

**Class Session:** Thursdays, 6:40 – 9:20 pm, Online & Olin Hall of Engineering (OHE) 114 On Campus

**Class Section:** 32301D (DEN/Off-campus) and 32331R (On Campus)

**Contact Information:**

Instructor: Kenneth Cureton  
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Course Builder: Trent Rule  
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**Course Description**

Systems engineering is an essential part of achieving success for system products, services, and processes in important domains such as Aerospace & Defense, Transportation, Medical, and Energy Management. As such systems become increasingly complicated and complex, fundamental concepts and rigor become increasingly important throughout the system life cycle: from concept evaluation through retirement. This class provides both theoretical and practical knowledge needed for conceptualizing, designing, supporting, and evaluating today's and tomorrow's systems.

**Course Learning Objectives:**

- Introduce students to Systems Engineering support of design processes, architecture concepts, operations concepts, systems integration, and life-cycle support concepts
- Explore means for performing trade studies and evaluating risk
- Introduce system Verification, Validation, Quality, Test, Specialty Engineering, Security, and Mission Assurance concepts
- Familiarize students with various standard Systems Engineering Handbooks and Guides and related International Standards Organization (ISO) documents
- Discuss representative systems that highlight course concepts

**Prerequisite(s):** None

**Readings:**

- Representative (INCOSE, DoD, NASA, and FAA) Systems Engineering Handbooks, Guides, ISO Standards, and other readings posted on the DEN/D2L system as downloadable PDF files.
- No textbooks are required for purchase in this class.

**Class Assignments:**

- All deliverables for the course must be submitted via the DEN/D2L system.

**Homework Assignments:**

The 12 homework analyses are assigned at the end of most lectures, and homework will be due before class the following lecture. The homework assignments count as 10% of your class grade.

CAUTION! Failure to accomplish the homework assignments will place you at a severe disadvantage in successfully completing the two exams, as the content of those two exams is consistent with the homework assignments!

**Midterm Exam**

The Midterm Exam will cover lecture topics presented in Lectures 1 through 7. The exam will be an individual effort, take-home exam with open book and notes. The exam will be downloadable from the DEN starting on Thursday March 2nd, 2023 at 9:10 PM Pacific Time. Responses must be submitted to the DEN before 6:30 PM Pacific Time on Thursday March 9<sup>th</sup>, 2023.

FORMAT: Microsoft WORD (.DOC or .DOCX) or equivalent (no PDF files, please).

GRADING: The Midterm counts as 45% of your class grade. All late or missing submissions will receive a score of zero. Collaboration on the Midterm is forbidden. Violators will receive an automatic score of zero.

**Final Exam**

The Final Exam will cover lecture topics presented in all lectures (1 through 14). The exam will be an individual effort, take-home exam with open book and notes. The exam will be downloadable from the DEN starting on Thursday April 27<sup>th</sup>, 2023 at 9:10 PM Pacific Time. Responses must be submitted to the DEN before 6:30 PM Pacific Time on Thursday May 4<sup>th</sup>, 2023.

FORMAT: Microsoft WORD (.DOC or .DOCX) or equivalent (no PDF files, please).

GRADING: The Final Exam counts as 45% of your class grade. All late or missing submissions will receive a score of zero. Collaboration on the Final Exam is forbidden. Violators will receive an automatic score of zero.

**Class Grade:**

Your class grade is based on the homework assignments (10% of your class grade), the take-home midterm exam (45% of your class grade), and the final exam (45% of your class grade).

**Schedule of Class Sessions:**

The exact schedule and topics are subject to change. Changes will be announced in class.

<b>Date</b>	<b>Planned topics</b>
1/12	<b>Lecture #1: Introduction to Systems Engineering Concepts / Value of SE</b> (Cureton) <i>Personal Introduction assigned; Homework #1 assigned</i>
1/19	<b>Lecture #2: Systems Engineering Processes Overview &amp; Life Cycles</b> (Cureton) <i>Personal Introduction due; Homework #1 due; Homework #2 assigned</i>
1/26	<b>Lecture #3: Mission/Business Analysis, Stakeholders, Needs, Scope, &amp; CONOPS</b> (Cureton) <i>Homework #2 due; Homework #3 assigned</i>
2/2	<b>Lecture #4: Requirements Analysis and Development</b> (Cureton) <i>Homework #3 due; Homework #4 assigned</i>
2/9	<b>Lecture #5: Functional Analysis and Allocation</b> (Sievers) <i>Homework #4 due; Homework #5 assigned</i>
2/16	<b>Special Topic Lecture: Operations, Maintenance, Disposal</b> (Cureton) <i>No Homework assigned or due</i>
2/23	<b>Lecture #6: Architecture Definition / Design Definition</b> (Cureton) <i>Homework #5 due; Homework #6 assigned</i>
3/2	<b>Lecture #7: Trade Study and Risk Analysis</b> (Sievers) <b><i>Take-Home Midterm Exam assigned (Lecture #1-7 content); Homework #6 due</i></b>
3/9	<b>Lecture #8: Systems Analysis and Control</b> (Cureton) <b><i>Take-Home Midterm Exam Due; Homework #7 assigned</i></b>
3/16	<b>SPRING RECESS--</b> (no class lecture this night)
3/23	<b>Lecture #9: Implementation, Integration &amp; Transition, Interface Analysis</b> (Cureton) <i>Homework #7 due; Homework #8 assigned</i>
3/30	<b>Lecture #10: Cyber-Physical Systems</b> (Sievers) <i>Homework #8 due; Homework #9 assigned</i>
4/6	<b>Lecture #11: Verification, Validation, Quality, Test</b> (Sievers) <i>Homework #9 due; Homework #10 assigned</i>
4/13	<b>Lecture #12: Specialty Engineering, Security, Mission Assurance</b> (Sievers) <i>Homework #10 due; Homework #11 assigned</i>
4/20	<b>Lecture #13: Fault-tolerant and Resilient Systems</b> (Sievers) <i>Homework #11 due; Homework #12 assigned</i>
4/27	<b>Lecture #14: Role of Model-Based Systems Engineering</b> (Sievers) <b><i>Take-Home Final Exam assigned (Lecture #1-14 content); Homework #12 due</i></b>
5/4	<b>Final Exam Week</b> (no class lecture this night) <b><i>Take-Home Final Exam Due</i></b>

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## Statement on Academic Conduct and Support Systems

### Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](https://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, [policy.usc.edu/scientific-misconduct](https://policy.usc.edu/scientific-misconduct).

### Support Systems:

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*  
[studenthealth.usc.edu/counseling](https://studenthealth.usc.edu/counseling)

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*  
[suicidepreventionlifeline.org](https://suicidepreventionlifeline.org)

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call*  
[studenthealth.usc.edu/sexual-assault](https://studenthealth.usc.edu/sexual-assault)

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298*  
[equity.usc.edu](https://equity.usc.edu), [titleix.usc.edu](https://titleix.usc.edu)

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

*Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298*  
[usc-advocate.symplicity.com/care\\_report](https://usc-advocate.symplicity.com/care_report)

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

*The Office of Disability Services and Programs - (213) 740-0776*  
[dsp.usc.edu](https://dsp.usc.edu)

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

*USC Campus Support and Intervention - (213) 821-4710*

[campussupport.usc.edu](http://campussupport.usc.edu)

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

*Diversity at USC - (213) 740-2101*

[diversity.usc.edu](http://diversity.usc.edu)

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

*USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call*

[dps.usc.edu](http://dps.usc.edu), [emergency.usc.edu](http://emergency.usc.edu)

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

*USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call*

[dps.usc.edu](http://dps.usc.edu)

Non-emergency assistance or information.