94.581 Advanced Topics in Computer Communications: Mobile Computing

Winter 2001

Tue & Thu 11:30 am – 1 pm

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Wireless Communication and Mobile Applications are relatively new paradigms in communications and computer science. This course will provide an introduction and overview of wireless 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 developers of mobile applications. The course prerequisite is a course in computer or data networks.

Resources: There is no single textbook that adequately covers such a 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. I made copies of my set of transparencies available as course notes and they are available in the bookstore. 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/sce581/. I will also post marks, assignments, and sample solutions on this webpage.

Marking Scheme: There will be a midterm exam worth 20%, a final exam worth 30%, and a course project, which is worth 50%. To obtain the full marks on the course project, students will have to submit a project proposal by Thursday, January 26. The proposal should be submitted via e-mail to tkunz@sce.carleton.ca, and be about one page (60 lines of ASCII text) long (see below for a discussion of the project requirements). You will receive feedback on the proposal within one week.

Due Dates: The midterm will be in class, on February 27, the final exam will be in class on April 3. The project report is due April 8.

	Handed Out	Weight
Midterm Exam	February 27	20 %
Final Exam	April 3	30 %
Project Report	April 8	50%

Cheating: Collaboration on assignments and the project is not permitted. Suspected collaboration will be investigated and will be reported to the Dean of Engineering, see also General Regulation 14. Cheating covers a wide range of offences, including submitting another student’s work as your own solution or providing solutions to assignments that are copied from publicly available material without proper citation.

Project: 50% of your mark will be determined by an individual course project. The idea is to have students independently explore a technical concept related to the course, present the result in a cohesive format, and to suggest a research project that would extend the reviewed state-of-the-art. To ensure that students are on the right track, I require students to submit a 1-page proposal by January 26 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. The following points should be kept in mind when research 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)
- make sure reports do not “rehash” course content
- reports and suggested research should focus on **technical** issues, not marketing

The final report should be at most 15 pages in total (including cover page, Appendix, TOC, …..), use 11pt font or larger, printed single-sided with 1in margins all around. The text may be typeset single-spaced.

Outline:

- Introduction and History
  - overview of technologies for wireless communication
  - marketplace (growth, dominant technologies)
- Data in Wireless Cellular Systems
  - radio access schemes
  - CDPD, GSM (GPRS), IMT-2000
- Data in Wireless Local Area Networks
  - Wireless LANs: WaveLan, IEEE 802.11
  - Personal Area Networks: Bluetooth
  - High-Speed Wireless Networks: HiperLan
- Internet Protocols
  - IP
  - DHCP
  - Mobile IP (in IPv4 and IPv6)
- Routing
  - review of standard Internet routing
  - routing in ad-hoc networks
- TCP over Wireless Link
  - “standard” TCP protocol
  - TCP performance over wireless link: I-TCP, snoop
- Services and Service Discovery
  - DNS as an example of a service
  - RFC 2165 (Service Location Protocol)
  - Jini: Overview, Service Discovery
- System Support for Mobile Applications
  - Theoretical Model
  - File Systems and Databases
  - Wireless WWW
  - WAP (Wireless Application Protocol)