

# **Discover Viterbi: Industrial & Systems Engineering with Program Faculty**

Viterbi School of Engineering  
University of Southern California

**Fall 2019**

# WebEx Quick Facts

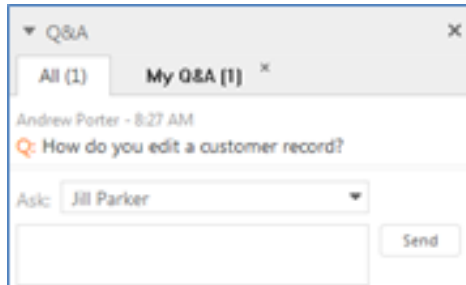
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Will I be able to get a copy of the slides after the presentation?

**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.

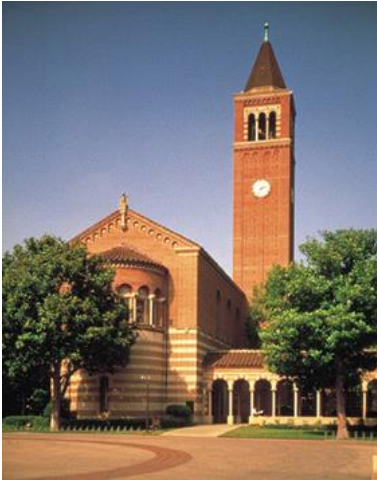
# Today's Program

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



# UNIVERSITY OF SOUTHERN CALIFORNIA



**USC** Viterbi  
School of Engineering



# The University of Southern California

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- Oldest Private University in the western U.S.
  - Founded in 1880
- 47,500 Students
  - 20,000 Undergraduates | 27,500 Graduates
- 4,451 Full-time Faculty
- Diverse Student Population
- Located in Los Angeles

# Viterbi School at a Glance

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## Academic Departments

- 8 Academic Departments

## Faculty

- 188 tenure-track faculty
- 16 Full-time, TT NAE Members (30 Total)
- 70+ NSF CAREER, National & Presidential Young Investigator

## Student Populations (Fall 2018)

- 2,767 Undergraduate
- 5,922 Graduate students

## Research

- Leader in funded research
- 35+ Research Centers
- More than \$207M in research expenditures annually

# USC Engineering: Points of Distinction

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- International Reputation for Excellence
- The Trojan Family Network: 77,000+ (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



# ***U.S. News & World Report, 2019***

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## **Best Engineering Graduate Schools**

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- **Top 10 Ranked Graduate Engineering Program**

## **Best Online Graduate Engineering Programs**

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

## **Best Online Graduate Engineering Programs for Veterans**

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

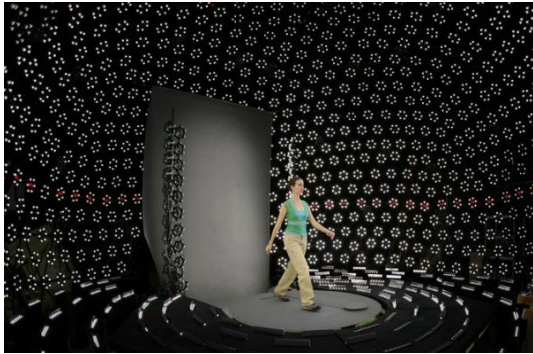


# The Viterbi School of Engineering: A Leader in Research

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

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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

# Meet Our Faculty

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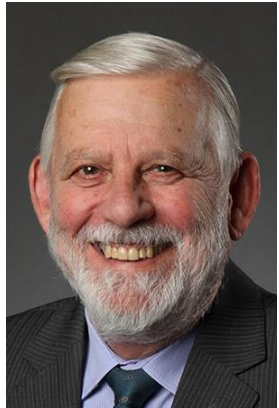


## Dr. Maged Dessouky

- Chair, Daniel J. Epstein Department of Industrial and Systems Engineering
- Dean's Professor of Industrial & Systems Engineering and Spatial Sciences

## Dr. Cesar Acosta

- Director, MS Analytics Program
- Senior Lecturer, Industrial & Systems Engineering



## Prof. Geza Bottlik


- Director, MS Engineering Management Program
- Associate Professor of Industrial & Systems Engineering Practice



# Industrial & Systems Engineering: Program Offerings

## Master's Degree Programs





 Available online via DEN@Viterbi

- MS in Analytics
- MS in Engineering Management 
- MS in Industrial & Systems Engineering 
- MS in Manufacturing Engineering
- MS in Operations Research Engineering 
- MS in Product Development Engineering 

## Graduate Certificate Programs

- Health Systems Operations

## Dual Degree Programs

- MS in Aerospace Engineering / MS in Engineering Management 
- MS in Mechanical Engineering / MS in Engineering Management 
- MS in Electrical Engineering / MS in Engineering Management 
- MS in Petroleum Engineering / MS in Engineering Management 
- MS in Industrial & Systems Engineering / MBA

# MS in Analytics – Program Details

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*Program Requirements: Minimum of 30 units*

## Required Courses (15 units)

- INF 559 – Intro to Data Management
- INF 529 – Predictive Analytics
- ISE 530 – Optimization Methods for Analytics
- ISE 533 – Integrative Analytics
- ISE 562 – Decision Analysis

## Group A Course (3 units, choose one)

- ISE 538 | Performance Analysis Using Markov Models
- ISE 580 | Performance Analysis with Simulation

## Electives (12 units)

- Industrial & Systems Engineering (ISE) Elective (3 units)
- Informatics or Computer Science Elective (3 units)
- Additional electives subject to advisor's approval (6 units)



# MS in Engineering Management - Overview

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- The engineering management program is intended to prepare engineers for careers in management
- *A third of engineers become managers and are faced with problems they are unprepared for unless they have the preparation provided by this degree*
- The program is intended for both working engineers and recent graduates from bachelor programs
- Recent bachelor graduates will increase their employability and their chances of being considered for subsequent management positions, as well as becoming better engineers

Helpful Link:

<https://viterbigradadmission.usc.edu/emt>

# MS in Engineering Management - Overview

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- Working engineers benefit from the degree by enhancing their chances for promotion as well as becoming better engineers
- Engineers who are already managers benefit by a deeper understanding of the issues and methods involved in managing technology oriented projects
- The program averages 100 -125 students, with about 50 graduating per year
- About 15% of the students are off campus
- Classes are taught by a combination of full time professor and industry experts with substantial teaching experience
- Graduates find jobs in domestic and international positions and both in large and smaller companies

# MS in Engineering Management – Program Details

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*Program Requirements: Minimum of 30 units*

 Available online via DEN@Viterbi

## Required Courses (12 units)

- ISE 500 | Statistics for Engineering Managers
- ISE 515 | Engineering Project Management
- ISE 544 | Management of Engineering Teams
- ISE 561 | Economic Analysis of Engineering Projects

## Business and Management Area (3 units)

- Select one 500 level course with business and/or management content with advisor approval

## Required Elective (3 units, choose one)

- ISE 530 | Optimization Methods for Analytics
- ISE 536 | Linear Programming and Extensions
- ISE 562 | Decision Analysis

## Electives

- Four courses for at least 12 units chosen to form a coherent program with the consent of the department advisor.

# MS in Engineering Management – Dual Degree Program Offerings

 Available online via DEN@Viterbi

USC Viterbi also offers dual degrees with Engineering Management:

- MS in Aerospace Engineering / MS in Engineering Management
- MS in Mechanical Engineering / MS in Engineering Management
- MS in Electrical Engineering / MS in Engineering Management
- MS in Petroleum Engineering / MS in Engineering Management
- All applicants must meet the admission requirements of both the Department of Industrial and Systems Engineering for the MS in Engineering Management component and the department of the corresponding MS degree of the specific dual degree program
- Dual degree programs are available online via DEN@Viterbi and on-campus



# MS in Industrial & Systems Engineering– Program Details

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*Program Requirements: Minimum of 30 units*

 Available online via DEN@Viterbi

## Required Courses (12 units)

- ISE 513 | Inventory Systems
- ISE 514 | Advanced Production Planning and Scheduling
- ISE 515 | Engineering Project Management
- ISE 583 | Enterprise Wide Information Systems

## Electives (9 units)

- *Courses must be selected with approval from the department advisor.*

## Group A (3 units, choose one)

- ISE 530 | Optimization Methods for Analytics
- ISE 536 | Linear Programming and Extensions

## Group B (3 units, choose one)

- ISE 525 | Design of Experiments
- ISE 527 | Quality Management for Engineers

## Group C (3 units, choose one)

- ISE 538 | Performance Analysis Using Markov Models
- ISE 580 | Performance Analysis with Simulation

# MS in Manufacturing Engineering – Program Details

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*Program Requirements: Minimum of 30 units*

## Required Courses (12 units)

- CSCI 585 | Database Systems  
or ISE 510 | Advanced Computational Design and Manufacturing
- ISE 511L | Mechatronic Systems Engineering
- ISE 517 | Modern Enterprise Systems  
or ISE 576 | Industrial Ecology: Technology-Environment Interaction
- ISE 525 | Design of Experiments  
or AME 525 | Engineering Analysis

## Electives (18 units)

- A list of approved electives in specialization areas is available from the department. Departmental approval is required for courses not listed.

# MS in Operations Research Engineering – Program Details

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*Program Requirements: Minimum of 30 units*

 Available online via DEN@Viterbi

## Required Courses (minimum 21 units)

- ISE 532 | Network Flows
- ISE 536 | Linear Programming and Extensions
- ISE 538 | Performance Analysis Using Markov Models
- ISE 580 | Performance Analysis with Simulation
- ISE 582 | Web Technology for Industrial Engineering  
or ISE 583 | Enterprise Wide Information Systems

*\* Please see the program page for complete list of elective courses:*

<https://viterbigradadmission.usc.edu/programs/masters/msprograms/industrial-systems-engineering/ms-operations-research/>

## Electives\* (6 units, choose two)

- ISE 514 | Advanced Production Planning and Scheduling
- ISE 520 | Optimization Theory and Algorithms: Numerical Optimization
- ISE 525 | Design of Experiments
- ISE 562 | Decision Analysis
- ISE 563 | Financial Engineering
- ISE 576 | Industrial Ecology: Technology-Environment Interaction
- SAE 541 | Systems Engineering Theory and Practice

# MS in Product Development Engineering – Program Details

*Program Requirements: Minimum of 27 units*

 Available online via DEN@Viterbi

## Required Courses (6 units)

- AME 503 | Advanced Mechanical Design
- ISE 545 | Technology Development and Implementation

## Product Development Technology Track Required Courses (6 units)

- AME 505 | Engineering Information Modeling
- AME 525 | Engineering Analysis  
or AME 526 | Introduction to Mathematical Methods in Engineering II

## Recommended Product Development Technology Track Technical Electives\* (6 units)

- AME 527 | Elements of Vehicle and Energy Systems Design
- AME 588 | Materials Selection
- ISE 576 | Industrial Ecology: Technology-Environment Interaction

## Product Development Systems Track Courses (6 units)

- ISE 515 | Engineering Project Management
- ISE 544 | Management of Engineering Teams

## Product Development Systems Track Technical Electives\*, choose two (6 units)

- ISE 525 | Design of Experiments
- ISE 527 | Quality Management for Engineers
- ISE 561 | Economic Analysis of Engineering Projects
- ISE 576 | Industrial Ecology: Technology-Environment Interaction
- ISE 580 | Performance Analysis with Simulation
- ISE 585 | Strategic Management of Technology
- SAE 541 | Systems Engineering Theory and Practice

## General Electives (9 units)

- *Courses must be selected with approval from the department advisor.*

\* Please see the program page for complete list of elective courses:

<https://viterbigradadmission.usc.edu/programs/masters/msprograms/aerospace-mechanical-engineering/ms-product-development/>



# MS in Industrial & Systems Engineering/MBA (dual degree)

## – Program Details

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*Program Requirements: Minimum 66 units total; minimum 18 units for ISE; 48 units for MBA portion*

### Required Courses (6 units)

- ISE 514 | Advanced Production Planning and Scheduling
- ISE 515 | Engineering Project Management

### ISE Electives (Choose one from each group)

- Systems Design (3 units)
- Information Systems (3 units)
- Quantitative Methods (3 units)

### Systems Design (3 units, choose one)

- ISE 525 | Design of Experiments
- ISE 527 | Quality Management for Engineers
- SAE 541 | Systems Engineering Theory and Practice

### Information Systems (3 units, choose one)

- ISE 580 | Performance Analysis with Simulation
- ISE 582 | Web Technology for Industrial Engineering
- ISE 583 | Enterprise Wide Information Systems

### Quantitative Methods (3 units, choose one)

- ISE 532 | Network Flows
- ISE 536 | Linear Programming and Extensions
- ISE 538 | Performance Analysis Using Markov Models

# Graduate Certificate in Health Systems Operations – Program Details

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*Program Requirements: 17 – 18 units*

## Required Courses (17-18 units)

- ISE 507 | Six-Sigma Methods and Applications
- ISE 508 | Health Care Operations Improvement
- PPD 509 | Problems and Issues in the Health Field
- PPD 513 | Legal Issues in Health Care Delivery
- PPD 517 | Concepts and Practices in Managing Health Care Organizations  
or PPD 514 | Economic Concepts Applied to Health
- PPD 557 | Modeling and Operations Research  
or ISE 530 | Optimization Methods for Analytics  
or ISE 562 | Value and Decision Theory

# Where Our Alumni Are Working

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**WHAT DO OUR STUDENTS DO?**

**WHAT DO OUR GRADUATES DO?**



# Course Delivery Methods

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## 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



# How DEN@Viterbi Works

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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)

# 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

# DEN@Viterbi's E-Learning System

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DEN@Viterbi Classroom

# DEN@Viterbi's E-Learning System

The screenshot displays the DEN@Viterbi E-Learning System interface. At the top, a breadcrumb trail shows 'Table of Contents > Week 4 > Lecture Video 09/13/2017'. Below this, the title 'Lecture Video 09/13/2017' is displayed. The main content area shows a video player with a pull-out tab on the left for weekly content access. The video content includes handwritten mathematical equations:  $\frac{\partial u}{\partial t} = \alpha \nabla^2 u$  and  $\nabla^2 u = \frac{1}{r} \frac{\partial}{\partial r} \left( r \frac{\partial u}{\partial r} \right) + \frac{1}{r^2} \frac{\partial^2 u}{\partial \theta^2} + \frac{\partial^2 u}{\partial z^2}$ , along with a diagram of a cylinder in a coordinate system. The video player controls at the bottom include a progress bar, play/pause, and forward/rewind buttons. Below the player, there are buttons for 'Play HD (1.5MB)', 'Play SD (750KB)', and 'Android / IOS'. Callouts provide additional information: 'Breadcrumbs for easy navigation' points to the top trail; 'Bookmark needed content areas' points to a bookmark icon; 'Navigate to the next item or previous' points to navigation arrows; 'Pull-out tab for easy weekly content access' points to the left sidebar; 'Player controls include play/pause, and forward/rewind 30 seconds' points to the video controls; and 'Stream in HD, SD, or on your mobile device' points to the format selection buttons.

Table of Contents > Week 4 > Lecture Video 09/13/2017

Lecture Video 09/13/2017

Breadcrumbs for easy navigation

Bookmark needed content areas

Navigate to the next item or previous

Pull-out tab for easy weekly content access

$\frac{\partial u}{\partial t} = \alpha \nabla^2 u$

$\nabla^2 u = \frac{1}{r} \frac{\partial}{\partial r} \left( r \frac{\partial u}{\partial r} \right) + \frac{1}{r^2} \frac{\partial^2 u}{\partial \theta^2} + \frac{\partial^2 u}{\partial z^2}$

Player controls include play/pause, and forward/rewind 30 seconds

Stream in HD, SD, or on your mobile device

Play HD (1.5MB) Play SD (750KB) Android / IOS

# DEN@Viterbi's E-Learning System

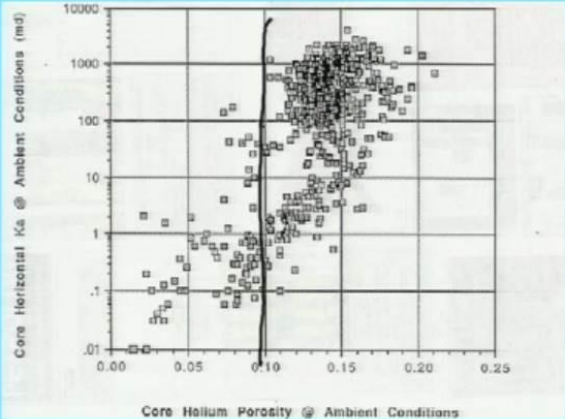
2017 USC Sec 03 Petrophysics Slides.pdf - Adobe Acrobat Reader DC

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Home Tools 2017 USC Sec 03 P... 2017 USC Sec 03 I... 2017 Sec 03 Frm W... 2017 Section 19-A ...

23 / 74 97.6%

## Helium Porosity vs. Air Permeability



Core Helium Porosity @ Ambient Conditions

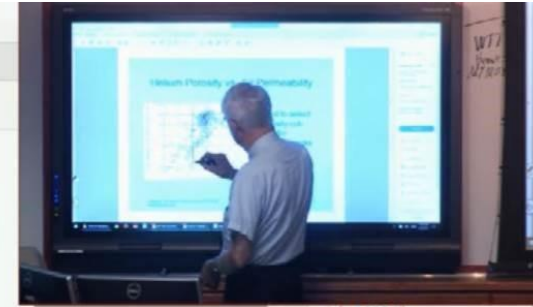
Core Horizontal  $K_a$  @ Ambient Conditions

- Used to select porosity cut-offs, for reservoir rocks.
- Based on permeability values.

Donald G. Hill, Ph.D., R.Gp. R. G., R.P.G., L.P.Gp.  
dgh@hillpetro.com

PTE-461: Fall 2017 Section 3: Petrophysics

Slide No.: 23



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Learn More

USC Viterbi

USC Viterbi  
School of Engineering



# 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



**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.

# DEN@Viterbi Additional Information

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## Limited Status

- Allows strong candidates with an undergraduate degree in engineering, math or a hard science from a regionally accredited institution with a *cumulative GPA of at least 3.0* (on a 4.0 scale) to begin coursework before formal admission.
- Courses (*maximum of 12 units*) can be applied toward degree program if admitted but *Limited Status does not guarantee formal admission*.
- Get Started this Spring 2020 - completing your DEN@Viterbi Profile: [viterbi.usc.edu/DENProfile](https://viterbi.usc.edu/DENProfile)

## Employer Reimbursement Deferment

Students supported by a company can defer payment of up to 90% of tuition until after the semester is over.

### Program Eligibility

- Your employer reimburses you for tuition at the end of each term.
- Your student account is current.

**Program Participation Requirements** (required every semester prior to the settlement deadline each term)

- Complete and submit deferment application
- Pay 10% of tuition, 100% of all fees and a \$100 application fee
- Sign and submit promissory note packet to [uscsfs@usc.edu](mailto:uscsfs@usc.edu)

For additional information: <https://sfs.usc.edu/payment/employer-reimbursement/>

# Application Criteria - Master's & Graduate Certificate Programs

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Each program has unique application requirements – please be sure to review specific information for your program(s) of interest:

<https://viterbigradadmission.usc.edu/programs/masters/msprograms/industrial-systems-engineering/>

## General Application Criteria

- An undergraduate degree in engineering, math or hard science from a regionally accredited college or university
- A cumulative undergraduate GPA of at least 3.0 on a 4.0 scale is recommended (*not required*)
- Satisfactory scores on the general portion of the Graduate Record Examination (GRE) that are less than five years old
- Resume/CV (Required)
- Personal Statement (Required)
- Letters of Recommendation (Varies by program – see individual program page)
- TOEFL (International Applicants)

# Application Deadlines

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## Application Deadlines

### Fall 2020

- Deadline to submit all required materials: January 15, 2020\*
- Deadline for Scholarship Consideration (on-campus only): December 15, 2019

### Spring 2021

- Deadline to submit all required materials : September 15, 2020\*
- Deadline for Scholarship Consideration (on-campus only): August 31, 2020

*\* A deadline extension for DEN@Viterbi applicants may be available. Please email [DEN@Viterbi.usc.edu](mailto:DEN@Viterbi.usc.edu) for more information.*

#### Helpful Links:

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

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

# Tuition & Fees (2019-2020)

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Current tuition and fees for on-campus and online  
DEN@Viterbi students

PER-COURSE FEES	Unit Cost	Tuition for 3-Unit Course	Tuition for 4-Unit Course
Tuition for 500/600 level course	\$2,075	\$6,225	\$8,300

Please see the Tuition and Fees page for more details:

<https://viterbigradadmission.usc.edu/programs/masters/tuition-funding/tuition-funding-masters/>

# Getting Started

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For those interested in taking classes on campus:

- Visit USC campus
- Start your application: <https://gradadm.usc.edu/apply/>

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

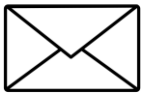
- Start your application: <https://gradadm.usc.edu/apply/> -or-
- Start as a Limited Status Student as early as Spring 2020  
Complete the DEN@Viterbi Profile: [viterbi.usc.edu/denprofile](https://viterbi.usc.edu/denprofile)



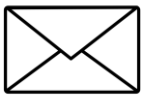
# Contact Us

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## USC Viterbi School of Engineering Admission & Student Engagement



**On Campus: [viterbi.gradadmission@usc.edu](mailto:viterbi.gradadmission@usc.edu)**



**DEN@Viterbi: [DEN@Viterbi.usc.edu](mailto:DEN@Viterbi.usc.edu)**



**213.740.4488**



**<http://viterbi.usc.edu/gradprograms>**