# ISE-350: Principles and Practices of Systems Engineering

**Units: 4**
**Term—Day—Time:   Spring semester 2025,**
**2 days per week, 1 hour 50 minutes each session**
**Monday and Wednesday, noon to 1:50 pm**

**Location: VHE 210 (Vivian Hall of Engineering)**

**Instructor:   Neil Siegel, Ph.D.**
The IBM Professor of Engineering Management, and

Professor of Practice, Daniel Epstein Department of Industrial and Systems Engineering, and

Professor of Practice, Thomas Lord Department of Computer Science

USC Viterbi School of Engineering

**Office: GER 202C**

**Office Hours:** TBD
(additional office hours are available by appointment – send me an email)

**Contact Info:** nsiegel@usc.edu, 213-740-0263
I usually respond the same day.

**Teaching Assistant / Course Producer:**  TBD
  **Contact Info:**  TBD

**IT Help** (for the Viterbi Desktop and the Rhapsody software)**:** John Ng
  **Hours of Service:** Monday-Friday, 9:00 am to 4:00 pm
  **Contact Info:** johnng@usc.edu

**Course Description**

*Systems as complex collaborative ensembles of interconnected components. Theory and practice of requirements, design, implementation, testing, deployment, operation, and disposal. Case studies from real projects.*

This course is designed for engineering undergraduate students interested in learning about the field of systems engineering.

Society today depends on many large systems – complex ensembles of capability, interconnected so as to provide some benefit not achievable by the individual components. Examples include air traffic control and scheduling, medical systems that optimize care and cost, the power grid that integrates many sources of energy to provide continuous electric service (even in the presence of disruptions and failures of components), systems that coordinate the supply chain of businesses so as to ensure continuous availability of desired products while also reducing waste, and so forth. It is not an exaggeration to say that society as we know and expect it could not exist without such systems, which provide safety, reliability, and affordability for many critical products and services.

Such systems are among the most complex artifacts ever created by humans. How does one learn to design and build such systems? This is the role of the field of *systems engineering*. This course provides an introduction for aspiring practitioners and other interested persons into the art of creating such complex systems for our society.

**Learning Objectives**

By the end of the course, students will be able to:

- Articulate the motivation for systems thinking, and for the use of systems engineering, to address the development of large, complex societal systems
- Explain the systems engineering value-proposition, be familiar with examples of systems that are in use today, and understand the contribution of systems engineering to society
- Analyze the major elements of the *system engineering process*, including the examples (case-studies) drawn from real projects
- Describe the complete *system life-cycle* (requirements, design, implementation, test, deployment, operations and maintenance, disposal), key leverage points, and key lessons-learned from actual large projects, to address the development of large, complex societal systems
- Solve systems engineering problems, reflecting roles ranging from an entry-level position on a large project, to chief systems engineer on a large project, using the methodologies, tools, representations, and analysis methods used in systems engineering, taught through the case studies from actual projects that are presented in the class. These case studies cover both the technical and social aspects of being an effective systems engineer, including dealing with our non-technical stake-holders (which might include those who make procurement decisions, those who make funding decisions, those who make applicable laws and regulations, our customers and users, and (increasingly) the general public and the media), as well as our fellow engineers and scientists.
- Summarize the basic diagrammatic representations used in systems engineering, in support of addressing the development of large, complex societal systems
- Create systems engineering diagrams for use-cases (sample problems) provided by the professor, such as the OV-1, N2, OV-2, mission threads, decision tree, quality functional deployment (QFD)

- Create automated SysML representations of a use-case using a computer-based systems engineering tool (IBM Rational Rhapsody)
- Solve example problems using the systems engineering analysis techniques taught in the lectures

**Prerequisite(s):** ISE 225 *Engineering Statistics I*, or a similar statistics course
**Co-Requisite(s):** None
**Concurrent Enrollment:** None
**Recommended Preparation**: None

**Course Notes**
The course may be taken only for a conventional letter grade.

Lecture, 110 minutes, once per week.

Facilitated lab session, 110 minutes, once per week.

Outside study and homework includes reading assignments, short written summaries of those readings, individual study to master the lecture materials, and completion of projects started during the weekly facilitated lab sessions.

The professor will hold office hours each week for students of this class, and will also be available for consultation via email, phone, and Zoom.

Lecture slides will be posted on the Brightspace learning management system.

**Technological Proficiency and Hardware/Software Required**
The IBM Rhapsody software will be used for a 4-week section of the course. That portion of the course will require ***that the students each load the Rhapsody software onto their own laptop computer*** (via the USC Viterbi "MyDesktop", which is available for both Windows and Macintosh computers). There may also be a USC computer laboratory that has that software already installed that is available to students.

The course lectures will be available in Microsoft PowerPoint (or occasionally Adobe Acrobat Reader) format. Registered USC students can obtain copies of Microsoft PowerPoint at:

http://itservices.usc.edu/officestudents/

Adobe Acrobat Reader is available for free from the Adobe web site.

**Required Readings and Supplementary Materials**
Each student will be required to purchase *two textbooks* for this class:

1. "Principles of Systems Engineering", Neil Siegel.  Book Baby, 2022, ISBN-13: 978-1-66788-150-8 (hard-cover edition).  This text is available via the USC bookstore, and also via on-line sources such as Amazon.com (https://www.amazon.com/Principles-Systems-Engineering-Neil-Siegel/dp/1667881507/ref=sr_1_6?keywords=neil+siegel&qid=1674535932&sprefix=neil+siegel%2Caps%2C136&sr=8-6).  The cover looks like this:
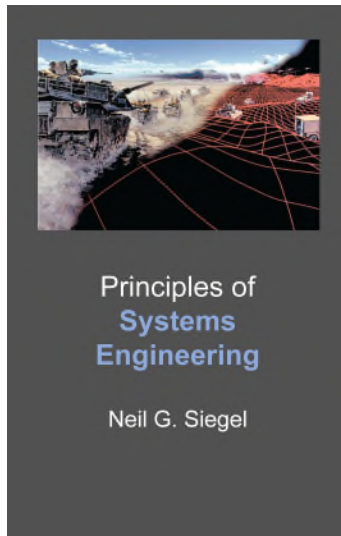


- "Engineering Project Management: A Hands-On Guide for Successful Engineering Projects", 2nd Edition, Neil Siegel, Wiley, ISBN-13: 978-1394242986.  This text is available via the USC bookstore, and also via on-line sources such as Amazon.com (https://www.amazon.com/Engineering-Project-Management-Hands-Successful-dp-1394242980/dp/1394242980/ref=dp_ob_title_bk).  Note that the required textbook is the *2nd edition*; use of the 1st edition is not suitable, as there is a lot of material added to the 2nd edition that is covered in the course.  The cover of the 2nd edition looks like this:
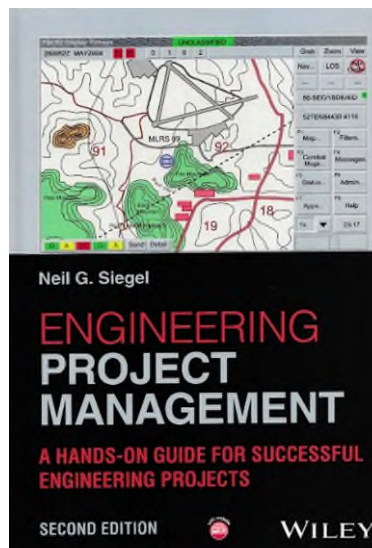
Both of these texts are available via the USC bookstore, and also via conventional on-line sources, such as Amazon.

Additional reference materials will be provided via Brightspace by the professor.

**Description and Assessment of Assignments**
Homework will be assigned during the course, and will figure as a part of your grade (see the section below, "Grading Breakdown").

Many of the homework assignments consist of written summaries of your readings from the textbook; these are in the fourth column of the table below.  Instructions regarding this portion of the homework will be contained in the weekly lectures.

During the facilitated lab work, there will be work assigned to you, some of which will be accomplished during the lab sessions themselves; you will likely, however, have to finish these assignments outside of class.  Your products from these sessions will also constitute homework (these are also listed in the fourth column of the table below).

The point-value of each homework assignment towards your grade for this course are summarized below:

- The DoDAF drawing assignment is worth 100 points
- SysML drawing assignment (Rhapsody) is worth 100 points
- The decision-tree assignment is worth 100 points
- The 1-page summaries of an assigned reading are each worth 15 points (there are 4 of these); the 2-page summaries of an assigned reading are each worth 20 points (there are 2 of these)

Thus, the homework comes to a total of 400 points (out of 1,000 total) towards your grade.

The due-dates for each homework assignment are depicted in the matrix, below, entitled "**Course Schedule, a weekly breakdown**".

All assignments should be turned in through Brightspace.

**Examinations**
There will be two written examinations as a part of the course:

Mid-term examination – during the 1st class session for week 9 (300 points)

Final examination – during finals week; you will be notified of the specific date, time, and location well in advance of the examination (300 points).

The two written examinations will cover materials presented in the *course lecture slides*. The course lecture slides indicate which materials that might be included on the exams by

a large red asterisk ("*").  If this asterisk appears on the slide's title line, everything on that slide might be included on one of the exams.  If this asterisk appears next to an item on that slide, that item ***and all of its indented sub-items*** might be included on one of the exams.

Two additional PowerPoint files will be made available by the professor:

One will summarize the key aspects of the lectures up until the mid-term examination; this file will be made available about a week before the mid-term examination.

The second will summarize key aspects of the lectures for the entire course; this file will be made available about two weeks before the final examination.

The date for the final examination is prescribed by the University, and cannot be changed by the professor; the final examination can be offered on another date only under the most extraordinary circumstances (I once had a student who was getting married that day – we did arrange for that student to take the test the day before!). The following describes the written examinations:

- The questions will all be "essay" questions, e.g., the professor will describe a situation, and ask you to discuss it in light of what you have learned from the class. Expect that all the questions will draw *only* from material presented in the course lecture slides. Of course, this material is also discussed in the textbook, but *every* item on both exams will be presented on one of the course lecture slides.
- *VERY IMPORTANT: You may bring 1 letter-sized piece of paper* (8½" x 11" – with text &/or drawings on both sides – hand-written or typed, at your discretion) *of notes to use during each examination.*
- You may use a stand-alone calculator (e.g., no memory or internet connectivity) during the examinations.
- Bring pencils, erasers, and a pencil sharpener to the examinations!
- Bring some scratch paper, too.
- No computers, phones, iPads / tablets, Dick-Tracy wrist watches, etc. – nothing with computing, storage, or internet connectivity will be allowed during the examinations.

**Grading Breakdown**
- Homework assignments – 40%
- Mid-term examination – 30%
- Final examination – 30%

The grading scale for the course is as follows:

| A 941-1,000 | A- 900-940 | B+ 880-899 | B 841-879 | B- 800-840 | C+ 766-799 |
|---|---|---|---|---|---|
| C 733-765 | C- 700-732 | D+ 666-699 | D 633-665 | D- 600-632 | F Below 600 |

The total for all point-scoring opportunities is 1,000; the mid-term examination is 300 points (e.g., 30% of your grade); final examination is 300 points (e.g., 30% of your grade); and the homework assignments are 400 points (e.g., 40% of your grade). Your grade will be based on your total point score, using the table above. During the conduct of the course, all of your examination and homework scores will be posted on Brightspace (usually within a couple of days), to which you can gain access anytime by logging in with your USC login information.

**Course Schedule: A Weekly Breakdown**

| Date | Monday (generally, a lecture) | Wednesday (generally, a facilitated lab session) | Reading and homework assigned | Homework due |
|------|-------------------------------|--------------------------------------------------|-------------------------------|--------------|
| Week 1 (1-13-2025) | • Motivation<br>• Course overview, expectations, texts | • Introduction to the assigned use-case (sample problem)<br>• Introduction to the concept of systems diagrams, and in particular, to the $1^{st}$ DoDAF diagram: the *context diagram*<br>• Build two context diagrams ("as-is" and "could-be") for the assigned use-case | • Read chapter 1 of the "***Principles of Systems Engineering***" textbook (hereafter, "**PoSE**") chapter 1<br>• Write a 1-page summary of chapter 1 (optional: a short bio of yourself, on the $2^{nd}$ page); turn it in as **HW 1** by next week | • (no homework is due this week) |
| Week 2 (1-20-2025) | • **(no class today: MLK birthday holiday)** | • Lecture: Overview of the method<br>• Introduction to another system diagram: the $N^2$ chart<br>• Build two $N^2$ charts (basic and enhanced) for the assigned use-case | • Read **PoSE** chapter 2<br>• Write a 1-page summary of **PoSE** chapter 2, and turn it in as **HW 2** by next week | • **HW 1**: 1-page summary of **PoSE** chapter 1 (15 points) |
| Week 3 (1-27-2025) | • Requirements definition (part I) | • Introduction to a few more system diagrams, including the basic SYSML diagrams<br>• Define 3 separate stimuli for our example system<br>• Build a Mission-Thread diagram for each of those 3 separate stimuli (e.g., a disaggregated OV-2 diagram) | • Read **PoSE** chapter 3; no written summary is required | • **HW 2**: 1-page summary of **PoSE** chapter 2 (15 points) |
| Week 4 (2-3-2025) | • Requirements definition (part II) | • Rhapsody session 1: Creating SysML diagrams using Rhapsody | • Read chapter 4 from the "**Engineering Project Management**" textbook (hereafter, "**EPM**")<br>• Write a 1-page summary of **EPM** chapter 4, and turn it in as **HW 4** by next week | • Turn in the DoDAF drawings as **HW 3** (100 points) |

| Date | Monday (generally, a lecture) | Wednesday (generally, a facilitated lab session) | Reading and homework assigned | Homework due |
|---|---|---|---|---|
| Week 5 (2-10-2025) | • Design (part I): methodology<br>• Case studies | • Rhapsody session 2: Creating SysML diagrams using Rhapsody | • Read **PoSE** chapter 4 (you get 3 weeks to finish reading this chapter). There will be a **2-page** written summary due during week 8.<br>• Also, read **EPM** chapter 8; no written summary is required | • **HW 4**: 1-page summary of **EPM** chapter 4 (15 points) |
| Week 6 (2-17-2025) | • **(no class today: President's day national holiday)**<br>• | • Design (part II): analysis methods<br>• | • Continue reading **PoSE** chapter 4 and **EPM** chapter 8 | • (no homework is due this week) |
| Week 7 (2-24-2025) | • Lecture: Design (part III): analysis methods. The trade study.<br>• Lecture: Design (part IV): lessons-learned in design, and case studies in design | • Rhapsody session 3: Creating SysML diagrams using Rhapsody | • Continue reading **PoSE** chapter 4 and **EPM** chapter 8 | • (no homework is due this week) |
| Week 8 (3-3-2025) | • Continuation: Design (part IV): lessons-learned in design, and case studies in design<br>• Implementation, integration, test; deployment, operational use and, disposal | • Review of the course so far<br>• Rhapsody session 4: Creating SysML diagrams using Rhapsody | • Read **PoSE** chapters 5 through 11 (you get 2 weeks to finish this set of readings; these are mostly short chapters)<br>• Write a 2-page summary of **PoSE** chapters 5 through 11; turn it in as **HW 6** in 2 weeks (e.g., during week 10)<br>• Also turn in the Rhapsody assignment as **HW 7** by the end of week 10 | • **HW 5**: **2-page** summary of **PoSE** chapter 4 (15 points) |
| Week 9 (3-10-2025) | • **Mid-term examination – covers lectures 1 to 8, inclusive** | • (No class session or lab on this Wednesday) | • Continue reading **PoSE** chapters 5 through 11 | • (Not due until the *END* of this week) **HW 6**: **2-page** summary of **PoSE** chapters 5 through 11 (15 points) |

| Date | Monday (generally, a lecture) | Wednesday (generally, a facilitated lab session) | Reading and homework assigned | Homework due |
|---|---|---|---|---|
| 3-16-2025 to 3-23-2025 | • **Spring break – no class this week** | • **Spring break – no class this week** | | |
| Week 10 (3-24-2025) | • Designing the user experience <br> • Testing *redux* | • Example: a walk-through of an Qualify Functional Deployment diagram set, by the professor | • Read **PoSE** chapter 12; no written summary is required | • (Not due until the *END* of this week) **HW 7**: the Rhapsody assignment (110 points) |
| Week 11 (3-31-2025) | • Lessons-learned: ten important concepts in systems engineering <br> • Case studies | • Decision-tree problem, session 1 | • Read **PoSE** chapter 13; no written summary is required | • (no homework is due this week) |
| Week 12 (4-7-2025) | • The social aspects of systems engineering <br> • An engineering career: what do we actually do? <br> • Mid-career change / getting ahead <br> • Identifying and resolving conflict in engineering settings | • Decision-tree problem, session 2 | • Read **EPM** chapter 13 <br> • Write a 1-page summary of **EPM** chapter 13; turn it in as **HW 8** by next week. | • (no homework is due this week) |
| Week 13 (4-14-2025) | • Case study: Health-care as a systems-engineering opportunity <br> • Case study: Preventing adverse drug interactions <br> • Case study: Network Hollywood | • Case study: the systems architecture skeleton (or another topic) | | • **HW 8**: 1-page summary of **EPM** chapter 13 (15 points) |
| Week 14 (4-21-2025) | • Risk and opportunity management | • Decision-tree problem, session 3 | • Read **EPM** chapter 9; no written summary is required | • (no homework is due this week) |
| Week 15 (4-28-2025) | • Case studies: pressure points <br> • Case study: AWACS <br> • Summary of the course | • Lecture: Ethics in engineering <br> • Lecture: How to get your recommendations adopted: creating credibility for technology-based recommendations | • Read **EPM** chapter 15; no written summary is required | • **HW 9**: the decision-tree assignment (100 points) |

| Date | Monday (generally, a lecture) | Wednesday (generally, a facilitated lab session) | Reading and homework assigned | Homework due |
|---|---|---|---|---|
| Study days (5-3-2025 to 5-6-2025) | • **(no class or homework this week)** | • **(no class or homework this week)** | | |
| Finals week (5-7-2025 to 5-14-2025 | **Final examination.  The final examination is probably on 11:00 am to 1:00 pm on *FRIDAY* 5-9-2025** | | | |

Note that in the above table, there are references to the **two different textbooks** – *Principles of Systems Engineering* (PoSE) and *Engineering Project Management* (EPM) –always be sure that you are reading from, and writing a summary of, the chapter from the correct book!

**Additional Policies**

Late homework assignments will usually be marked down for every day late; in general, *no* homework assignments will be accepted more than *7 days after the due date*.  The professor and/or the TA will try to make accommodation for legitimate documented illness or emergency.

The professor will always endeavor to treat his students with respect and dignity; he expects that you will do the same, both to him, and to the other students in the class.  He invites questions and discussion, but reserves the right to structure the course and the class time as he sees fit, including the right to request that a student take a line of discussion "off-line" to office hours if the professor believes that this line of discussion is not of general interest to the class, or not contributing to the established teaching objectives for this course.

To quote from a USC guidebook:  "Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior, and may be subject to disciplinary action.  Such behavior inhibits other students' ability to learn and an instructor's ability to teach.  A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem, and may be reported to the Office of Student Judicial Affairs for disciplinary action."

**ChatGPT and other similar "AI writing aids"**
Tools such as ChatGPT can in fact create written text in response to some of the
homework assignments, in particular, for the summaries of reading assignments. I can
only urge you ***not to use such tools***. In my opinion, using tools like ChatGPT to prepare a
portion of your homework is a violation of the USC Viterbi School Honor Code (see
below), unless your instructor has specifically invited you to use such a tool.

If I believe that you have used such tools (and, of course, there are methods to detect when
such tools have been used), ***I retain the discretion to lower your grade for that
assignment, and perhaps even for the entire class.***

The purpose of your taking the class is for you to acquire certain knowledge; the purpose
of the homework is to stimulate you actually to take the time to do so, and for me to form
some objective assessment of whether or not you have in fact succeeded. You are in
essence short-changing yourself if you use such tools in the context of this class. For this
class, using such tools constitutes cheating.

Also, be warned that ChatGPT has already been "caught" just making up facts out of thin
air that "sound good" (for example,
https://www.theverge.com/2023/5/27/23739913/chatgpt-ai-lawsuit-avianca-airlines-
chatbot-research).

**USC Viterbi School Honor Code**
The following is the USC Viterbi School honor code:

*Engineering enables and empowers our ambitions and is integral to our identities. In the
Viterbi community, accountability is reflected in all our endeavors.*

*Engineering+ Integrity.*
*Engineering+ Responsibility.*
*Engineering+ Community.*
*Think good. Do better. Be great.*

*These are the pillars we stand upon as we address the challenges of society and enrich
lives.*

This honor code was developed by Viterbi students.

In your written homework, please be sure to cite any referenced sources appropriately. We
will not look kindly on plagiarism or cheating; we will hold you to the highest standards in
this regard, and you will receive a grade of zero for the assignment if you are caught
cheating or plagiarizing, which will result in a lowered or failing grade for the class. You
will also be reported to the appropriate University office for plagiarizing, which could
result in further sanctions, including suspension or expulsion from school. Don't do it.

The same, of course, applies to the examinations; you are expected to do your own work
during the examination. The only legitimate sources of information about what to expect
on the examinations are the professor and the TA currently assigned to the course.

**Statement on Academic Conduct and Support Systems**

**Academic Integrity:**
The University of Southern California is a learning community committed to developing
successful scholars and researchers dedicated to the pursuit of knowledge and the
dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the

production or submission of academic work, comprises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

**Students and Disability Accommodations:**

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

**Support Systems:**

*Counseling and Mental Health* - *(213) 740-9355 – 24/7 on call*
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*988 Suicide and Crisis Lifeline* - *988 for both calls and text messages – 24/7 on call*
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

*Relationship and Sexual Violence Prevention Services (RSVP)* - *(213) 740-9355(WELL) – 24/7 on call*
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

*Office for Equity, Equal Opportunity, and Title IX (EEO-TIX)* - *(213) 740-5086*
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*
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

*The Office of Student Accessibility Services (OSAS)* - *(213) 740-0776*
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

*USC Campus Support and Intervention* - *(213) 740-0411*
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

*Diversity, Equity and Inclusion* - *(213) 740-2101*
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*
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) 442-1200 – 24/7 on call*
Non-emergency assistance or information.

*Office of the Ombuds* - *(213) 821-9556 (UPC) / (323-442-0382 (HSC)*
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

*Occupational Therapy Faculty Practice* - *(323) 442-2850 or* otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.

**About the professor**

Neil Siegel is the IBM Professor of Engineering Management and a Professor of Engineering Practice with Distinction in the Epstein Department of Industrial and Systems Engineering, and is also a professor of Computer Science practice, both within the Viterbi School of Engineering at the University of Southern California. He is a recognized expert in the design and development of large, complex systems that serve important societal needs, both as a practitioner at the largest scales, and as a researcher.
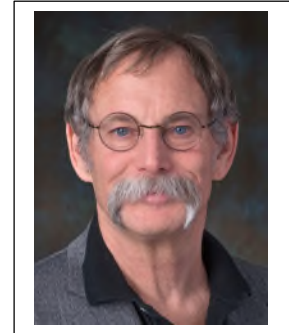
Until his retirement at the end of 2015, he held the position of sector vice-president and chief technology officer at Northrop Grumman, for the Mission Systems and Information Systems sectors. He led the sector's research portfolio ($600M / year), and oversaw the design and development of technical solutions for their customers' most-complex and most-important problems. He also oversaw the sector's 12,000-plus scientists and engineers, directed engineering process improvements, and activities to develop the company's technical talent.

Previously, Dr. Siegel served as vice-president and general manager of the company's Tactical Systems division, and a director of the company's U.K. subsidiary. He has been responsible for engineering projects in many countries, including the United States, the U.K., NATO, Saudi Arabia, etc. In all, he served as a vice-president of the company for nearly 18 years.

Dr. Siegel led the engineering on a large number of successful fielded military, intelligence, and commercial systems, including the U.S. Blue-Force Tracker; the Army's first unmanned aerial vehicle; the Forward-Area Air Defense system; the fire-control segment of the world's first complete laser weapon system; and played important roles for many other systems for ground, sea, space, and cyber-space. These systems have repeatedly been cited as model programs and important national capabilities. He also led work for the steel industry, the movie industry, the healthcare industry, and the electric power industry. He helped to invent techniques to reduce unintended interactions between drugs prescribed by different doctors that are used almost universally in the U.S. and elsewhere, saving many lives each year. Techniques that he pioneered are used in a very large number of consumer devices around the world (including almost every GPS receiver, smart phone, and tablet computer in existence). He is a recognized expert in information networking, especially network management, wireless networks, and networks of mobile devices. Much of his recent research has made contributions in the field of improving development methodology for large-scale systems, through the identification of novel root-causes of system-development failures, new methods to correct those root-causes, and application of those new techniques to problem domains such as health, energy, and Government information systems.

He holds nearly 50 issued and pending patents worldwide.

Among his many honors are the following:
- Awarded the National Medal of Technology and Innovation
- Election to the U.S. National Academy of Engineering
- Selection as a fellow of the U.S. National Academy of Inventors
- Selection as a fellow of the Institute of Electrical and Electronics Engineers (IEEE)
- Selection as a fellow of the International Congress on Systems Engineering (INCOSE)
- Selection as a Fellow of the Asia-Pacific Artificial Intelligence Association (AIAA)
- The IEEE Simon Ramo Medal for systems engineering and systems science
- His former company's Chairman's Award for Innovation (three times)
- The Army's Order of Saint Barbara
- The iCMG award for system architecture
- The Northern Virginia Technology Council CTO-of-the-year award

Programs that he has led have also won many honors, including the inaugural Crosstalk award as the best-ran software program in the entire U.S. government, the IDGA award as the "Most Innovative U.S. Government Program", and the Federal 100 Monticello Award.

More information is available at neilsiegel.usc.edu.