

Discover Viterbi: Computer Science, Cyber Security & Informatics Programs

Viterbi School of Engineering
University of Southern California
Fall 2017

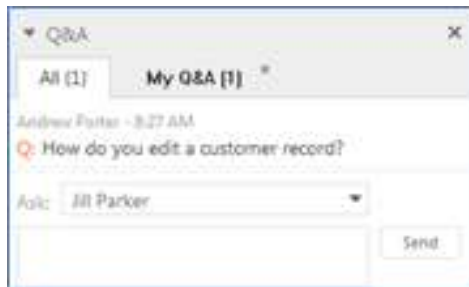
WebEx Quick Facts

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.

Today's Program

- University of Southern California
- USC Viterbi School of Engineering
- Program Overviews
 - Master's Programs in Computer Science
 - Master of Science in Cyber Security Engineering
 - Master's Programs in Informatics
- DEN@Viterbi
- Tuition & Fees
- Q&A



UNIVERSITY OF SOUTHERN CALIFORNIA



The University of Southern California



- Oldest Private University in the western U.S.
 - Founded in 1880
- 44,000 Students
 - 19,000 Undergraduates | 25,000 Graduates
- 4,190 Full-time Faculty
- Diverse Student Population
- Located in Los Angeles

Viterbi School at a Glance



Academic Departments

- 8 Academic Departments

Faculty

- 185 tenure-track faculty
- 20+ NAE
- 60+ NSF CAREER, National & Presidential Young Investigator

Alumni

- More than 65,000+

Student Populations

- 2,700 Undergraduate
- 5,600 Graduate students

Research

- Leader in funded research
- 45+ Research Centers
- More than \$185M in research expenditures

U.S. News & World Report, 2017

Best Engineering Graduate Schools

- **Top Ranked** Graduate Engineering Program

Best Online Graduate Engineering Programs

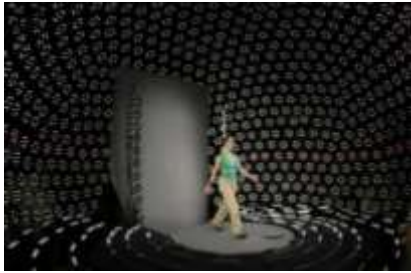
- **Ranked #1** Online Graduate Engineering Programs
- **Ranked #1** Online Computer Information Technology Program (Computer Science)

Best Online Graduate Engineering Programs for Veterans

- **Ranked #1** Online Graduate Engineering for Veterans
- **Ranked #1** Online Computer Information Technology for Veterans

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 as robotics, software engineering, sensor networks, vision sciences, automated construction and photonics
- Over 45 research centers
- Industrial partnerships and collaboration

Meet Our Faculty



■ Professor Cyrus Shahabi

- Chair, Computer Science Department
- Director, USC Informatics Program
- Director, USC Integrated Media System Center



■ Professor Clifford Neuman

- Associate Director, Cyber Security
- Director, USC Center for Computer Systems Security
- Scientist, ISI



■ Professor Craig Knoblock

- Associate Director, USC Informatics Program
- Division Director, Intelligent Systems Division, ISI
- Research Professor, CS



■ Professor Yolanda Gil

- Associate Director, Interdisciplinary Programs
- Director, Knowledge Technologies & Associate Division Director, ISI
- Research Professor, CS

Master's Programs in Computer Science

Master of Science Programs in Computer Science



Available online via DEN@Viterbi

- Computer Science 
- CS – Computer Networks
- CS – Computer Security 
- CS – Data Science 
- CS – Game Development
- CS – High Performance Computing and Simulation
- CS – Intelligent Robotics
- CS – Multimedia and Creative Technologies
- CS – Software Engineering 
- CS – Scientists and Engineers 

- Graduate Certificate in Software Architecture 

MS in Computer Science (General)

Total Units: 28

Core Curriculum

Required course (4 units):

- CSCI 570 | Analysis of Algorithms

Choose 2 of the following courses (8 units):

- CSCI 561 | Foundations of Artificial Intelligence
- CSCI 571 | Web Technologies
- CSCI 585 | Database Systems

Additional Course Work (16 units):

- The remaining elective units necessary to earn the degree are completed by selecting additional 500-level CSCI courses



Available online via DEN@Viterbi

MS in Computer Science (Scientists & Engineers)

- An expanded MS degree, designed specifically for students with an academic background in engineering or science, but a limited background in computer science.
- Combines an introductory sequence of undergraduate preparatory and foundational coursework with all the graduate breadth requirements necessary to satisfy the traditional MS in Computer Science.
- Available on campus or online via DEN@Viterbi

MS in Computer Science (Scientists & Engineers)

Total Units: 37 (33 degree applicable units)

Curriculum

Preparatory Programming Requirement (4 units):

- CSCI 455x | Introduction to Programming Systems Design

Foundational Requirements (7-8 units)

- CSCI 402 | Operating Systems
- EE 450 | Computer Networks or EE 457 | Computer Systems Organization

Breadth Courses (16 units)

- CSCI 570 | Analysis of Algorithms
- CSCI 561 | Foundations to Artificial Intelligence
- CSCI 571 | Web Technologies
- CSCI 585 | Database Systems

Elective Courses (7-8 units of approved graduate-level coursework from CSCI)

MS in Computer Science (Computer Security) vs. MS in Cyber Security Engineering

- **The MS in Cyber Security Engineering** (described later) replaces the CS core classes with a full suite of classes focused specifically on the topic of computer security and is focused more on operation of secure systems, and applications that operate in such environments rather than the development of the environments themselves
- **The Security Specialization within the Computer Science Masters degree** selects security relevant options from the basic Computer Science Masters and augments these with additional classes in security

MS in Computer Science (Computer Security) vs. MS in Cyber Security Engineering

Curriculum: MS in Computer Science (Computer Security) – 32 units

- General Computer Science core (12) Curriculum – plus -
- CSCI 530 – Security Systems (4)
- CSCI 531 – Applied Cryptography (4)
- CSCI 551 – Computer Communications (4)
- CSCI 555 – Advanced Operating Systems (4)

- Elective (4 units of approved graduate-level coursework in security)

Computer Science vs. Informatics

- **Computer Science** studies information and its transformation in the abstract, focusing more on algorithmic generality than on specific forms of content
- **Informatics** studies techniques for managing and analyzing data and their application to real world problems

Master of Science in Cyber Security

Master of Science in Cyber Security Engineering

Cyber Security Engineering focuses on fundamental theory and practice for engineering and operating secure information systems. The program addresses challenges of policy formulation, verifiably secure operating system components, security-aware applications, and use of cryptography and key management in high assurance environments and highly distributed cloud and network based applications.



Available online via DEN@Viterbi

Why pursue this degree?

Cyber security's ever-growing brain drain

by Peter Suci
SEPTEMBER 9, 2015, 12:14 PM EST



With each passing hack, the U.S. needs more cyber security professionals—and has fewer options on where find them.

Good help is increasingly hard to find. For proof, just watch the cyber security industry, where it may soon be impossible to fill all the jobs that need to be staffed. And though this isn't a new problem for the space, it's one that's poised to get much worse in years to come.

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Reuters



- Students should pursue this degree to prepare for careers as:
 - Security software developers
 - System Architects
 - Security administrators
 - Network administrators
 - Forensic Investigators
 - **CISO's (Chief Information Security Officers)**

MS in Cyber Security Engineering - Differentiators

- The Curriculum for USC Viterbi's MS in Cyber Security Engineering is based on a solid foundation developed by practitioners and visionaries from the high assurance systems community.
- This foundation is used to explain the approaches and philosophy needed to secure the deployment of modern, always connected, systems and critical infrastructure.

Master of Science in Cyber Security Engineering

Total Units: 28

Curriculum

Required course (20 units):

- CSCI 530 | Security Systems
- INF 519 | Foundations and Policy for Information Security
- INF 523 | Computer Systems Assurance
- INF 525 | Trusted System Design, Analysis and Development
- INF 529 | Security and Privacy in Informatics

At least one of the following (3 or 4 units):

- INF 521 | Applications of Cryptography to Information Security Problems
- INF 526 | Secure Systems Administration
- INF 528 | Computer Forensics

Additional Course Work (4-5 units):

- See department for approved coursework or other courses may be approved in consultation with department advisor



Available online via DEN@Viterbi

Master's Programs in Informatics

Master's Programs in Informatics

- Master of Science in Data Informatics
- Master of Communication Informatics
- Master of Science in Spatial Informatics

- Graduate Certificate in Big Data Fundamentals

Note: All Informatics Programs are currently on-campus only.

Why Data Informatics?

The image shows a screenshot of the Harvard Business Review website. The main article is titled "Data Scientist: The Sexiest Job of the 21st Century" by Thomas H. Davenport and D.J. Patil. A secondary article is highlighted: "There's No Panacea for the Big Data Talent Gap" by Paul Barth and Randy Bean, dated November 29, 2012. Three text boxes are overlaid on the right side of the page, listing applications and technologies related to data informatics.

Applications: Health, Transportation, Energy, etc.

Machine Learning, Data Mining, etc.

Parallel DBs, Cloud, HPC, Distributed Sys, etc.

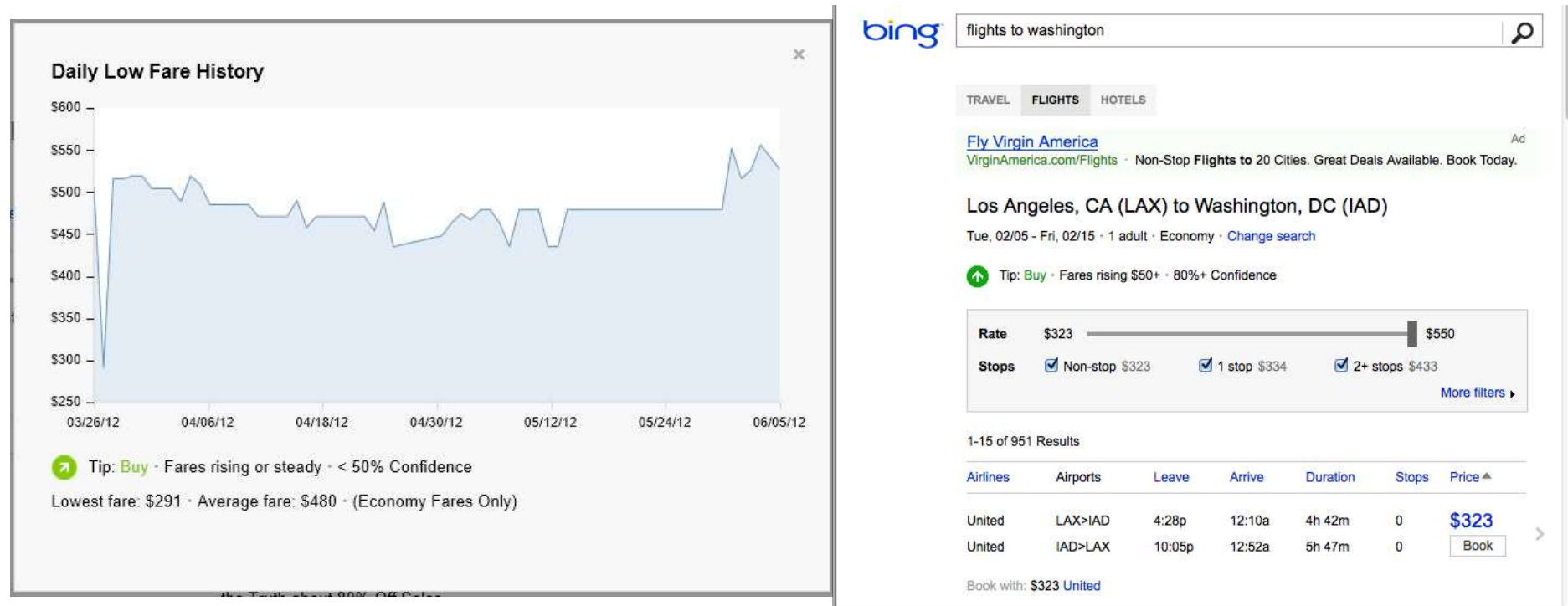
Master of Science in Data Informatics

Goal of the degree is to provides students with the knowledge and skill to:

- Understand and use **large data** environments
 - Hadoop, HDFS, Spark, etc.
- Work with and use the various **analysis** tools
 - Machine learning
 - Data mining
 - Visualization
 - User interfaces
 - Etc...
- Apply these methods to **real-world problems**

Example Application: Fare Prediction

- Collect and integrate flight prices over time
- Apply machine learning to predict when to buy



- [Etzioni, Knoblock, et al. KDD 2003]

MS in Data Informatics

Total Units: 28

Curriculum

Required course (20 units):

- INF 551 | Foundations of Data Management
- INF 552 | Machine Learning for Data Informatics
- INF 553 | Foundations and Applications of Data Mining

One of the following user/interface visualization:

- INF 554 | Information Visualization
- INF 555 | User Interface Design, Implementation and Testing
- INF 556 | User Experience Design and Strategy

One of the following capstone classes:

- INF 558 | Building Knowledge Graphs
- INF 560 | Data Informatics Professional Practicum

Elective course (8 units): Choose from an approved list

Master of Communication Informatics

Program Objectives

Train students where the fields of communication and engineering naturally converge:

- The engineering of communication, e.g.,
 - Big data and data analytics
 - Social media tools
 - Use of technology in journalism
- The communication of engineering, e.g.,
 - Public relations
 - Public awareness
 - Public engagement on science and technology

Master of Communication Informatics

Total Units: 32 | A cross-disciplinary joint degree program offered by the Viterbi School of Engineering and the Annenberg School for Communication and Journalism

Curriculum

Communication Informatics Core (16 units):

- COMM 502 | Theoretical Approaches to Multidisciplinary Design Projects
- INF 510 | Principles of Programming for Informatics
- INF 549 | Introduction to Computational Thinking & Data Science
- INF 550 | Overview of Data Informatics in Large Data Environments

Informatics Elective (4 units):

- Choose from an approved list of courses

Communications Electives (12 units):

- Choose from an approved list of courses

Master of Science in Spatial Informatics

Program Objectives

Provides students with the knowledge and skills to:

- Understand and use the big data and data analytics tools
- Understand the principles and application of geographic information science (GIS)
- Utilize the skills in these two areas solve location-based problems in a wide-range of industries and disciplines
 - Healthcare
 - Marketing
 - Social services
 - Environmental sustainability
 - Transportation

Master of Science in Spatial Informatics

Total Units: 32 | A cross-disciplinary joint degree program offered by the Viterbi School of Engineering and the Dornsife College of Letters, Arts and Sciences

Curriculum

Required courses (24 units):

- INF 549 | Introduction to Computational Thinking and Data Science
- SSCI 581 | Concepts of Spatial Thinking
- SSCI 580 | Spatial Computing
- SSCI 583 | Spatial Analysis
- INF 510 | Principles of Programming for Informatics
- INF 550 | Overview of Data Informatics in Large Data Environments

Spatial & Informatics Elective Courses (8 units):

- Chosen from an approved list

General Admission Criteria

Admission criteria differs by program. To review the requirements for your program of interest visit: <http://viterbi.usc.edu/msprograms>

General Admission Criteria for Masters Programs:

- Undergraduate degree in engineering, math or a hard science from a regionally-accredited university (*official transcripts submitted*)
- To be competitive, 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 5 years old
- CV/Resume Required
- Required supplemental materials may include Letters of Recommendation and a Statement of Purpose

Application Deadlines

Application Deadlines for 2018

Fall 2018

- Deadline to submit all required materials: January 17, 2018*
- Deadline for Scholarship Consideration (on-campus only): December 15, 2017
- *MS in Cyber Security Engineering & Master in Communication Informatics only accept applications for Fall*

Spring 2019

- Deadline to submit all required materials: September 15, 2018*
- Deadline for Scholarship Consideration (on-campus only): August 31, 2018

* A deadline extension for DEN@Viterbi applicants may be available. Please email 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>

Where our Alumni are working



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

Course Delivery Methods



Methods of Course Delivery

- On-campus, full time
 - 2 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

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



DEN@Viterbi Classroom

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 Spring 2018: <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>

Tuition & Fees (2017-2018)

PER-COURSE FEES	Unit Cost	Tuition for 3-Unit Course	Tuition for 4-Unit Course
Tuition for 500/600 level course	\$1,937	\$5,811	\$7,748

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/>

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 Spring 2018 –or–
- Start your application:
<http://www.usc.edu/admission/graduate/apply>

Contact Us

USC Viterbi School of Engineering Graduate & Professional Programs



On Campus: viterbi.gradprograms@usc.edu



DEN@Viterbi: DEN@Viterbi.usc.edu



213.740.4488



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