# CS402a/CS535a: Distributed and Parallel Systems

## Fall 1994

This course will study the fundamental aspects of modern distributed and parallel systems. This term, the course will be focusing more on distributed systems. Issues concerned with distributed systems such as transparency, communication, resource sharing, fault tolerance, scalability, consistency, and security as well as those concerned with designing, developing, and managing distributed applications and services will be covered in this course.

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|---|---|
| Lecture Hours: | 9:00 – 10:00 am, Tue, KB103 |
| | 10:00 – 11:00 am, Wed, KB103 |
| | 9:00 – 10:00 am, Thu, KB103 |



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| Instructor: | Dr. James W. Hong |
| Office Hours: | 11:00 am – 12 noon Tue & Thu |
| Office: | MC 28A-1 |
| Phone: | ext. 6906 |
| E-mail: | `jwkhong@csd.uwo.ca` |



## Required Texts.

Two books are required for this course and both are available for purchase from the University Bookstore.

- G. Coulouris, J. Dollimore and T. Kindberg, *Distributed Systems: Concepts and Design*, Second Edition, Addison-Wesley, ISBN 0-201-62433-8, 1994.
- John Bloomer, *Power Programming with RPC*, O'Reilly & Associates, Inc., Sebastopol, CA, ISBN 0-937175-77-3, 1992.

## Suggested References.

- Sape Mullender, *Distributed Systems*, Second Edition, Addison-Wesley, ISBN 0-201-62427-3, 1993.
- M. Sloman and J. Kramer, *Distributed Systems and Computer Networks*, Prentice-Hall International, Englewood Cliffs, NJ, ISBN 0-13-215864-7, 1987.
- A. S. Tanenbaum, *Modern Operating Systems*, Prentice-Hall, Englewood Cliffs, NJ, ISBN 0-13-588187-0, 1992.

- M. Singhal and N. G. Shivaratri, *Advanced Concepts in Operating Systems*, McGraw-Hill, Inc., New York, NY, ISBN 0-07-057572-X, 1994.
- W. Rosenberry, D. Kenney and G. Fisher, *Understanding DCE*, O'Reilly & Associates, Inc., Sebastopol, CA, ISBN 1-56592-005-8, 1992.
- J. Shirley, W. Hu and D. Magid, *Guide to Writing DCE Applications*, Second Edition, O'Reilly & Associates, Inc., Sebastopol, CA, ISBN 1-56592-045-7, 1992.
- OSF, *OSF DCE Application Development Reference*, PTR Prentice-Hall, Englewood Cliffs, NJ, ISBN 0-13-643834-2, 1993.
- H. W. Lockhart, Jr., *OSF DCE: Guide to Developing Distributed Applications*, McGraw-Hill, Inc., New York, ISBN 0-07-911481-4, 1994.
- D. Cerutti and D. Pierson, *Distributed Computing Environments*, McGraw-Hill, Inc., New York, ISBN 0-07-010516-2, 1993.
- S. M. Shatz, *Development of Distributed Software: Concepts and Tools*, Macmillan Publishing Company, New York, ISBN 0-02-409611-3, 1993.
- S. J. Leffler, M. K. McKusick, M. J. Karels and J. S. Quaterman, *The Design and Implementation of the 4.3BSD UNIX Operating System*, Addison-Wesley, Reading MA, ISBN 0-201-06196-1, 1989.
- A. S. Tanenbaum, *Computer Networks,* 2nd edition, Prentice-Hall, 1988.


## Assignments.

There will be four assignments (worth 50% of the final mark), some involving programming in C on Unix. All assignments must be typed, typesetted or wordprocessed. All assignments are due in class on the specified day. Table  lists the due dates and expected loads and their weights of planned assignments this fall:

| Assignment | Due Date | Groups | Expected Load | Weight |
|---|---|---|---|---|
| 1 | Sep 29 | No | Medium | 8% |
| 2 | Oct 20 | Yes | Medium | 10% |
| 3 | Nov 10 | Yes | Medium | 12% |
| 4 | Dec 01 | Yes | High | 20% |

Late assignments may be handed in, but there will be a penalty of 20% of the mark for assignments turned in less than one day late, and an additional penalty of 10% for each day thereafter.

The first assignment is to be done individually. The second and third assignments can be done individually or in groups of two. The last assignment can be done in groups of up to three. Discussing assignments is encouraged, but the ones you (or your group) hand in must be your (or your group's) own.

**Cheating Policy** — The default cheating policy is: Students are directed to "Scholastic Offenses" *pp* 30–1 of the *Academic Calendar* for a description of unacceptable conduct regarding assignments. The maximum penalty for the first offense is −100% for the assignment in question. Offenses are kept on file. Students are directed to "Penalties" *pp* 31 of the *Academic Calendar* for a list of other penalties if this unacceptable conduct occurs repeatedly.

## Exams.

There will be two in-class quizzes (worth 5% each of the final mark) during the course of the term. There will be a three-hour, closed-book final exam (worth 40% of the final mark), which will be scheduled by the registrar's office. To obtain a passing mark in the course, the weighted average of the final exam and the quizzes must be at least 50%.

## Computing Facilities.

Your basic facility is the `GAUL` (Graphics and Undergraduate Laboratory), which consists of Sun servers (via X-terminals) and IBM RS/6000s.

## Computer Accounts.

Most of you should have accounts already. If you have problems with your account or need a new account, please see Bruce Richards (MC 345).

## Printing.

Both line printers and laser printers are available for use by students. Line printers are encouraged to be used for debugging purposes and laser printers are recommended for the final output and documentation. Laser printing is costly so please use it wisely.

## Reading the News.

The newsgroup `uwo.csd.cs402` has been set aside for course use. You can read and post news to this newsgroup using the Unix commands `rn` (or `trn`, `xrn`) and `Pnews`, respectively.

In this newsgroup you will find changes to the lecture schedule, clarifications to the assignments, etc. *It is your responsibility to read this newsgroup on a daily basis.* There is likely to be little information at the beginning, but more as the course progresses.

## Course Topics

The following are tentative topics that will be covered in the course.

- Introduction to Distributed Systems
- Characteristics of Distributed Systems
- Design Goals and Issues
- Transparency
- Communication
- Remote Procedure Call (Sun RPC, DCE RPC)
- Naming
- Time and Coordination
- Replication
- Shared Data and Transactions
- Concurrency Control
- Fault-Tolerance
- Security
- Management
- Distributed Computing Environments (OSF DCE, ANSAware)
- Distributed Programming Languages
- Distributed Operating Systems (Mach, Amoeba, V System, Chorus)