

**Course:** CSE 788Q07 – Topics in OO systems, design patterns, reasoning about program behavior  
T, R: 11:00 (11:10?) am - 12:18 (11:25?) pm; DL 713.

**Quarter:** Au '09.

**Instructor:** Neelam Soundarajan.

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**Office hrs:** I am generally available; send me mail first.  
Questions by e-mail strongly encouraged.

**Text:** None.

**Course Objectives:** Discuss various aspects of OO systems, design patterns, AOP; reasoning about program behavior; also some discussion of issues in distributed computing, especially those related to reasoning about program behavior. A main focus will be on formal specification and verification issues.

**Topics to be covered:** We will start with a review type discussion of key OO ideas such as encapsulation, inheritance, polymorphism, dynamic binding, etc. Next we will talk about design patterns, how they are used, etc. We will fit in AOP along the way. Next we will turn to specification and, to a lesser extent, verification issues. We will look at work dealing with OO systems, distributed/concurrent systems, and recent work related to patterns. At that point, we will be moving into current research and open problems in the field. Several of you have been involved with this, some quite actively, while others are completely new to the topic; we have to figure out how to deal with this.

**Assignments etc.:** My main interest is in ways to formally reason about program behavior, and I believe there are a lot of interesting open questions in this area; but I am also interested in programming/system building techniques such as OO frameworks software architecture etc. Which brings me to what I will ask you to do. My current plan is to have everyone write two term papers. The first will essentially be a survey type paper on one of several topics, a possible example being *multiple inheritance*. What I would like to see in the paper you turn in is a complete and thorough discussion of the topic, including a discussion of what questions remain open, what attempts have been made to solve them, etc. If you have any ideas for topics for this paper, please let me know. I will try to generate a complete list in the next couple of weeks. I will ask you to submit a draft paper by the end of the fourth week or early fifth week; I will give my comments on the draft a day or two after you give me the draft. the actual paper itself will be due by the end of the sixth week. (If you want to get started now, and have ideas on what topic to write your paper on, talk to me or send me mail.)

The second term paper could be one of two types. For people who don't have much background, it could be another survey paper. For people who do have a decent background, I would like the second paper to be more research oriented. Identify a reasonable, well-defined, problem and try to develop your own solution for it. The problem may already have been solved in which case your goal would be to develop a better solution. An example of such a problem would be the *inheritance anomaly* problem.

Again you will turn in a draft, perhaps by the end of the eighth week or early ninth week. The final version will be due early in the exam week. An alternative, especially for people who have been working on these topics for some time, would be to present their work during a class session. I will talk individually with those of you that I know have been doing some work on these topics; if you have an OO/patterns-related

topic (or possibly concurrency/distributed systems-related topic that has some connection with OO) that you have looked at (not necessarily done any research but studied it in some depth, and would like to make a presentation, talk to me about it.

**Final comment:** I have taught this course a couple of times now but my ideas on how to run it are still somewhat nebulous. A main concern is the wide range of student backgrounds. If you have any suggestions, I would be very interested in hearing them. And, of course, please do speak up in class so we can have some interesting discussions. Also if there is any related topic that you would like to make a presentation on, let me know and we will try to fit that in.