# CS 218
# *Advanced Computer Networks*
# Quarter: Fall 2003

Course ID : CS218

Class hour : MW 8:00 - 10:00 pm

Classroom : BH 5273

# Course Admin Details

- **Prof Mario Gerla: BH 3732 F gerla@cs.ucla.edu**
- **Office Hrs: MW 10-12AM; or by appt**
- **TA: Kaixin Xu BH 3803 {xkx@cs.ucla.edu}**
- **Prerequisites : CS 118 or equivalent**
- **Course grading**
  - Class participation : 5%
  - Homework : 10%
  - Midterm : 35%
  - Term project/presentation : 50%

# Course objectives

- Expose students to active research areas in the field of networking
- This year, we target wireless networks (W-LANs, ad hoc nets and 3G) and the Internet protocols (QoS routing, multicasting, TCP congestion control and P2P).
- Student teams will study a specific topic in more depth via a term project involving analysis, simulation, implementation, measurements

# Course Outline

## A. Wireless Networks

i. Wireless LANs (802.11, Bluetooth); MAC layer protocols
ii. Ad hoc wireless networks (routing, clustering, multicast, Qos support, ad hoc TCP)
iii. Cellular systems (GSM, GPRS, UMTS)

## B. Internet protocols

i. Congestion control, TCP , streaming
ii. Routing; QoS routing
iii. Multicast
iv. P2P

# Recommended Textbooks

- S. Keshav, "An Engineering Approach to Computer Networking," Addison Wesley, 1997. (*Recommended*)
- D.E. Comer, "Internetworking with TCP/IP," Vol. I, Prentice Hall, Third Edition. (*Recommended*)

# CS 218 Fall 2003 Project Topics

**This is a partial list of projects proposed by my own PhD students.**

- **Audio Streaming over Bluetooth Scatternets using Adaptive Link Layer**
- **Enhancing Bluetooth TCP Performance with Bursty Errors**
- **ODMRP - ASYM (with asymmetric links) for Linux**
- **Split traffic multipath ODMRP (Protocol Design and Linux Implementation)**

# Cs 218 Fall 2003 Project topics (cont)

- Infrastructure and ad-hoc ODMRP implementation using Click modular router
- Towards interoperability between 802.11 modes and ad hoc modes
- Simulation of ANODR and ANODV (security)
- MOBI-GLOBUS: A mobile grid computing toolkit for mobile nodes

# CS 218 previous years Project Topics

- Mobility Management based on Mobile IP in Mobile Backbone Networks
- Evaluation of convergence of wireless technologies (eg, W-LAN and UMTS)
- Enforcing End-to-end Security in Wireless Networks
- PARO implementation in QualNet: Power Aware Routing
- QoS Provisioning in Intradomain Networks : Practical System Development

# CS 218 previous years Projects

- Fault Tolerance for Multicast with Bi-directional Tree
- Aggregated Multicast Support in NS2
- TCP Westwood Interaction With Network Layer Active Queue Management Schemes (e.g. RED)
- Efficient retransmission scheme in lossy environment (based on TCP Westwood)

# CS 218 Project grading criteria:

Class presentation style, clarity, organization, conciseness 15

Research value (say, if judged as a research paper to be published at some conference) 0-20

Tutorial value (for papers with predominantly tutorial value, as opposed to research value); clarity of the presentation of the various approaches; classification; comparison etc 0 – 20

References. How careful is the review of prior work ; ie, how complete and consistent is the set of references? How appropriate are the citations? 5

Report (max 15 pg double spaced, including figures and tables); writing style; clarity; organization 10

Total: 50

# CS 218 Fall 2003 Schedule

- Sept 29, Oct 1: Wireless LANs, MAC layer HW #1; Note: by Oct 1st projects are finalized and posted
- Oct 6,8: Wireless Ad hoc net intro; routing, multicast; HW #2
- Oct 13,15: Wireless ad hoc: QoS, adaptive voice/video applications; ad hoc TCP.; HW #3 Note by Oct 13: students submit team project proposals. Oct 15 - student projects and presentation schedule finalized
- Oct 20-22 Bluetooth scatternets; wireless cellular (GSM, CDMA,GPRS, UMTS); vertical handoff HW #4

# CS 218 Fall 2003 Schedule (cont)

- Oct 27, 29 Internet congestion control; TCP; streaming HW #5
- Nov 3,5 Internet routing; QoS routing (QOSPF); multicast Hw #6
- Nov 10-12 Holiday; Peer to peer protocols HW #7
- Nov 17-19 Guest lecture and/or class material review; Midterm (19) covering all material up to Nov 12
- Nov 24, 26 Student class presentations
- Dec 1,3,4 Student class presentations (overflow to Dec 2-7PM)
- Dec 12 Final Project Report due (No Final Exam)

# Classes to be rescheduled

- Oct 13 & 15 (Milcom conference)
- Proposed:
- Tuesday  Oct 7 (7:30 – 9:20 AM)
- Thu or Fri Oct 16-17 (8-10 AM)