94.536 Mobile Computing Systems
Fall 2002

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Wireless Communication and Mobile Applications are recent paradigms in communications and computer science. This course will provide an introduction and overview of communication alternatives for mobile data applications, focusing on mobility-related aspects of higher-level protocols, and examines in depth the infrastructure, available services, and application paradigms for mobile applications. The course prerequisite is a course in computer or data networks.

Resources: There is no single textbook that adequately covers the diverse range of topics (and buying multiple textbooks is clearly not very appealing financially). One reasonably complete book is Mobile Communications, by Jochen Schiller, Addison-Wesley 2000, ISBN 0-201-39836-2 (with the 2nd edition expected to become available soon). I made copies of my set of transparencies available as course notes and they are available via the IEEE student society. The notes have an extensive list of references in the Appendix. I will post these notes, plus other reference material, on the course webpage, http://kunz-pc.sce.carleton.ca/sce536/. I will also post marks, assignments, and sample solutions on this webpage.

Marking Scheme: There will be a two assignments worth 10% each, a midterm exam worth 30%, and a course project, which is worth 50% total (5% will be assigned based on the project proposal, and 45% will be based on the final report). All documents have to be submitted as a hardcopy and softcopy, and follow certain formatting guidelines (in particular length and font size limitations). See below for a discussion of these requirements..

Due Dates: The midterm exam will be in class (first hour) on November 1. The project proposal is due in class on October 4. The final project report is due November 29.

	Due Date	Weight
Project Proposal	October 4	5 %
Assignment 1	October 18	10 %
Midterm Exam	November 1	30 %
Assignment 2	November 15	10 %
Final Project Report	November 29	45 %

Cheating: Suspected academic offences (cheating) will be investigated and reported to the Dean of Graduate Studies and Research, see also General Regulation 14. Cheating covers a wide range of offences, including submitting another student's work as your own solution, or committing an act of plagiarism. A more detailed description of what constitutes plagiarism is available on the WWW (http://www.zoology.ubc.ca/bpg/plagiarism.htm).

Project: 50% of your mark will be determined by a course project. You have two options for the project: you can work individually on a *literature survey and research proposal*, or actually do a small *research project* in a team of up to 2 students. For the research proposal, explore a technical concept related to the course, present the results in a cohesive format, and suggest in-depth a research project that would extend the reviewed state-of-the-art. For the research project, you may want to team up with a partner of your choice, explore a technical concept related to the

course and, with the use of publicly available software tools, conduct experiments and analyze the results. These experiments should aim to explore previously unknown facts/insights. To ensure that students are on the right track, I require a 2-page proposal by October 4 the latest. This proposal should outline the suggested topic and why it is relevant to the course, provide the suggested structure of the final report, and list references to be used in the research. For a team-effort, only one (joint) proposal is necessary. The final report is limited to at most 15 pages (counting everything). The following points should be kept in mind when researching project topics:

- use publicly available references, academic journals, conference proceedings (I expect each final report to be based on at least 5 articles that appeared in traditional academic venues, plus references derived from the WWW and other sources), the majority of which were published within the last two years
- projects should not "rehash" course content: assume that everything discussed in the course, as demonstrated by the course notes, is known to a reader of the report
- reports and suggested research should focus on **technical** issues, not marketing

The submissions have to use 11pt fonts or larger, printed single-sided with 1in margins all around. The text may be typeset single-spaced. Some other formatting requirements are:

- cover page, table of content, abstract, and reference list are mandatory for the final report
- for research proposal, the proposal itself should be at least 5 pages long, including: what problem(s) to address, suggested solutions, how to test your idea, expected outcomes, etc.
- for research efforts, the description of the experiments, results, and their analysis (including a comparison to related work) should at least be 5 pages as well.

Failure to adhere to these requirements will result in a loss of up to 30% of the project mark.

Outline:

- Introduction and History
  - overview of technologies for wireless communication
  - marketplace (growth, dominant technologies)
- Data in Wireless Cellular Systems
- Data in Wireless Local Area Networks
  - Wireless LANs: WaveLan, IEEE 802.11
  - Personal Area Networks: Bluetooth
  - High-Speed Wireless Networks: HiperLan
- Internet Protocols, Mobile IP
- Routing in ad-hoc networks
- TCP over Wireless Link
- Services and Service Discovery
- System Support for Mobile Applications
  - Theoretical Model
  - File Systems and Databases
  - Wireless WWW
  - WAP (Wireless Application Protocol)