	End of Module # 03	30 pts	3%
Blackboard Discussion # 4	Beginning of Module # 04	End of Module # 04	30 pts	3%
Blackboard Discussion # 5	Beginning of Module # 05	End of Module # 05	30 pts	3%
Blackboard Discussion # 6	Beginning of Module # 06	End of Module # 06	30 pts	3%
Blackboard Discussion # 7	Beginning of Module # 09	End of Module # 09	30 pts	3%
Blackboard Discussion # 8	Beginning of Module # 10	End of Module # 10	30 pts	3%
Blackboard Discussion # 9	Beginning of Module # 11	End of Module # 11	30 pts	3%
Blackboard Discussion # 10	Beginning of Module # 12	End of Module # 12	30 pts	3%
Blackboard Discussion # 11	Beginning of Module # 13	End of Module # 13	30 pts	3%
Blackboard Discussion # 12	Beginning of Module # 14	End of Module # 14	30 pts	3%
		TOTAL	**360 pts**	**36%**

- Programming Project Assignments:

Programming Assignment	Published Date	Due Date	Grade Points	Grade Weight
First Program	Beginning of Module # 05	End of Module # 07	100 pts	10%
Second Program	Beginning of Module # 08	End of Module # 11	100 pts	10%
Third Program	Beginning of Module # 12	End of Module # 15	100 pts	10%
		TOTOAL	**300 pts**	**30%**

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.