Discover Viterbi: Systems Architecting & Engineering with Prof. Azad Madni

Viterbi School of Engineering
University of Southern California
Spring 2019

USC Viterbi School of Engineering | USC University of Southern California

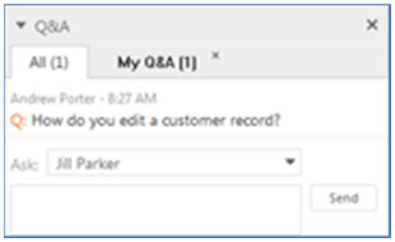
WebEx Quick Facts

Will I be able to get a copy of the slides after the presentation?

YES!

How can I ask a question during the information session?

1. Using the Q&A Panel, type a question in the box below the Ask drop-down menu.
2. Select a recipient from the Ask drop-down menu.



3. Click Send. We will respond as soon as we are able.

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Today's Program

- University of Southern California
- USC Viterbi School of Engineering
- Graduate Programs in Systems Architecting & Engineering
  - Program Overview
  - Application Criteria
- DEN@Viterbi
- Tuition & Fees
- Q&A

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UNIVERSITY OF SOUTHERN CALIFORNIA

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The University of Southern California

- Oldest Private University in the western U.S.
  - Founded in 1880
- 47,500 Students
  - 20,000 Undergraduates | 27,500 Graduates
- 4,361 Full-time Faculty
- Diverse Student Population
- Located in Los Angeles

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Viterbi School at a Glance

Academic Departments

- 8 Academic Departments

Faculty

- 189 tenure-track faculty
- 16 Full-time, TT NAE Members (35 Total)
- 60+ NSF CAREER, National & Presidential Young Investigator

Alumni

- More than 76,000+

Student Populations

- 2,591 Undergraduate
- 5,702 Graduate students

Research

- Leader in funded research
- 35+ Research Centers
- More than $204M in research expenditures annually

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U.S. News & World Report, 2019

Best Engineering Graduate Schools

- **Top Ranked** Graduate Engineering Program

Best Online Graduate Engineering Programs

- **Ranked #1** Online Computer Information Technology Program (Computer Science)
- **Ranked #2** Online Graduate Engineering Programs

Best Online Graduate Engineering Programs for Veterans

- **Ranked #1** Online Graduate Computer Information Technology Program (Computer Science) for Veterans
- **Ranked #2** Online Graduate Engineering Programs for Veterans

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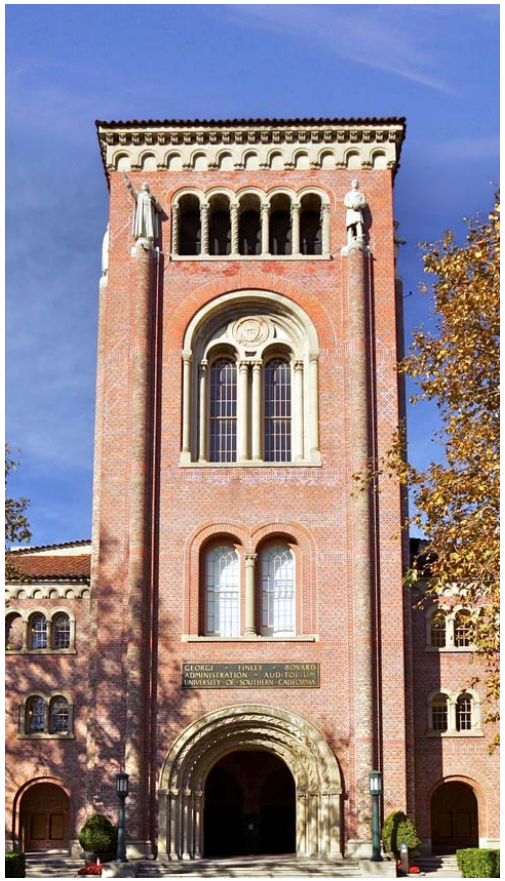
USC Engineering: Points of Distinction



- International Reputation for Excellence
- The Trojan Family Network: 76,000+ engineers strong
- Unique engineering programs available: *Online, on site & on campus*
- Complete range of programs
  - Doctoral, Masters and Bachelors
  - Graduate Certificates
  - Short Courses
  - Custom Programs

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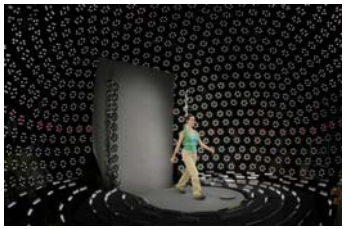
The Viterbi School of Engineering: A Leader in Research

Viterbi School is a consistent leader in funded research in the U.S.



Institute for Creative Technologies

Biomimetic Microelectronic Systems Engineering Research Center

National Center for Metropolitan Transportation Research

CREATE
Homeland Security Center

- Highly interdisciplinary research environment
- Diverse research areas such as robotics, software engineering, sensor networks, vision sciences, automated construction and photonics
- Over 35 research centers
- Industrial partnerships and collaboration

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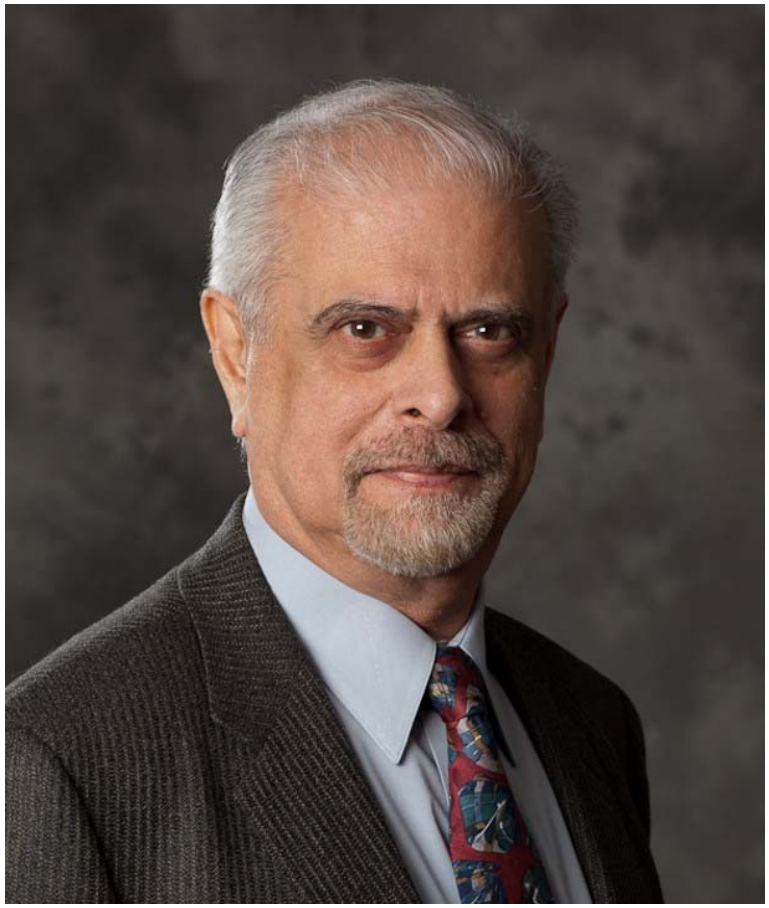
Meet Professor Azad Madni



- Professor Azad Madni
  - Executive Director, SAE Program
  - Professor, Astronautical Engineering
  - 2019 William B. Johnson International Inter-Professional Founders Award from Engineers' Council
  - 2019 Prestigious Pioneering Educator Award from Orange County Engineering Council
  - 2018 INCOSE Outstanding Service Award
  - 2011 INCOSE Pioneer Award
  - Fellow of AAAS, AIAA, IEEE, INCOSE, IETE, SDPS
  - Developed SAE 549, SAE 547, SAE 548, SAE 546

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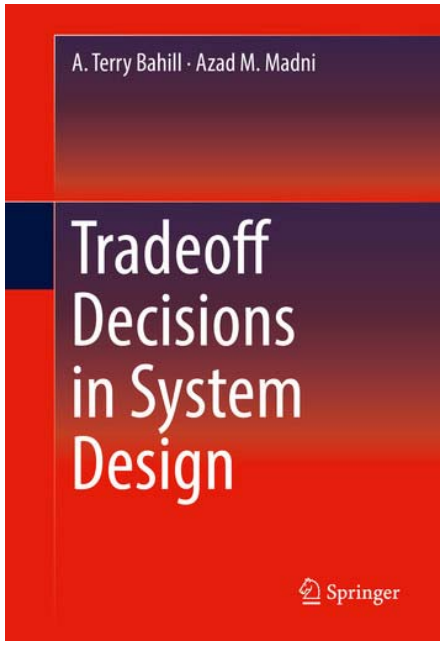
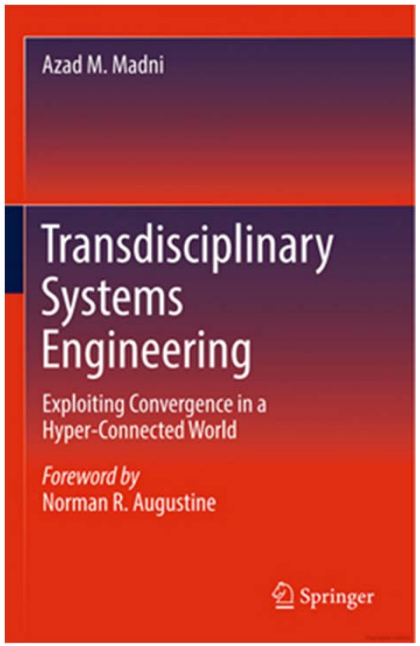
Professor Azad Madni's Books

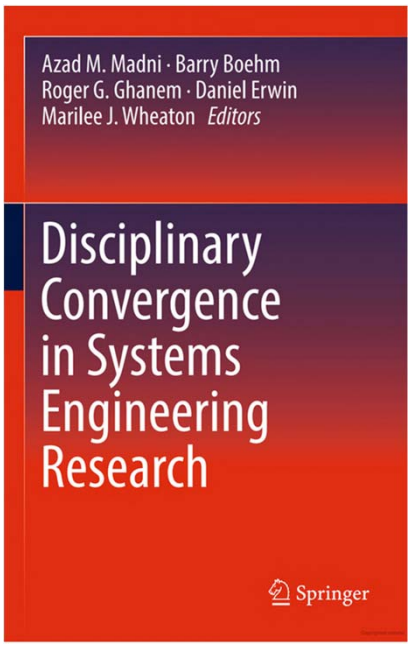
SAE 549



SAE 549 & SAE 547



SAE 546



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What Makes the SAE Program Unique

- USC's Eb Rechtin: Systems Architecting Pioneer
  - His book on Systems Architecting is a required text
- Only Program with 2 INCOSE Pioneer Award Winners
  - Azad M. Madni and Eb Rechtin
- Several Fellows of Professional Societies
  - 1 AAAS, 10+IEEE, 7 INCOSE, 2 AIAA, 1 IISE
- Active Participation in Professional Societies and Conferences
  - SAE students active in INCOSE, IEEE, AIAA, CSER
  - First INCOSE Student Division in Southern California
  - Co-founder and Organizer of Conference on Systems Engineering Research
  - Co-founder and Chair of IEEE SMC TC on Model-Based Systems Engineering
- Synergy between teaching and research
  - Research feeds new material into courses.
  - Teaching uncovers new areas for research.
- Madni's award-winning storytelling, P2P learning approach
- Top notch adjunct faculty from industry
- Named a "Top Information Systems Masters Programs" in 2017 by www.mastersindatascience.org

Helpful Link:

http://viterbi.usc.edu/sae

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Interesting Factoids for MS Students

- Active INCOSE-LA USC Student Division
  - Opportunity to network with SAE students and faculty
- Active INCOSE-LA Chapter
  - Opportunity to network with engineers in space, aerospace, medical devices and energy sectors
- Conference on Systems Engineering Research
  - Opportunity to present technical/research papers and network with SE students from US and abroad
- INCOSE-LA Mini-Conference and Regional Mini-Conference
  - Opportunity to present and network with industry professionals, students and faculty from LA region

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SAE Skills in Demand

- Systems Architecting
- Systems Thinking
- Systems Integration/SoS Integration
- Concept of Operations Prototyping
- Model Based Systems Engineering
- Simulation-Based Modeling and Analysis
- Human Systems Integration
- Cyber-Physical-Human Systems
- Resilience Engineering
- Agile Development
- Lean Operations

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Potential Employers

- Aerospace and Automotive Companies
  e.g., Boeing, NGC, Raytheon, Space-X, General Motors, Tesla
- FFRDCs and National Labs
  e.g., Aerospace Corp., JPL, MITRE, RAND
- Medical Devices and Healthcare Organizations
  e.g., Medtronic, Kaiser Permanente, VA
- Web Companies
  e.g., Google, Amazon, Facebook
- State and City Organizations
  e.g., Port of Los Angeles, LADWP

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Systems Architecting & Engineering: Program Offerings

- MS in Systems Architecting & Engineering

- Graduate Certificate in Systems Architecting & Engineering
- Graduate Certificate in Software Architecture
- Graduate Certificate in Network Centric Systems

Available online via DEN@Viterbi

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M.S. in Systems Architecting & Engineering – Program Details

Available on DEN@Viterbi

Required Courses (15 Units)

- One of the following courses:
  - SAE 560 | Economic Considerations for Systems Engineering *or*
  - ISE 460 | Engineering Economy
- SAE 541 | Systems Engineering Theory and Practice
- SAE 542 | Advanced Topics in Systems Engineering
- SAE 549 | Systems Architecting
- And one of the following courses:
  - SAE 547 | Model-Based Systems Architecting & Engineering *or*
  - SAE 548 | Systems/System-of-Systems Integration & Communication

Elective Courses (6 Units)

- Technical Management Area (3 units)
- General Technical Area (3 units)

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M.S. in Systems Architecting & Engineering – Program Details

Available on DEN@Viterbi

Technical Specialization Areas (9 units)

- Aerospace and Mechanical Systems
- Artificial Intelligence/Neural Networks
- Automation and Control Systems
- Communication and Signal Processing Systems
- Computer and Information Systems
- Construction
- Cyber-Security
- Engineering Management Systems
- Integrated Media Systems
- Manufacturing Systems
- Network-centric Systems
- Software Process Architecture
- Systems

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Application Criteria for the M.S. in Systems Architecting & Engineering

- Undergraduate degree (Bachelor of Science) in engineering, math, or hard science from a regionally-accredited university
- Industry experience recommended but not required
- A cumulative undergraduate GPA of at least 3.0 on a 4.0 scale is recommended
- Satisfactory scores on the general portion of the Graduate Record Examination (GRE) that are less than five years old
- Resume/CV
- Supplemental Materials:
  - 3 Letters of Recommendation (Required)
  - Statement of Purpose (Required)
- TOEFL (International Applicants)

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Application Criteria for the M.S. in Systems Architecting & Engineering

Waiving the GRE Requirement (only applies to the MSSARE)

There are two ways to waive the GRE admissions requirement for the MS in Systems Architecting and Engineering program. They are:

1. Having an undergraduate degree in engineering with an overall GPA of 3.0 (or higher) on a 4.0 scale plus either an MS in Engineering or an MBA degree

2. As a Limited student, completing SAE 541, SAE 542, and SAE 549; and either SAE 560 (preferred) or ISE 460. A grade of "B" or better must be earned in each course in order to qualify for the waiver.

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Grad Cert in Systems Architecting & Engineering – Program Details

Available on DEN@Viterbi

Required Courses (15 units)

Five of the following courses required:

- SAE 560 | Economic Considerations for Systems Engineering
- ISE 460 | Engineering Economy
- ISE 515 | Engineering Project Management
- ISE 544 | Management of Engineering Teams
- SAE 541 | Systems Engineering Theory and Practice
- SAE 542 | Advanced Topics in Systems Engineering
- SAE 547 | Model based Systems Engineering
- SAE 549 | Systems Architecting
- SAE 546 | Resilient Systems and System-of-Systems

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Application Criteria for the Grad Cert in Systems Architecting & Engineering

- Undergraduate degree (Bachelor of Science) in engineering, math, or hard science from a regionally-accredited university
- Industry experience recommended but not required
- To be competitive, a cumulative undergraduate GPA of at least 3.0 on a 4.0 scale is recommended
- Resume/CV (Required)
- Letters of Recommendation (3 Required)
- TOEFL (International Applicants)

All courses taken can apply to the MS in SARE (if admitted).

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Grad Cert in Software Architecture – Program Details

Available on DEN@Viterbi

Required Courses (14 units)

- CSCI 568 | Requirements Engineering
- CSCI 578 | Software Architectures
- SAE 547 | Model-Based Systems Architecting & Engineering
- SAE 549 | Systems Architecting

Electives (3-4 units)

1 course required from approved list

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Application Criteria for the Grad Cert in Software Architecture

- Undergraduate degree in engineering, math, or hard science from a regionally-accredited university
- Substantial background in computing constitutes a minimum requirement
- To be competitive, a cumulative undergraduate GPA of at least 3.0 on a 4.0 scale is recommended
- Resume/CV (Required)
- Statement of Purpose (Optional)
- Letters of Recommendation (Optional)
- TOEFL (International Applicants)

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Grad Cert in Network Centric Systems – Program Details

Required Course (3 units)

- SAE 574 | Net-Centric Systems Architecting & Engineering

Choose four courses from one area of emphasis (12-16 units)

- Computer Science Emphasis –or-
- Electrical Engineering Emphasis

Note: The Graduate Certificate in Network Centric Systems is not available via DEN@Viterbi.

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Application Criteria for the Grad Cert in Network Centric Systems

- Undergraduate degree in engineering, math, or hard science from a regionally-accredited university
- Minimum of 3 years of industrial experience is highly recommended
- To be competitive, a cumulative undergraduate GPA of at least 3.0 on a 4.0 scale is recommended
- Resume/CV (Required)
- Letters of Recommendation (Optional)
- Statement of Purpose (Optional)
- TOEFL (International Applicants)

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Application Deadlines

Application Deadlines for 2019-2020

Helpful Links:

List of DEN@Viterbi Programs
http://viterbi.usc.edu/DENDegrees

USC Graduate Application:
https://usc.liaisoncas.com

Fall 2019

- Deadline to submit all required materials: January 15, 2019*

Spring 2020

- Deadline to submit all required materials: September 15, 2019*
- Deadline for Scholarship Consideration (on-campus only): August 31, 2019

Fall 2020

- Deadline to submit all required materials: January 15, 2020
- Deadline for Scholarship Consideration (on-campus only): December 15, 2020

** A deadline extension for DEN@Viterbi applicants may be available. Please email DEN@Viterbi.usc.edu for more information.*

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Where Our Alumni Are Working

- What do our students do?
- What do our graduates do?

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Course Delivery Methods

Methods of Course Delivery

- On-campus, full time
  - 3 classes per semester
  - 1.5 – 2 years to complete

- Online delivery via DEN@Viterbi
  - 1-2 classes per semester
  - 2.5 – 3 years to complete degree

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How DEN@Viterbi Works

The Viterbi School of Engineering uses a state-of-the-art, proprietary web-based delivery system that enables students from around the world to access classes live or on-demand.

DEN@Viterbi Students:

- View the same lectures as on-campus students, with fresh content every semester
- Participate in highly interactive discussions with professors and peers
- Submit homework electronically
- Take exams at proctored testing centers near their home or work (or at USC if in the Los Angeles area)

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DEN@Viterbi Overview

	DEN@Viterbi Student	On-Campus Student
Program Admission	USC Graduate Application & required materials	USC Graduate Application & required materials
Weekly Course Lectures	Online with Interactivity	On USC's Campus
Online Course Archives (Lectures & Course Documents)	✓	✓ *
Assignments	Submit electronically according to course deadlines	Submit during lecture or lab according to course deadlines
Exams	Proctored location	USC's campus
Courses per Semester (Average)	1-2	3-4
Degree Completion Requirements	27-37 units with a 3.0 GPA or above	27-37 units with a 3.0 GPA or above
USC Diploma (No Distinction)	✓	✓

*DEN@Viterbi Sections Only

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DEN@Viterbi's E-Learning System

DEN@Viterbi Classroom

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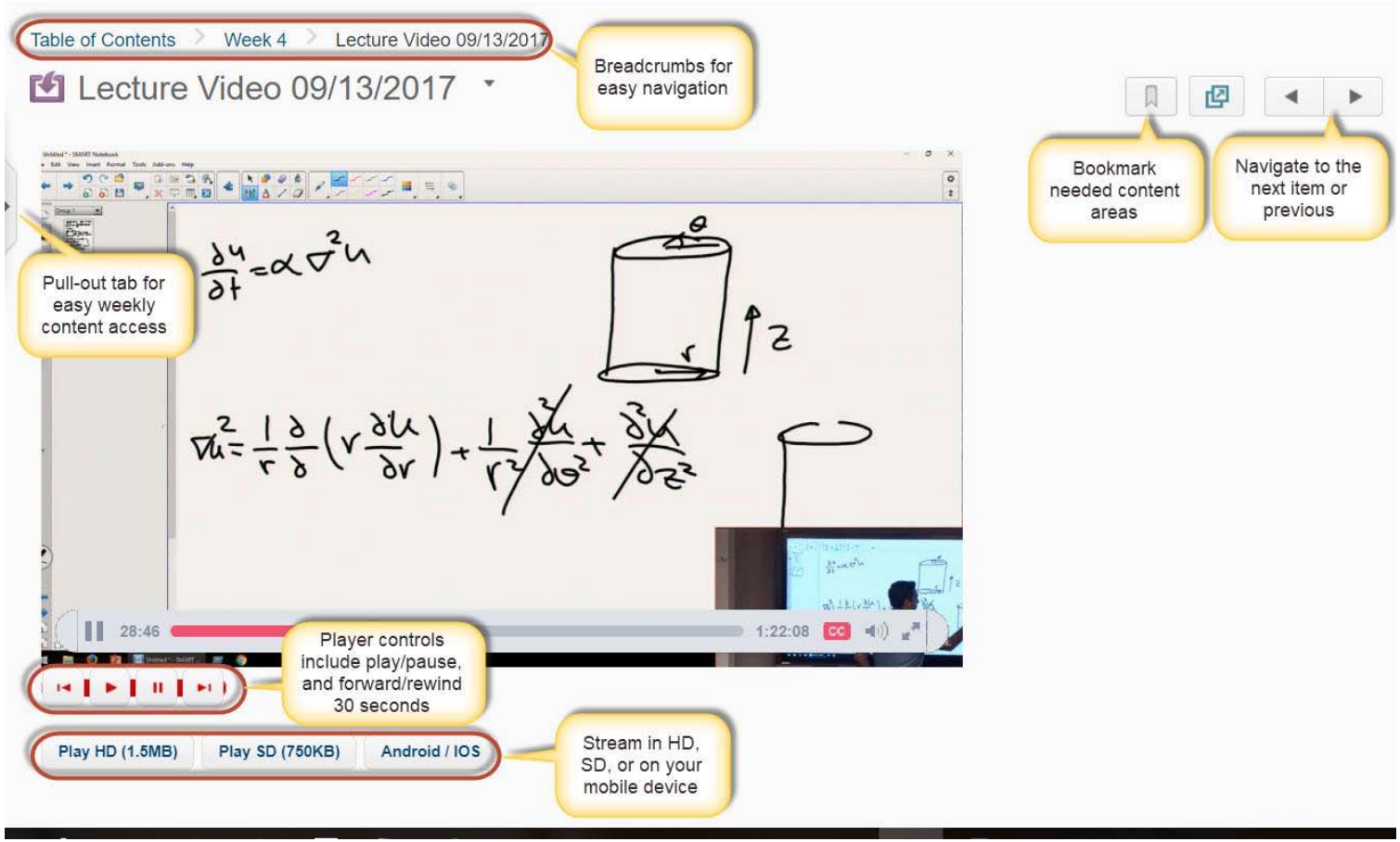
DEN@Viterbi's E-Learning System



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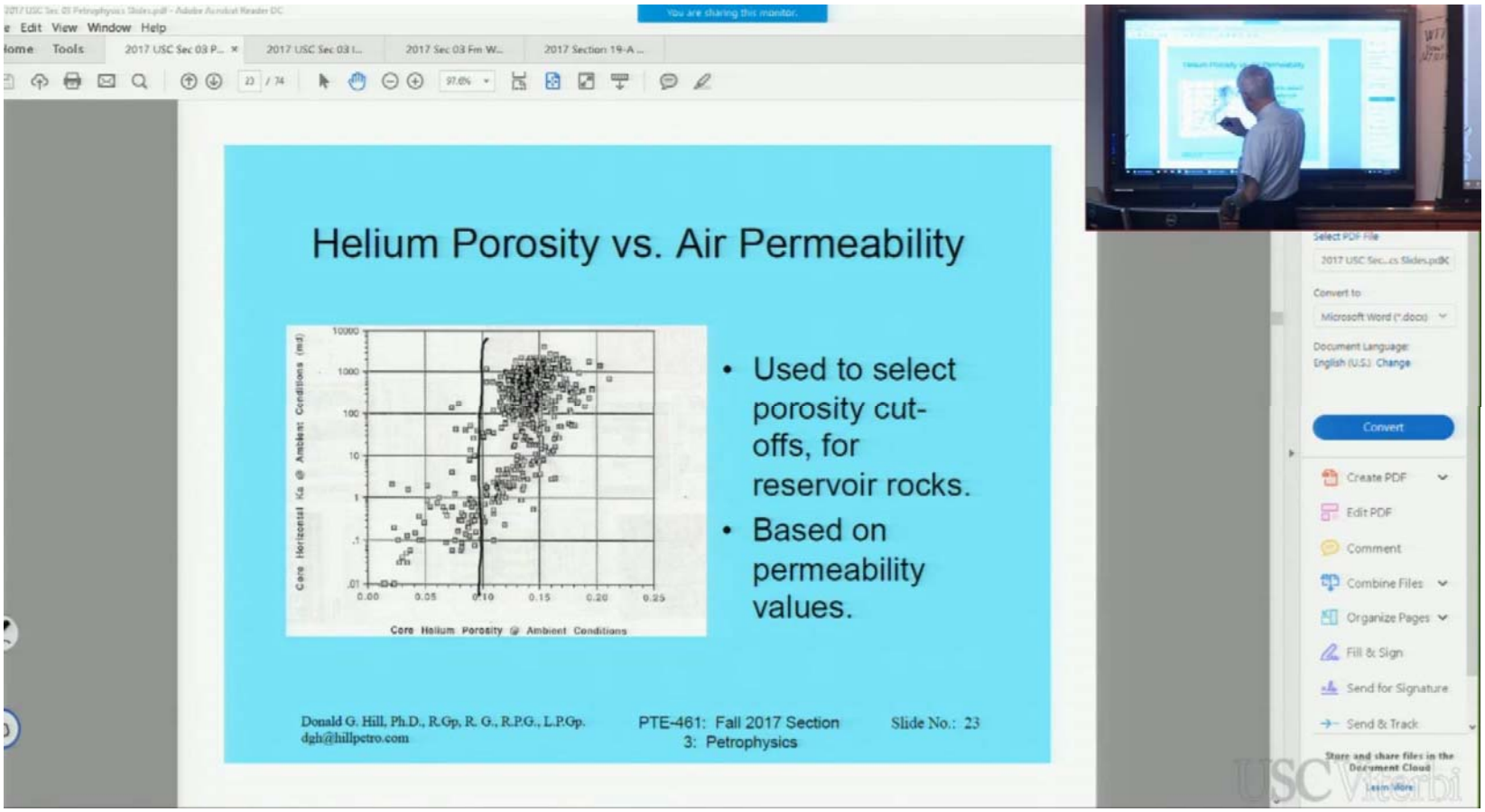
DEN@Viterbi's E-Learning System



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Student Interactivity & Group Meetings

- All DEN@Viterbi students are provided access to their own meeting rooms which can be used for several purposes:
  - Enable video communication (web and mobile)
  - Integrate phone conferencing
  - Integrate fixed room IP video systems
  - Desktop sharing
  - Set up meetings with faculty, teaching assistants and peers
- Call in during live lectures
- Participate in live chats and threaded discussion boards

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DEN@Viterbi

Question: Is there any difference between earning a Master's degree on campus vs. via DEN@Viterbi?

Answer: NO. DEN@Viterbi is a delivery method. Students adhere to the:

- Same Admission Criteria
- Same Curriculum
- Same Exams and Homework
- Same Academic Standards and Graduation Requirements

Therefore…

You earn the *same diploma* whether you earn the degree on-campus or online through DEN@Viterbi.

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DEN@Viterbi Additional Info

Limited Status

- Allows strong candidates to begin coursework before formal admission.
- Courses (***maximum of 12 units)*** can be applied toward degree program once admitted but ***limited status does not guarantee admission***.
- **Get Started this Summer 2019:** https://viterbigradadmission.usc.edu/denviterbi/getting-started/

Tuition Deferment Program

- Students supported by company can defer "up front" payment of tuition until after the semester is over.
- Company must pay 75-100% of tuition to be eligible for program.
- For additional information: https://viterbigrad.usc.edu/tuition-and-funding/employer-supported

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Getting Started

For those interested in taking classes on campus:

- Visit USC campus
- Start your application:
  http://www.usc.edu/admission/graduate/apply

For those interested in taking classes online via DEN@Viterbi:

- Start as a Limited Status Student in Summer 2019–or-
- Start your application:
  http://www.usc.edu/admission/graduate/apply

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Tuition & Fees (2018-2019)

PER-COURSE FEES	Unit Cost	Tuition for 3-Unit Course	Tuition for 4-Unit Course
Tuition for 500/600 level course	$2,005	$6,015	$8,020

Degree Programs are 27-36 units (9-11 courses)

For an overview of additional fees, please visit:
https://viterbigradadmission.usc.edu/programs/masters/tuition-funding/tuition-funding-masters/

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Contact Us

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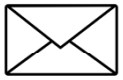
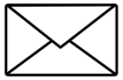
Graduate & Professional Programs


On Campus: viterbi.gradprograms@usc.edu


DEN@Viterbi: DEN@Viterbi.usc.edu

213.740.4488

http://viterbi.usc.edu/gradprograms

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