Master of Advanced Study (MAS) Degree Information Session

27 March 2019

Watch the live stream video of the presentation [here](#).
Agenda

• Master of Advanced Study Overview
  – MAS vs MS
  – Application Process/Requirements/Tuition

• Wireless Embedded Systems (WES)

• Data Science and Engineering (DSE)

• Architecture-based Enterprise Systems Engineering (AESE)

• Next Steps
Introduction

• UC San Diego School of Engineering
  – Jacobs School of Engineering (largest in CA among public universities)
  – Top ranked engineering school
    • 6th in the nation among public universities / 11th among all engineering programs
  – Distinguished faculty (>230 research-active faculty)
  – Commitment to serving needs of industry for latest in research and education
Introduction

• Master of Advanced Study (MAS)
  – Master’s degree, conferred by the University of California, San Diego
  – Technical education programs designed for engineering professionals
  – Unique multidisciplinary degree program focused on emerging technology areas and new fields traditional curricula do not address
  – MAS degree programs
    • WES - Wireless Embedded Systems (since 2011)
    • DSE - Data Science and Engineering (since 2014)
    • AESE - Architecture-Based Enterprise Systems Engineering (since 2010)

194 Companies Represented

4Med Imaging Solution
Abbott Laboratories
Abbott Vascular Devices
Accenture
Active Mind Technology
Advanced Brain Monitoring
AeroAstroTech
ai-one
Ajinomoto Althea
Alion Science and Technology
Alphatec Spine
American Bureau of Shipping
Angeles Crest Engineering
Apex Biotechnology
Applied Medical
AT Dynamics
Athena Mobile
Automatic Data Processing
BAE Systems
Bank of America
Bank of America Home Loans
Barona Resort & Casino
Beckman Coulter
Biopico Systems
Biorxn
Boeing
Booz Allen Hamilton
Branchpoint Technologies
Broadcom
CA Technologies
Cakesoft Technology
California Correctional Health Care
Gas and Power Technologies
Services
Callaway Golf
Caltrans
Caradigm
Carefusion
Carollo Engineers
Catheter Connections
CeloNova BioSciences
Circadence
Clarity Design
Classic Wire Cut
CodeMetro
Cognegx Corporation
CoStar Group
Covidien
Coway USA
Crafter Brothers
Cubic Global Defense
Cubic Mission Systems
Cubic Transportation Systems
Cymer
DRK Engineering
Deccan International
Dexcom
EMN Defense Services
Encore Capital Group
Endologix
EnGenious Technologies
Entropic Communications
Epic Systems
ESRI
Fallbrook Engineering
FICO
FloGast
Forcepoint
Ford Motor Company
Forward Slope
Future Education
Galaxy
Genentech
General Atomics
Gimbal
GlySens
Goal Structured Solutions
Google
GoPro
greenfence
Growth 2.0
Harper Construction
Hewlett Packard
Hologic
Hospira
Hyundai Mobis
IBM
IKA
Illumina
InfoSys
Innovive
Inova Diagnostics
Integrate
INTEGRIS Group
Intel
Intuit
JMJ Financial
John Wayne Cancer Institute
KAB Laboratories
KEDZIG
Kelpac Medical
Kirana Analytics
Komaru Technologies
Kontron America
kWh Analytics – Solar Risk
Management
Lead Crunch
Leica Systems
Leidos
Life Technologies
LifeNet Health
LinkedIn
Loan Depot
Lockheed Martin
Los Angeles Dodgers
Lucent-Alcatel
Makena Technologies
Medimexico
MedImpact
Medtronic Ablation Frontiers
Medtronic Minimed
Metron Scientific Solutions
Microsoft
MITRE
NAVAIR
Network Appliances (NetApp)
Neustar
Nokia
Northrop Grumman Aerospace
Systems
Northrop Grumman Mission Systems
Novartis
NuVasive
Obzervant
Oncore Manufacturing
OneRoof Energy
Optum360/United Health Group
Panasonic
Parastack
Pegasystems
Peregrine Semiconductor
Pfizer
PluralProQinase GmbH
Qualcomm
Raytheon
Resonetics
SAIC
Samsung
San Diego State University
Scripps Health
Scripps Institute, UC San Diego
SeaSpine
Sentek Global
Servicios Quirurgicos S.A.
Shutterfly
Skillnet Solutions
SkySurgery
Slacker Radio
Social Nightlife
Solar Turbines
SPAWAR SSC Pacific
Stanford University
Stonehenge Financial Partners
Survice Engineering
Sycuan Casino
SyneractHCR
Tandem Diabetes
TASC
Tecl Dagnostics
Teradata
Texas Instruments
Thermo Fisher Scientific
Ticom Geomatics
TrellisWare
Triage Consulting Group
Turn Key
Ubigomm
UCSD Health
UCSD Information Technology Services
UCSD Medical Center
UCSD Research Administration
UCSD Scripps Institute of Oceanography
UCSD San Diego Super Computer
United States Navy
United Technologies Aerospace
Universal Hospital Services
Uptake
Veyo
ViaSat
Volcano
Vulcan Wireless
Walt Disney Company
Webroot
West Arbor Group
Workday
Y8L Consulting
Zodiam Pool Systems
# Program Requirements

<table>
<thead>
<tr>
<th>General Requirements</th>
<th>Work Experience Required</th>
<th>Application Deadline (all dates 2019)</th>
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</thead>
<tbody>
<tr>
<td>AESE</td>
<td>5 Years</td>
<td>April 30 (early/priority) June 25(standard)</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td></td>
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<tr>
<td>- Engineering</td>
<td></td>
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<tr>
<td>- Science</td>
<td></td>
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<tr>
<td>WES</td>
<td>2 Years</td>
<td>April 30 (early/priority) June 25(standard)</td>
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<tr>
<td>- Mathematics</td>
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<tr>
<td>- Physics</td>
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<tr>
<td>GPA</td>
<td>2 Years</td>
<td>April 30 (early/priority) June 25(standard)</td>
</tr>
<tr>
<td>- 3.0 Minimum*</td>
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</tr>
<tr>
<td>DSE</td>
<td>2 Years</td>
<td>April 30 (early/priority) June 25(standard)</td>
</tr>
<tr>
<td>No GRE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No TOEFL if working in US for more than 1 year (may require Letter of Exception)</td>
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</tbody>
</table>

* Some exceptions

- You may apply to more than 1 program
# Program Schedule

<table>
<thead>
<tr>
<th>Program</th>
<th>Schedule</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>AESE</td>
<td>1 Year (Full-time) 42 units total</td>
<td>13 units ----- 3 classes + project</td>
<td>13 units ----- 3 classes + project</td>
<td>13 units ----- 3 classes + project</td>
<td>3 units ----- capstone project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WES</td>
<td>2 Years (Part-time) 36 units total</td>
<td>4 units ----- 1 class</td>
<td>4 units ----- 1 class</td>
<td>4 units ----- 1 class</td>
<td>4 units ----- 1 class</td>
<td>8 units ----- 2 classes</td>
<td>8 units ----- 2 classes</td>
<td>4 units ----- capstone</td>
</tr>
<tr>
<td>DSE</td>
<td>2 Years (Part-time) 38 units total</td>
<td>6 units ----- 1 class 1 seminar</td>
<td>8 units ----- 2 classes</td>
<td>8 units ----- 2 classes</td>
<td>no summer classes</td>
<td>8 units ----- 2 classes</td>
<td>6 units ----- 1 class</td>
<td>2 units</td>
</tr>
</tbody>
</table>
# Program Cost (Fall 2019 Cohorts)

<table>
<thead>
<tr>
<th>Program</th>
<th>Total Cost*</th>
<th>Includes</th>
</tr>
</thead>
</table>
| AESE    | $33,000.    | • Tuition  
|         |             | • Books  
|         |             | • Software  
|         |             | • Mandatory UC Graduate Student Fees  
|         |             | • Breakfast and Lunch on class days  
|         |             | • Parking (10 days/quarter)  
| WES     | $37,000.    | • Does NOT include mandatory health coverage (~$3500. per academic year) – can be waived with proof of insurance  
|         |             | • Payment options  
|         |             | • Pay by quarter (standard)  
|         |             | • Other payment options (MAS only)  
| DSE     | $39,000.    | |
|         |             | |

* UC Graduate Student Fees are estimated pending State of California final budget
Specific Program Information

http://jacobsschool.ucsd.edu/mas/

Details available for each program

Master of Advanced Study Degree

Course Calendar

FAQ
Master of Advanced Study

Questions?
Master of Advanced Study Degree

Wireless Embedded Systems

Faculty Directors
Professor George Papen
Professor Ryan Kastner
Wireless Embedded Systems

Deep and broad education in the multidisciplinary fundamentals of wireless communications and embedded system design.

• Faculty directors
  – Professor George Papen, Electrical and Computer Engineering
  – Professor Ryan Kastner, Computer Science and Engineering

• Electrical and Computer Engineering + Computer Science and Engineering

• Intended audience
  – Engineering professionals with a background in computer science and/or electrical engineering

• Courses:
  – 2 year program (September 2019 – June 2021)
  – Alternating Fridays or Friday/Saturdays
  – 7 quarters, including Summer
Why a MAS Wireless Embedded Systems Degree?

• **Wireless revolution**
  – Interconnection of everyday devices through wireless technology - "Internet of Things"
  – 50 billion wireless devices by 2020: Ericson CEO Hans Vestberg
  – Inherently interdisciplinary, residing at the boundary between Electrical Engineering and Computer Science

• **Next generation embedded wireless devices**
  – Form factor, cost, and power consumption must be dramatically lower than existing cellular phones.
  – Design requires a unique interdisciplinary background in systems, software, hardware, and communication theory.

There is a strong need for a targeted *high-quality* program aimed at high-level training of professional engineers.
MAS WES: Curriculum

CS
- Embedded Systems Design
- Software for Embedded Systems
- Hardware Design for Embedded Systems

EE
- Digital Signal Processing
- Digital Communication Systems
- Wireless Communication Systems

Capstone Project
- Validation and Prototyping of Embedded Systems
## MAS WES: Curriculum

<table>
<thead>
<tr>
<th>Y1 Fall</th>
<th>Y1 Winter</th>
<th>Y1 Spring</th>
<th>Y1 Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Signal Processing (Prof. Fred Harris)</td>
<td>Intro to Embedded Systems (Prof. Hoover/Prof. Barngrover)</td>
<td>DSP II / Wireless Communication Circuit Systems (Prof. Das)</td>
<td>Software for Embedded Systems (Prof. Gupta)</td>
</tr>
<tr>
<td>Y2 Fall</td>
<td>Y2 Winter</td>
<td>Y2 Spring</td>
<td></td>
</tr>
<tr>
<td>Y2 Winter</td>
<td>Y2 Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y2 Spring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capstone Project (Prof. Kastner)</td>
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</tbody>
</table>

Program Requirements

• Admission Guidelines:
  – Bachelor’s Degree
    • Computer Science
    • Electrical Engineering

• GPA: 3.0 Minimum
• Statement of Purpose
• 3 Letters of Recommendation
• No GRE required: 2 Years relevant experience
• Pre-Admissions open now
Wireless Embedded Systems

Questions?

CS
Embedded Systems Design
Software for Embedded Systems

EE
Digital Signal Processing
Digital Communication Systems

Capstone Project
Validation and Prototyping of Embedded Systems

UC San Diego Jacobs School of Engineering
Master of Advanced Study Degree

Data Science and Engineering

Faculty Directors
Professor Ilkay Altintas de Callafon
Professor Yoav Freund
Professor Alin Deutsch
**MAS Data Science and Engineering**

Combine the skills of software programmer, database manager and statistician to create mathematical models of the data, identify trends, then present them in effective visual ways.

- **Faculty directors**
  - Dr. Ilkay Altintas de Callafon, Chief Data Science Officer, San Diego Supercomputer Center
  - Professor Yoav Freund, Computer Science and Engineering
  - Professor Alin Deutsch, Computer Science and Engineering

- **Computer Science and Engineering + San Diego Supercomputer Center**

- **Intended audience**
  - Engineering professionals with a background in computer science or other engineering or mathematics with substantial experience in data analysis.

- **Courses:**
  - 2 year program (September 2019 – June 2021)
  - Alternating Fridays or Friday/Saturdays
What is Big Data?

10^9 Gigabyte
- The first Gigabyte hard drive was introduced by IBM in 1980 and weighed 550 lbs with a price of $40,000

10^12 Terabyte
- 500TB of new data per day are ingested in Facebook databases

10^15 Petabyte
- The CERN Large Hadron Collider generates 1PB per second

10^18 Exabyte
- 1EB of data is created on the internet each day

10^21 Zettabyte

10^24 Yottabyte

10^27 Brontobyte

10^30 Geopbyte

10^24 Yottabyte

10^21 Zettabyte

10^18 Exabyte

10^15 Petabyte

10^12 Terabyte

10^9 Gigabyte

10^6 Megabyte

10^3 Geobyte
The Education of a Data Scientist

Doing Data Science: Straight Talk from the Frontline
Rachel Schutt & Cathy O’Neil
# MAS DSE: Coursework

<table>
<thead>
<tr>
<th>Y1 Fall</th>
<th>Y1 Winter</th>
<th>Y1 Spring</th>
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</thead>
<tbody>
<tr>
<td>DSE 290: Case studies in Data Science (2 units) - Various</td>
<td>DSE 210: Probability and Statistics using Python (4 units) – Dasgupta</td>
<td>DSE 230: Data Science using Hadoop and Spark (4 Units) – Freund</td>
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</table>

<table>
<thead>
<tr>
<th>Y2 Fall</th>
<th>Y2 Winter</th>
<th>Y2 Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 203: Data Integration &amp; ETL (4 units) - Gupta</td>
<td>DSE 241: Data Visualization (4 units) - Chourasia</td>
<td></td>
</tr>
<tr>
<td>DSE 250: Beyond Relational Data Models (4 units) - Deutsch</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Y2 Winter</th>
<th>Y2 Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSE 260 (2 units) – Altintas de Callafon</td>
<td>DSE 260 (2 units) – Altintas de Callafon</td>
</tr>
</tbody>
</table>

Case Studies

Data Science Design Capstone Project
MAS Data Science and Engineering

Curriculum

**Foundational Courses (required)**
- Python for Data Analysis
- SQL Database Management Systems
- Statistics and Probability Using Python

**Core Courses (required)**
- Data Integration & ETL
- Machine Learning
- Data Analysis Using Hadoop, and Spark
- Case Studies in Data Science

**Rotating Courses (2 required)**
A subset of these courses will be offered each year.
- Data Analysis Using R
- Performance Measurement
- Online Analytics Applications
- Data Visualization
- Beyond Relational Data Models
- Managing Large-Scale Graph Data

**Capstone Course (required)**
- Data Science Capstone Design Project
MAS DSE: Admissions Requirements

• **MAJOR Importance** (at least 2/3)
  1. Programming experience in a general purpose language (C, Java, Python)
  2. Experience with databases/SQL
  3. Experience with data analysis in an application domain

• **MINOR Importance** (strengthens your application)
  1. **MATH**: Linear Algebra, Probability and Statistics
  2. **Distributed Systems**: Hadoop, Spark ...
MAS DSE: Requirements

1. What is your programming experience? List the programming languages in which you are fluent in. Describe your role in the development of a complex/interesting software project.

2. Describe your experience using SQL systems. Have you designed a database schema? Have you tuned the performance of a database? Have you written queries involving joins/outer-joins, nesting, grouping?

3. Do you have any hands-on experience with parallel and distributed systems? Please describe one of these experiences.

4. Describe your experience using analytical software such as R, Matlab, SPSS, SAS, Stata, Pandas, Weka, ... ? Briefly describe on one of the projects using that software.

5. What are the more advanced concepts from probability, statistics, and machine learning that you have used in your work? (Examples: regression, covariance, decision trees, graphical models, SVD, SVM, P-values....) Briefly describe the context in which you used one of these concepts.

6. Describe the most significant analytical task that you have performed in the course of your job or school work.
Questions?
Master of Advanced Study Degree

Architecture-Based Enterprise Systems Engineering Leadership Program

Founding Director
Professor Hal Sorenson
Master of Advanced Study Degree

Architecture-based Enterprise Systems Engineering Leadership Program

Founding Director
Professor Hal Sorenson

Thinking & Engineering

UC San Diego
Rady School of Management
What Is the AESE Problem?

• Information Age capabilities
  – The Internet
  – Digital capabilities
have produced
  – Mobile devices
  – Internet of Things (IoT)
  – The Cloud
  – Big data
  – Deep learning
  – ....

and these are changing almost all aspects of our society

• The engineering of systems has been enabled in ways that a few years ago was unimaginable

• Instead of concentrating on the implementation of
  – prescribed requirements
  – through the use of the most appropriate technologies

We focus on the integration of previously unconnected systems and their interoperation to accomplish previously unavailable tasks
What Embodies the AESE Solution?

• The engineering considerations start much earlier to include
  – Human-based involvements
  – Organizational and business aspects in addition to
  – Technology and engineering

• Thus, the problems have grown to require consideration of the triumvirate of technology, organizations, and people (i.e., TOP)

• The engineering of TOP systems is referred to here as enterprise systems engineering (ESE)

• ESE requires essentially a TOP-down assessment

Result: engineers are better prepared for senior engineering and management positions
What is “Systems Thinking“?

- Function
- Requirements
- Trade-off analyses/alternatives
- Specification
- Verification and validation
- System test
- Life cycle “-ilities”

This is not what we do in AESE!
What is “Systems Thinking”? 

- Understand Enterprise Landscape 
- Involve Enterprise Stakeholders 
- Define a Goal and Mission  
  – Including a strategy and operational concept 
- Identify Desired Capabilities  
  – Consider Different Alternatives To Achieve The Capabilities 
  – Create Business Process Models/Use Cases 
- Develop Architectural Models  
  – Verify Logic, Behavior, and Performance of Models 
  – Emphasize Events and Decision-making 
- Iterate The Earlier Considerations Based On Experimentation and Team Projects 

- **Become Leaders and Team Builders** 
  This is what we do in AESE!
Enterprise systems and system-of-systems are necessarily complex adaptive systems. Development of complex adaptive systems stresses heuristics through synthesis rather than analysis. Team projects are major requirement for program completion.

70:20:10 Learning Model

- Team Project Work: 70%
- On the Job Experience: 20%
- Mentoring & Coaching: 10%
- In-Class Breakouts: 20%
- Classroom: 10%
- Courses: 10%
- Defining Project: 10%
- Defining Capabilities: 20%
- Architecture Development: 10%
Participation in AESE Offerings

• AESE students are expected to have at least five years of engineering experience

• The AESE Leadership Program has been offered for twelve years, now conducting our thirteenth

• A total of 305 students have completed the program over the course of these thirteen offerings
## Participating Organizations

<table>
<thead>
<tr>
<th>Anritsu</th>
<th>Harper Construction</th>
<th>Sentek Global</th>
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</thead>
<tbody>
<tr>
<td>Anthea Mobile</td>
<td>Hewlett Packard</td>
<td>Social Nightlife</td>
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<tr>
<td>BAE Systems</td>
<td>Honeywell Systems</td>
<td>Solar Turbines</td>
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<tr>
<td>Booz Allen Hamilton</td>
<td>Integrant, Inc.</td>
<td>Sophrosyne Youth</td>
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<td>Development Foundation</td>
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<tr>
<td>Cubic Defense</td>
<td>Lockheed Martin</td>
<td>SSC Pacific</td>
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<td>Cubic Transportation</td>
<td>MITRE</td>
<td>SPAWAR PEO C4I</td>
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<td>Domenix Corporation</td>
<td>Northrop Grumman AS</td>
<td>Stellar America</td>
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<td>Northrop Grumman IS</td>
<td>Thermo Fisher Scientific, Inc.</td>
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<td>Northrop Grumman MS</td>
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<td>Novartis</td>
<td>UCSD Medical Center</td>
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<td>UTC</td>
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<td>ViaSat</td>
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<td>QinetiQ-NA</td>
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<td>SAIC</td>
<td>SeaSpine</td>
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<td>SD Supercomputer Center</td>
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Graduate Admissions Guidelines 1/2

• Following the example of other MAS programs, we substitute long-term work experience for the submission of GRE test scores

• The full list of admission guidelines is as follows:
  – Possession of a bachelor’s degree in engineering, science, or mathematics
  – Undergraduate record (a minimum overall GPA of 3.0 or equivalent)
  – Minimum 5 years of relevant work experience or equivalent
    • Provide an informative resume
  – Three letters of recommendation
Graduate Admissions Guidelines 2/2

• Statement of Purpose in the broad issues associated with enterprise-wide development of knowledge and decision-making systems

• Proposal for an enterprise systems engineering capstone project (Students who do not have a project idea at the time of admission will work with cohorts and the AESE Co-Directors to identify a problem of interest upon start of the program)

• TOEFL or TSE scores (international applicants only)

AESE admissions information available at: http://jacobsschool.ucsd.edu/mas/aese/admissions.shtml

Priority Application due: April 30, 2019
Application due: June 24, 2019
Structured for Working Professionals

• One year program (e.g., September 2019 – August 2020)
  – Classes scheduled on alternating Friday/Saturdays
  – Plus one Wednesday-Saturday Workshop each quarter
  – Every class is scheduled from 8 AM to 5 PM
  – Breakfast and lunch are provided each day

• Each class has 32 contact hours (8 hours x 4 days)

• Classes are offered sequentially (not concurrently)
  – Three courses/quarter
  – One two-day Team project meeting

• Final four-day Team Project class at the end of August
Distance Learning

• On-line education for the AESE Leadership Program
  – Approved by the University of California
  – Accredited by the Western Association of Schools & Colleges (WASC)

• On-line education is accomplished using
  – Synchronous, two-way video/audio connections
  – Students must attend the four day Workshops
    • One in each quarter
    • Final team presentations in August
  – All lectures are video taped and available within a few days

• 29 students in nine locations have participated
  – No degradation in their learning experience
Questions?
Master of Advanced Study Degree

Next Steps
Next Steps – All Programs

• For more information:
  – JacobsSchool.ucsd.edu/MAS

• Applications:
  – Open now: each program has an admissions page
  – April 30 first application deadline for all three programs

• Questions:
  – Ask today!

• More questions:
  – JacobsMAS@eng.ucsd.edu
  – Specify program
# AESE Program Costs 2019 – 2020

Download pdf at [jacobsschool.ucsd.edu/mas/aese/cost.shtml](http://jacobsschool.ucsd.edu/mas/aese/cost.shtml)

## Tentative

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Class #</th>
<th>Class Name</th>
<th># Units</th>
<th>Class Fee</th>
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</thead>
<tbody>
<tr>
<td>Fall 2019</td>
<td>MGT 291</td>
<td>Essentials of Business Practice</td>
<td>4</td>
<td>$2,940.00</td>
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<tr>
<td></td>
<td>MGT 406</td>
<td>Leadership Values, Skills &amp; Team Building</td>
<td>4</td>
<td>$2,940.00</td>
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<td></td>
<td>AESE 278A</td>
<td>Complexity and Large Scale Systems</td>
<td>4</td>
<td>$2,940.00</td>
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<tr>
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<td>AESE 279A</td>
<td>AESE Quarterly Team Project</td>
<td>1</td>
<td>$735.00</td>
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<tr>
<td></td>
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<td>Mandatory UCSD Graduate Student Fees*</td>
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<td>$751.62</td>
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<td>Quarter Total</td>
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<td>13</td>
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<td>Winter 2020</td>
<td>AESE 278B</td>
<td>Enterprise Archetecting</td>
<td>4</td>
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<tr>
<td></td>
<td>AESE 278D</td>
<td>Engineering Essentials for Distributed Systems</td>
<td>4</td>
<td>$2,940.00</td>
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2019-2020 Total | 42 | $33,030.16

* Fall Quarter 2019 fees include a mandatory $100 New Student One-Time Document Fee
** 2019-2020 UCSD Graduate Student Fees are estimated pending State of California final budget
WES Calendar 2019 – 2021

Download pdf at jacobsschool.ucsd.edu/mas/wes/

*University scheduling policy may necessitate changes. Advance notice will be given.*
**WES Program Costs 2019 – 2021**

Download pdf at jacobsschool.ucsd.edu/mas/wes/cost.shtml

### Wireless Embedded Systems Master’s Degree Program

**TENTATIVE**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Class #</th>
<th>Class Name</th>
<th># Units</th>
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<td>Digital Signal Processing</td>
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**2019-2021 Total**: $37,379.02

*Fall Quarter 2019 fees include a mandatory $100 New Student One-Time Document Fee

**2019-2021 UCSD Graduate Student Fees are estimated pending State of California final budget*
## DSE Calendar 2019 – 2021

Download pdf at [jacobsschool.ucsd.edu/mas/dse/](jacobsschool.ucsd.edu/mas/dse/)

*University scheduling policy may necessitate changes. Advance notice will be given.*
### JACOBS SCHOOL OF ENGINEERING
### PROGRAM COSTS 2019 – 2021

Data Science and Engineering Master’s Degree Program

**TENTATIVE**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Class #</th>
<th>Class Name</th>
<th># Units</th>
<th>Class Fee</th>
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<tbody>
<tr>
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**DSE Additional Course Options**

- DSE 221: Data Analysis Using R
- DSE 232: Performance Measurement
- DSE 240: Online Analytics Applications
- DSE 241: Data Visualization
- DSE 250: Beyond Relational Data Models
- DSE 251: Managing Large-Scale Graph Data

* Fall Quarter 2019 fees include a mandatory $100 New Student One-Time Document Fee
** 2019-2021 UCSD Graduate Student Fees are estimated pending State of California final budget
***Additional Courses TBD