Syllabus for "Course 1-02-431: Distributed Information Systems"
Kinneret College on the Sea of Galilee
School of Engineering

Instructor: Michael J. May

Semester 1 of 5770

1 Course Details

The course meets **1pm-4pm** on Tuesdays. The Targil for the course is **4pm-6pm** on Tuesdays.

The course has **3** hours of lecture and **2** hour of Laboratory. The room for the course is **Caravan 513**. The room for the Laboratory is **202** in the Sciences Building.

2 Prerequisites

The prerequisites for this course are "Course 1-02-324: Information Systems Engineering 2", "Course 1-02-328: Communication and E-Commerce Security", "Course 1-02-215: Introduction to Systems Programming", "Course 1-02-327: Introduction to Networks", and a proficiency in programming in C# and Java.

3 Overview

The course is a followup to previous courses on network communication and system programming. The goal of this course is to introduce a design and implementation study of *distributed information systems*, where data, computation, and resources are distributed across a network. We will study several internet based applications which illustrate good distributed systems design.

The topics for the course include some or all of the following:

Distributed Computation
Primitives for Distributed Computation
Common Problems (and Solutions) for Distributed Systems
Techniques and Algorithms
Distributed Information Systems
The Internet and Internet Applications as a Distributed Information System
The Internet Environment (TCP/IP)
Existing Internet Applications
Client-Server Applications
Peer-to-Peer Applications
Coding Internet Applications Using TCP and UDP
Distributed Computing Using Java

The material for the course is primarily from Tanenbaum and Van Steen [6], but includes supplementary material from Coulouris, *et. al* [1] and other sources.

Students may review fundamental networking information (primarily for lectures 3, 7, and 11) from standard books on computer networks (*e.g.,* Tanenbaum [5] or Kurose and Ross [2]).

4 Lecture Schedule

The course lectures are structured in the following way. The relevant chapters of Tanenbaum and Van Steen (TV) and Coulouris and *et al.* (C) are in the indicated columns. Material not covered well in the books may be supplemented from papers or other sources as shown in the O column. The column will be updated during the course of the semester to reflect supplemental information included during the course of the semester as time permits.

#	Date	Subject	TV	C	O
1	20 Oct	Intro to Distributed Systems	1		
2	27 Oct	Architectures of Dist. Sys	2		
3	3 Nov	Chord, Processes and Threads	3.1-3.2		[4]
4	10 Nov	Virtualization, Clients, Servers	3.2-3.5		
5	17 Nov	Migration, Communication, RPC	3.5-4.3		
6	24 Nov	Communication,	4.3-4.5		
7	1 Dec	Review of RPC, Naming	5		
8	8 Dec	Naming 2	5		
9	15 Dec	Synchronization	5.4-6.2		
10	22 Dec	Synchronization 2	6.2-6.4		
11	29 Dec	Vector Clocks, Elections, Intro Consistency	6.5-7.1		
12	5 Jan	Consistency and Replication	7.2,7.4		
13	12 Jan	XML and Web Services	12.1.1, 12.3.2	19.1-19.2	
14	19 Jan	XML Security, Distributed DBs		19.5	[3]:22

Since this is an advanced course, students **are expected to come to class having read the material listed above in the lecture schedule**. Students who do not come prepared will find themselves at a significant disadvantage.

5 Quizzes

There will be (a maximum of) four in class short quizzes at the beginning of lectures during the course of the semester. The quizzes will take place from 1:00pm-1:10pm. There will be (a maximum of) one quiz during weeks 1–3, one between weeks 4–7, one between weeks 8–10, and one between weeks 11–14. The quiz material will come from the readings assigned for the lecture on which the quiz is given. Students will be told of the upcoming quiz **in class the week before the quiz**.

Students may skip or drop the grade of one of the quizzes without penalty.

Students who arrive in class after 1:10pm will not be given the opportunity to take the quiz.

5.1 Tentative Quiz Schedule

Quizzes will tentatively take place on the following dates and on the following material:

#	Date	Topic	Source
1	3 Nov	Distributed architectures and transparency	TV1-2
2	1 Dec	RPC	TV3.5
3	22 Dec	Naming	TV5
4	12 Jan	Synchronization	TV6

The above dates may change during the course of the semester.

6 Programming Projects

There will be four large programming assignments during the course of the semester, one for each portion of the course. They will involve a fairly significant amount of programming.

Each project can be done in groups of two (2) or three (3) students.

More details of the projects will be distributed during the course of the semester.

7 Laboratory Work

Since the course does not have an assigned Targil period, the Laboratory period will function as both a review forum and a chance to apply the concepts learned in class. Most Laboratory periods will feature a programming task, some of which will be spread over several periods.Students may ask questions during the session and the instructor will answer all questions and issues posed.

Any laboratory task will be based on material covered in previous lecture or readings, not new material. The laboratory tasks will not be taken into consideration in the final grade.

Some laboratory periods will be dedicated to help student groups make progress on their programming assignments.

8 Attendance

Students are responsible for all material presented in class, recitation, and laboratory sessions, all assigned readings, and all material provided for additional reading out of class.

Attendance of lectures and targil sessions is expected and required for this course. As per College policy, a student who misses 20% or more of the lectures of targil sessions may not be permitted to take the final exam. Attendance will be taken from time to time, but will not be taken directly into consideration in the calculation of the course grade. Students who miss lectures do so at their own risk and expense and will be expected to make up missed material on their own.

Students who know they will be missing two or more lectures due to circumstances beyond their control should inform the instructor as soon as possible before or after the fact to prevent misunderstandings or problems at the end of the semester.

Students who miss a lecture or targil are recommended to contact their classmates to get notes or find out what material was covered. The course syllabus and web page will also indicate the material covered and have the slide sets presented at all lectures.

8.1 Decorum

Students who attend lecture are expected to give their full attention to the material. Talking on cellular phones, text messaging, or other disturbing behavior will not be tolerated. Students who need to speak on the phone during lecture time or are expecting urgent messages *must* leave the classroom quietly, conduct their business, and return when they can participate fully in the class.

Students must arrive to lectures **on time, within the first 5 minutes of class.** As per college policy, the instructor reserves the right to expel from the classroom any student who enters more than 5 minutes late for lecture or who is disturbing others.

9 Submissions

9.1 How to Submit Work

To ensure timely submission of projects and work, students **may only submit work via the Telem system, in person, or to the course email address (`ise431@gmail`)**. Materials sent in any other

manner risk being ignored or ungraded without consideration of their merits. Technical issues with the Telem software should be directed to the information technology support staff in Kinneret College who will address them in a timely manner.

9.2 Late Submission Policy

Students are expected to be on time with their assignments. Each assignment must be turned in by the date it is due.

Each student may turn in **one** assignment up to 7 days late without penalty. Subsequent assignments will be assessed a 20% penalty for up to 4 days late and a 30% penalty for up to 7 days late. After 7 days, any assignment will be accepted with a 60% penalty until January 24, the last day of classes in the semester, until the solutions are posted on line, or any date announced by the instructor.

Students who are called up to Miluim duty will have their assignment deadlines extended in accordance with college policy.

10 Exams

There will be a single exam at the end of the course. The final exam will be worth **60%** of the course grade and will be scheduled in accordance with the Mador Bechinot of Kinneret College. In accordance the School of Engineering rules, the final will be three (3) hours long, will cover all of the material in the course, and is a required element of the course grade.

11 Grading

Final grades will be calculated by combining grades from projects, laboratory assignments, and exams. The grades are weighted as follows:

4%	Quizzes
36%	Programming Projects
60%	Final exam

The instructor will not address questions about specific individual grades during the lecture or review sessions. Students may contact the instructor *in person* during office hours or after the lecture/review sessions at the instructor's convenience.

Students may request a regrade for exams or programming projects using the regrade request form found on the course web site. The instructor will regrade the entire item submitted, without prejudice to the grade previously assigned to it.

12 Books

The following books are used for the class: Tanenbaum [5], Kurose and Ross [2], Coulouris, *et. al* [1], and Tanenbaum and Van Steen [6].

The library has copies of the books listed, but students are encouraged to purchase the books as needed.

A bibliography of the books and articles used in the course of the semester is shown below.

13 Cheating

Cheating of any sort will not be tolerated. Student collaboration is encouraged, but within limits as set forth in the college's rules on academic integrity. Any students caught cheating will be immediately referred to the office of the Deacon and may receive a failing grade for the course.

Cheating includes:

- Copying information, content, or verbatim text to answer questions, solutions, or aid in programming projects from other students, internet sites, books (other than the ones listed in the bibliography), other other unaffiliated individuals.
- Copying source code **without attribution** from other students, **web sites**, online repositories, text books, open source programs, or other unaffiliated individuals.
- Other forms of academic misconduct as described on the site: `www.vpul.upenn.edu/osl/acadint.html` or as reasonably assessed by the instructor, program head, or deacon.

14 Contact Information

Instructor:	Michael J. May
Email:	`mjmay@kinneret.ac.il`
Office Hour:	Monday 10am-11am or by appointment

References

[1] Jean Dollimore George Coulouris and Tim Kindberg. *Distributed Systems: Concepts and Design*. Addison Wesley, 4th edition, June 2005.

[2] James F. Kurose and Keith W. Ross. *Computer Networking: A Top-Down Approach*. Addison-Wesley, 4/E edition, 2008.

[3] Abraham Silberschatz, Henry F. Korth, , and S. Sudarshan. *Database System Concepts*. McGraw Hill, 5th edition, 2006.

[4] Ion Stoica, Robert Morris, David Karger, M. Frans Kaashoek, and Hari Balakrishnan. Chord: A scalable peer-to-peer lookup service for internet applications. In *SIGCOMM '01: Proceedings of the 2001 conference on Applications, technologies, architectures, and protocols for computer communications*, pages 149–160, New York, NY, USA, 2001. ACM.

[5] Andrew S. Tanenbaum. *Computer Networks*. Prentice-Hall, 4th edition, 2003.

[6] Andrew S. Tanenbaum and Maarten Van Steen. *Distributed Systems: Principles and Paradigms*. Prentice Hall, 2nd edition, October 2006.