

ENGR 102: FRESHMAN ACADEMY

FALL 2016

Instructor:

Milind Tambe

Email: tambe@usc.edu [best way to reach me]

<http://teamcore.usc.edu/tambe>

Office: SAL 300

Tel: 213-740-6447

Office hours: Friday 4 pm (or send me an email to set up alternate time)

Class:

- ENGR 102-28507 on Mondays at 11:00-12:50pm in DRB146

Coaches:

- Avery McEvoy, mcevoy@usc.edu
- Elyse Kedzie, kedzie@usc.edu

INTRODUCTION

The primary purpose of the USC Viterbi Freshman Engineering Academy is to introduce first-year students to the “Viterbi Experience.” The faculty and staff at the Viterbi School understand that entering engineering, computer science, and materials science students are highly qualified to pursue undergraduate studies at Viterbi. We also understand that the identity of each student relative to any given major is important. Viterbi is an extremely high-performance and demanding environment that will stretch most students. A major focus of the course is to expose each Freshman student to a variety of subject matter content, skills, experiences, faculty, Academy coaches, and staff that can help the process of “sensemaking” that is so critical for each and every student as she or he is welcomed into the Trojan Family.

Course Goals & Objectives:

The main goal is to introduce freshman engineering students to various aspects of engineering, including the technical, political, ethical and societal impacts of the field. There will be a focus on the following themes:

1. **Thinking like an engineer:** development of problem-solving and teamwork skills

2. **Social and historical context:** understand social and historical context of engineering
3. **Potential of engineering:** understand vast potential of engineering and rewards of engineering profession compared to others
4. **Ethics component:** understand ethical issues and concepts related to engineering through discussion of real events and other related activities.
5. **Grand Challenges for engineers of the future:** understand through discussion and projects the 14 grand challenges for engineers as identified by the National Academy of Engineering.

While the course is not intended to focus on specific technical issues, I would like you to take away some technical issues from this course that will be very useful to you in the future: (i) Basic introduction to game theory and its potential; (ii) Some basic introduction to linear programming; (iii) The debate surrounding Artificial Intelligence.

Textbook and Assigned Reading Materials: No textbook; other course resources will be made available as needed in class

Schedule of classes: Freshman Academy

- August 22: Lecture 1:
 - Introduction: Coaches, students, professor
 - Overview of class syllabus, expectations
 - Grand challenges of engineering
 - Artificial Intelligence (AI), the White House and the summer of AI

Engineering and its applications:

- August 29:
 - Challenges of physical and cybersecurity
 - Computational Game theory and applications to security
 - Activity: Play a game
- Sept 5:
 - No class
- Sept 12:
 - Analysis of your game play
 - Protecting forests, fish, wildlife
 - Coaches activity
- Sept 19:
 - Invited lecture: Prof. Phebe Vayanos, linear programming and applications
 - Linear programming and game theory
 - Homework #1: Demonstrate learning of linear programming or game theory, project inspired by NAE challenges, AI
- Sept 26:
 - Invited lecture: Avata Intelligence, a startup company based on AI
 - Student panel on research at Viterbi
 - *Homework project continued:*
- Oct 3:
 - Finishing homework project
 - Project presentation in class

AI and Engineering for Social Impact, Social Good

- Oct 10:
 - Invited lecture: Prof. Eric Rice, School of Social Work, Urban challenges
 - Coaches activity
- Oct 17:
 - Invited lecture: Prof. Najmedin Meshkati, Safety and control in self-driving cars
 - Project details: Impact of AI/Automation

...the White House Office of Science and Technology Policy is excited to announce that we will be co-hosting four public workshops over the coming months on topics in AI to spur public dialogue on artificial intelligence and machine learning and identify challenges and opportunities related to this emerging technology. These four workshops will be co-hosted by academic and non-profit organizations, and two of them will also be co-hosted by the National Economic Council. These workshops will feed into the development of a public report later this year. We invite anyone interested to learn more about this emergent field of technology and give input about future directions and areas of challenge and opportunity. You can learn more about these events via the links to the event websites below, and each workshop will be livestreamed:

- May 24, 2016: **Legal and Governance Implications of Artificial Intelligence** in Seattle, WA
- June 7, 2016: **Artificial Intelligence for Social Good** in Washington, DC
- June 28, 2016: **Safety and Control for Artificial Intelligence** in Pittsburgh, PA
- July 7: **The Social and Economic Implications of Artificial Intelligence Technologies in the Near-Term** in New York City
 - Will divide the class into four groups and each group will be assigned a topic
- Oct 24:
 - Invited lecture or a short movie related to the topics covered
 - Project discussions
 - Initial project submission
- Oct 31:
 - Project work in class: come up with a presentation.

- Nov 7:
 - Project II: Final project presentations and debate
 - Each student in each group must speak up

Student projects, coach feedback, Wrapup

- Nov 14: Nadine Afari: Ethics workshop

- Nov 21: No classes (Thanksgiving week)

- Nov 28:
Questions and advice from coaches, Wrap up

GRAND CHALLENGES FOR ENGINEERING- BACKGROUND AND CONTEXT

The National Academy of Engineering has identified 14 “Grand Challenges” for engineering in the 21st Century (<http://www.engineeringchallenges.org/>). These Grand Challenges are:

- [Make solar energy economical](#)
- [Provide energy from fusion](#)
- [Develop carbon sequestration methods](#)
- [Manage the nitrogen cycle](#)
- [Provide access to clean water](#)
- [Restore and improve urban infrastructure](#)
- [Advance health informatics](#)
- [Engineer better medicines](#)
- [Reverse-engineer the brain](#)
- [Prevent nuclear terror](#)
- [Secure cyberspace](#)
- [Enhance virtual reality](#)
- [Advance personalized learning](#)
- [Engineer the tools of scientific discovery](#)

These 14 Grand Challenges can be classified as belonging to four categories: sustainability, health, security, and enriching life. The Grand Challenges represent societally relevant engineering issues which, when addressed, will greatly improve global society. Although the Academy will briefly address the 14 Grand Challenges, each course section is primarily focused on one, possibly two, of the Grand Challenges. The course content will be centered on this Challenge to provide you with contemporary contexts.

TEXTBOOK AND ASSIGNED READINGS/MATERIALS

There is no textbook for the course, however comprehensive reading, viewings, and other course resources may be available via posts on Blackboard, emailed, the World Wide Web, or Class Time.

Class Requirements, Structure & Grading Policy

This course includes one lecture/discussion per week. The course may also include readings, videos, podcasts, team or group and whole class discussions, team activities or projects, and lectures by experts and other guest speakers. The course will be graded according to the following:

(1) Active Participation & Class Attendance (30%)

Students are required to participate in discussions, respond to email requests, and act as responsible and respectful team members and colleagues to others in the class. Completion of all in-class assignments is **mandatory**. If you plan on missing a class meeting or activity, please provide **advance notice** to your Coaches. You are responsible for any information covered in a class you do not attend.

(2) Outside-the-Class Activities (30%)

Students are required to participate in 2 of 3 large (All Academy) lectures and attend 3 of 4 outside-the-class activities planned by the Coaches (including a one-on-one meeting with a Coach)

(3) Homework, Problem Statement, Project Report/Video and Presentation (40%)

A limited number of homework assignments will be required, due the day before each class via submission on Blackboard or other means as determined by your faculty. Please follow USC's guidelines on academic integrity across the entire content of the class (from homework assignments to exams). A collaborative, team-oriented design project will be completed during the semester. This project will be determined by the class/group in discussion with one another and in consultation with the course instructor and the Coaches.

(4) Replacement for ONE Outside-the-Class Activity

Students may substitute **ONE Outside-the-Class Activity** with participation in ONE or more career-related events sponsored by the office of Student Engagement and Career Connections. Please visit RTH 218 for a list of events. Students will be required to submit a **2-page, double-spaced paper OR a six-minute color video** describing the career-focused event and have it signed off by the appropriate Career Connections staff. Check with your Coaches for more details.

Grading

The final course grade will be computed from the assignments listed in table below. Late assignments will receive a reduction of 5 points per day past the due date.

<i>Assignment</i>	<i>Due</i>	<i>Points</i>
Participation and Attendance	Weeks 1-15 Class Time	30
Outside-the-Class Activities	Dates to be Determined	30
Project I	Oct 3	10
Project II	(30 points total)	
Initial presentation	Oct 24	10
Final Presentation	Nov 7	10
Coaches	Nov 28	10
	TOTAL	100

Grade Scale

The final grade for this course will be awarded using the following point scale:

A 90-100	B+ 75-79	C+ 63-66
A- 80-90	B 70-74	C 55-63
	B- 67-69	C- 50-54

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 the instructor (or to the Coach) as early in the semester as possible. DSP is located in STU 301 and is open from 8:30 a.m. – 5:00 p.m., Monday through Friday, (213) 740-0776

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 and to avoid using another's work as one's own. All students are expected to understand and abide by these principles.

Section 11.00 of *SCampus*, the USC Student Guidebook, which outlines behaviors that violate the USC Student Conduct Code, can be found here:

<https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/>

A list of recommended sanctions for a range of academic integrity violations are located in Appendix A of *SCampus*, which can be found here:

https://scampus.usc.edu/files/2009/08/appendix_a.pdf

Should there be any suspicion of academic dishonesty, students are referred to the Office of Student Judicial Affairs and Community Standards (SJACS) for further review. The SJACS review process can be found here:

http://www.usc.edu/student-affairs/SJACS/pages/students/academic_integrity.html

The SJACS website provides additional resources that you will find helpful in understanding what is meant by academic integrity, such as the following:

Academic Integrity: A Guide for Graduate Students

<http://www.usc.edu/student-affairs/SJACS/forms/GradIntegrity.pdf>

Academic Integrity Overview

<http://www.usc.edu/student-affairs/SJACS/forms/AcademicIntegrityOverview.pdf>

INCOMPLETES

An incomplete (IN) is given when work is not completed because of documented illness or some other emergency occurring after 80% of the course has been completed. Arrangements for the IN and its removal should be initiated by the student and agreed to by the instructor prior to the final exam. The University policy on IN is as follows (from the USC Catalogue):

Conditions for Removing a Grade of Incomplete: If an IN is assigned as the student's grade, the instructor will fill out the IN Completion form which will specify to the student and to the department the work remaining to be done, the procedures for its completion, the grade in the course to date, and the weight to be assigned to work remaining to be done when computing the final grade. A student may remove the IN by completing only the work not finished as a result of illness or emergency. Previously graded work may not be repeated for credit. It is not possible to remove an IN by re-registering for the course, even within the designated time.

Time Limit for Removal of an Incomplete: One calendar year is allowed to remove an IN. Individual academic units may have more stringent policies regarding these time limits. If the IN is not removed within the designated time limit, the course is considered "lapsed" and the grade is changed to an IX and it will be calculated into the grade point average as 0 points. Courses offered on a Credit/No Credit basis or taken on a Pass/No Pass basis for which a mark of IN is assigned will be lapsed with a mark of NC or NP and will not be calculated into the grade point average.

STANDARDS OF APPROPRIATE ONLINE BEHAVIOR

This course involves both in-person and online segments. The protocols defined by the USC Student Conduct Code will be upheld in online classes. Students are not allowed to post inappropriate material, spam to the class, use offensive language, or engage in online flaming. For more information, please visit <http://www.usc.edu/student-affairs/SJACS>

EMERGENCIES AND COURSE CONTINUITY

In case of emergency, and if travel to campus is difficult, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of 2SC, teleconferencing, and other technologies. Although this course uses the 2SC LMS for online support, an emergency site for the course is also available through 2SC (2SC.usc.edu). For additional information about maintaining classes in an emergency, please access: <http://cst.usc.edu/emergency-preparedness/>

In the Event of Technical Breakdowns: Students may submit assignments to the instructor via email by the posted due date. Remember to frequently back up your work, post assignments once completed, load files onto a power drive, and keep a hard copy of papers/projects.

ACADEMIC ACCOMMODATIONS

The University of Southern California is committed to full compliance with the Rehabilitation Act (Section 504) and the Americans with Disabilities Act (ADA). As part of the implementation of this law, the University will continue to provide reasonable accommodation for academically qualified candidates with disabilities so that they can participate fully in the University's educational programs and activities. Although USC is not required by law to change the "fundamental nature or essential curricular components of its programs in order to accommodate the needs of disabled candidates," the University will provide reasonable academic accommodation. It is the specific responsibility of the University administration and all faculty serving in a teaching capacity to ensure the University's compliance with this policy.

Any candidate 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 as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. to 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776. The email address is ability@usc.edu. The website for DSP has additional information regarding accommodations and requests (www.usc.edu/disability).