

CSC 2221: Theory of Distributed Computing

St. George Campus, Fall 2010

This course studies fundamental models and problems in distributed computing with an emphasis on synchronization and fault tolerance. Algorithms and impossibility results will both be considered.

For the purposes of breadth requirements, it counts as methodology 1 (Analysis and Computation in Discrete Models) and research area 9 (Distributed Computing).

Professor: Faith Ellen <faith@cs.toronto.edu>, SF 2302B, 416-978-6183

Teaching Assistant: Avery Miller

Time: Thursdays 12:10pm to 2:00pm (although we may sometimes continue until 2:30pm)

Textbook: Attiya and Welch, Distributed Computing: Fundamentals, Simulations, and Advanced Topics, second edition, Wiley, 2004.

It is available online, through the University of Toronto Library, as an electronic resource.

Prerequisite: A course in algorithm design and analysis.

Grading: Students taking the course for credit will be required to do homework assignments and give a class presentation.

In homework assignments, students will be expected to design algorithms, prove algorithms correct, analyze the complexity of algorithms, and prove impossibility results.

The presentation is a lecture about 15 minutes in length describing an interesting idea or result from the theory of distributed computing. Good sources of material are PODC and DISC proceedings, journals, and text books. Half of the mark will be for understanding of the topic, the other half will be for the quality of the presentation. This will include convincing the class that the topic is interesting. Presentations will occur in December. I will meet with each person, individually, when they have a draft of their presentation ready, to suggest ways to improve it.

Tentative List of Topics

Message Passing Models

Broadcast

Spanning Tree Construction

Asynchronous Shared Memory Models

Mutual Exclusion

Consensus

Byzantine Agreement

Snapshots

Approximate Agreement

Consensus Hierarchy

Universality of Consensus

Simulations

Timestamps

Renaming