Class Sessions:

Day: Monday
Time: 3:30 pm – 6:10 pm
Room: OHE 120 (Webcasted Course)
Class Number: 32319D (DEN/Off-campus) and 32349D (On Campus)

Contact Information:

Instructor: Dr. Azad Madni
Office hours: By Appointment Only
Office location: RRB 201
Office phone: (213)-740 9211
E-mail: azad.madni@usc.edu

TA: Edwin Ordoukhanian
Office hours: By Appointment Only
Office location:
Office phone: (818)-720-2682
E-mail: ordoukha@usc.edu

Course website http://www.uscden.net (DEN Blackboard, login required)

Course Learning Objectives:

• To improve students’ ability to think critically, ask the right questions, and apply the right methods when architecting various types of systems.
• To improve students’ understanding of the role of system architects and their relationship to systems engineers and systems engineering.
• To introduce the students to new, advanced multidisciplinary topics (e.g., systems thinking, systems modeling, psychological principles in systems architecting, biologically-inspired architectures, agent-based modeling, human capabilities and limitations) relevant to complex systems architecting.
Readings:


Second Reader for SAE 549, Fall 2010 “Selected Readings”
These readings were culled from papers by Dr. Madni and others.


Recommended Reading:


Notes:
Weekly class notes/charts will be provided. They will be posted on the DEN Blackboard.

IF YOU WANT HELP

Our phone numbers and e-mail addresses are listed at the top of this syllabus.

We encourage you to e-mail us if you have any questions about the Research Paper and difficulties with understanding course materials. The usual turnaround time for emails is 24 hours. If you don’t hear from us within that timeframe, please send us a reminder.

Always include the TA in any email sent to me. Questions pertaining to homework, due dates, mid-term, and final term paper should be addressed to the TA directly.

GRADE

Your grade will be based on Homework, Mid-term Exam, and a Final Research Paper. Homework and Mid-term will each account for 30% of the class grade. The Final Research Paper will account for the remaining 40% of the final grade.
HOMEWORK

Homework assignments will be assigned typically a week before they are due. They will be posted in the “Assignments” area on Blackboard. For example: Describe and analyze the architecture of a selected system in terms of any or all of the class concepts presented in Lecture XYZ. Your analysis should provide a quantitative and qualitative evaluation of the characteristics, benefits, and limitations of that system. Exploration of heuristics relative to that system is strongly encouraged.

LENGTH: Homework should be no more than 2 pages, single-spaced, in 12-point type, in the normal profile orientation. It is highly recommended that students stay within the 2-page limit.

DELIVERY: All homework should be submitted through Turnitin. Links for submitting the assignments will be available under “Assignment” section of DEN Blackboard 48 hours before the deadline.

GRADING: Each homework will be graded on the 0 to 100 scale. Your grade would depend on the qualitative and quantitative analysis.

LATENESS: Any homework submitted after the time it was due, will be penalized 10% of the maximum possible score for the first 24 hours. For every additional day that it is late, it will be penalized a further 10% per day. Any homework submitted 10 days after the deadline automatically will get 0. You can request the instructor (copy the TA), for an extension, ahead of the deadline for an assignment. Most if not all assignments are due on Monday at 3:30 pm. Therefore, an extension must be requested no later than Friday noon.

MIDTERM EXAM

The mid-term will consist of multiple questions requiring short answers. It will test the students’ knowledge about the fundamentals of systems architecting, critical thinking, and systems thinking. This will be an online, open book exam on all the subjects from Lecture 1 to Lecture 6. It will be during regular class time on March 9 from 3:30pm to 6:10pm. You will have 2 hours and 40 minutes to finish the exam.

RESEARCH PAPER GUIDELINES

RESEARCH PAPER:

The Research paper should address the following research problem:

Describe and analyze the architecture of a selected system in terms of any or all of the class concepts presented in lectures. Your analysis should discuss how the architecting process led to the architecture. The architecting process should address, to the extent possible, the key tradeoffs, the steps taken, the questions asked, the people involved, the options generated, the
decisions made, and the techniques used. The analysis of the system should also include a quantitative and qualitative evaluation of the characteristics, benefits, and limitations of the selected system as a result of the aforementioned activities.

The Research paper should be of sufficient quality for potential submission to a reputable IEEE/INCOSE/IIE/AIAA conference, with the eventual goal of submitting it to a journal.

The student gets to propose the topic, subject to my approval:
- It can be something that the student has been personally involved in, or something that is of interest to the student.
- It should address a system where the architecting/development process is well-documented, and the measures of effectiveness, are available in the public domain.

**APPROVAL:** Submit a one-page proposal on the topic for approval, and is due on February 23, 2015 by 3:30 PM. Follow the research paper guideline available on course website.

**LENGTH:** The Research Paper should be no more than 12 pages, single-spaced, in 12-point type. The Research Paper is due on or before April 27, 2015 at 3:30 pm.

**DELIVERY:** The research paper proposal, and main research paper should be submitted through Turnitin. Links for submitting the assignments will be available under “Assignment” section of DEN Blackboard system (http://den.usc.edu).

**GRADING:** Each research paper will be graded on the letter scale: A, A-, B+, B, B-, etc. Your research paper grade will require writing a paper that would be instructive or of general interest to systems architects, including those who may not be necessarily interested in the particular system you analyze.

**LATENESS:** Research papers are due on April 27, 2015 at 3:30 pm. No late papers will be accepted after the due date and time, and the student will receive an automatic F grade for a paper.

**ADDITIONAL INFORMATION**

- Policies and procedures for submitting homework and exams (via DEN for all students) are available on the GAPP website (http://gapp.usc.edu/graduate-programs/den/getting-started/policies-procedures). *Students are responsible for understanding and following these policies and procedures.*

- There have been previous attempts of students to copy someone else’s text into their papers or homework. *Never copy text in to your file without marking it with a citation. Never attempt to copy text into your file and then “edit it into your own words.”* All the text that you turn in that comes from somewhere else must be marked as quotation. All the ideas that you turn in that come from someone else must be cited. The default punishment for plagiarism by a graduate student is failing the course, and expulsion is possible.
- If English grammar, spelling and syntax are not your strong points, *I strongly suggest that you obtain help in editing your text*. Your grade depends on the clarity of presentation.

**UNIVERSITY LEVEL ISSUES**

**STATEMENT FOR STUDENTS WITH DISABILITIES:**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

**STATEMENT ON ACADEMIC INTEGRITY:**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. *Scampus*, the Student Guidebook, contains the Student Conduct Code in Section 13.00, while the recommended sanctions are located in Appendix A: [https://scampus.usc.edu/university-student-conduct-code/](https://scampus.usc.edu/university-student-conduct-code/). Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: [http://www.usc.edu/student-affairs/SJACS/](http://www.usc.edu/student-affairs/SJACS/).
### Schedule of Class Sessions:
The exact schedule is likely to change, based on availability of guest lecturers. Dates of readings may change to align with other schedule adjustments. Changes will be announced.

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<thead>
<tr>
<th>2015</th>
<th>Session number: Planned topics</th>
<th>Readings</th>
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<tbody>
<tr>
<td>Jan 12</td>
<td>1: Introduction to the SAE Program, the course, the instructor, and the systems architecting discipline</td>
<td>1. “Preface” of Rechtin, 1991</td>
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<td>Jan 19</td>
<td>Martin Luther King Day, University Holiday</td>
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<td></td>
<td>Homework #1 assigned</td>
<td>“Selected Readings”:</td>
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<td>Homework #1 due</td>
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<td>Feb 9</td>
<td>4: Guest Lecture 1:</td>
<td>“Selected Readings”</td>
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<td>Homework #2 due.</td>
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<td>Feb 16</td>
<td>President’s Day, University Holiday</td>
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<td>Research Paper Proposal Due</td>
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<td>“Selected Readings”</td>
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<td>Date</td>
<td>Session number: Planned topics</td>
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<td>Mar 9</td>
<td>7: MIDTERM</td>
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<td>Mar 16</td>
<td>Spring Break</td>
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| Mar 23| 8: Agile Systems Architecting and Engineering | “Selected Readings”:  
| Mar 30| 9: Human-System Integration: Implications for Systems Architecting | “Selected Readings”:  
| Apr 6 | 10: Guest Lecture 2: | No additional readings. |
| Apr 13| 11: Manufacturing & Production, Acceptance Testing & Operation: Architecting Implications | “Selected Readings”:  
1. Ch 6, 7 and 8 from (Rechtin, 1991).  
2. Military Innovation in the Interwar Period by Murray and Millett |
| Apr 20| 12: Guest Lecture 3: | “Research Paper Due” |
| Apr 27| 13: Course Review |  
| May 4 | 14. No Class, Study Days |          |