Agenda

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

• Architecture-based Enterprise Systems Engineering

• Wireless Embedded Systems

• Data Science and Engineering

• Next Steps
Introduction

- UC San Diego School of Engineering
  - Jacobs School of Engineering
  - Top ranked engineering school
  - Distinguished 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 executive education program designed for engineering professionals
  – Unique multidisciplinary degree program focused on emerging technology areas and new fields traditional curricula do not address
  – MAS degree programs
    • Architecture-Based Enterprise Systems Engineering (since 2010)
    • Wireless Embedded Systems (since 2011)
    • Data Science and Engineering (since 2014)

MAS Alums and Current Students

Abbott Laboratories
Abbott Vascular
Accenture
Active Mind Technology
Advanced Brain Monitoring
AerostarTech
ai-one
Ajinomoto Althea
Ailon Science and Technology
Alphatec Spine
American Bureau of Shipping
Angeles Crest Engineering
Anthea Mobile
Apex Biotechnology Corp
BAE Systems
Applied Medical
AT Dynamics
Bank of America
Bank of America Home Loans
Barona Resort & Casino
Beckman Coulter
Biopico Systems
Bionx
Boeing
Booz Allen Hamilton
Branchpoint Technologies
Broadcom
CA Technologies
Cakesoft Technology
California Correctional Health Care
Caltrans
Camadigm
Callaway Golf
Carefusion
Carollo Engineers
Catheter Connections
CeloNova BioSciences
Clarity Design
Classic Wire Cut
CodeMetro
Cognex Corporation
Coast Career Institute
CoStar Group
Covidiens
Crafter Brothers
Cubic Global Defense
Cubic Transportation Systems
Cymer
Deccan International
Dexcom
D&B Engineering
EMN Defense Services
Encore Capital Group
Endologix
EnGenius Technologies
Entropic Communications
Epic Systems
ESRI
Fallbrook Engineering
Forcepoint
Ford Motor Company
Forward Slope
Future Education
Galaxy
Gas and Power Technologies
Genentech
General Atomics
Gimbals
GlySens
Google
GoPro
greenforce
Growth 2.0
Harper Construction
Hewlett Packard
Hologic
Hospira
Hyundai Mobis
IKA
Illumina
InfoSys
Innovate
Inova Diagnostics
Integrant
INTEGRIS Group
Intel
Intuit
JMU Financial
John Wayne Cancer Institute
KAB Laboratories
KEDZIG
Kepco Medical
Koram Technologies
Kontron America
kWh Analytics
Lead Crunch
Leica Systems
Leidos
Life Technologies
LifeNet Health
Loan Depot
Lockheed Martin
Los Angeles Dodgers
Lucent-Alcatel
Makena Technologies
Medtronic Ablation Frontiers
Medtronic Minimed
Metron Scientific Solutions
MITRE
NAVAIR
Network Appliances (NetApp)
Neustar
Nokia
Northrop Grumman Aerospace
Northrop Grumman Mission Systems
NuVasive
Obevarent
Oncore Manufacturing
OneRoof Energy
Optum360, a division of
United Health Group
Panasonic
Parastack
Pegasystems
Peregrine Semiconductor
Pfizer
ProGinase GmbH
Qualcomm
Radiology
Resonetics
SAIC
Samsung
San Diego State University
San Diego Super Computer
SeaSpine
Senetek Global
Servicios Quirugicos S.A.
Scripps Health
Scripps Institute, UCSD
Shutterfly
SkySurgery
Slacker Radio
Social Nightlife
Solar Turbines
Stonehenge Financial Partners
SPAWAR
SSC Pacific
Survice Engineering
SyneractHCR
Tandem Diabetes
TASC
Teco Diagnostics
Teradata
Texas Instruments
Thermo Fisher Scientific
The Boeing Company
Ticom Geomatics
TrellisWare
Triage Consulting Group
Turn Key
Ubiquim
UCSD IT Services
UCSD Medical Center
UCSD Research Administration
UCSD Scripps Institute of Oceanography
United States Navy
United Technologies Aerospace
Universal Hospital Services
Uptake
Veyo
ViaSat
Volcano
Vulcan Wireless
Walt Disney Company
Webroot
West Arbor Group
Workday
YBL Consulting
4Med Imaging Solutions

New in 2017-18
# Program Requirements

<table>
<thead>
<tr>
<th>General Requirements</th>
<th>Work Experience Required</th>
<th>Application Deadline (all dates 2018)</th>
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</thead>
<tbody>
<tr>
<td><strong>AESE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>5 Years</td>
<td>April 30 (early/priority)</td>
</tr>
<tr>
<td>- Engineering</td>
<td></td>
<td>June 25 (standard)</td>
</tr>
<tr>
<td>- Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Mathematics</td>
<td>2 Years</td>
<td>April 30 (early/priority)</td>
</tr>
<tr>
<td>- Physics</td>
<td></td>
<td>June 25 (standard)</td>
</tr>
<tr>
<td>GPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 3.0 Minimum*</td>
<td>2 Years</td>
<td>April 30 (early/priority)</td>
</tr>
<tr>
<td>No GRE</td>
<td></td>
<td>June 25 (standard)</td>
</tr>
<tr>
<td>No TOEFL if working in US for more than 1 year (may require Letter of Exception)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Some exceptions

- Online application process: MASEng.ucsd.edu/<<program>>/admissions
- You may apply to more than 1 program
<table>
<thead>
<tr>
<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 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 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 2 classes</td>
<td>8 units 2 classes</td>
<td>8 units 2 classes</td>
<td>4 units capstone</td>
</tr>
<tr>
<td>DSE 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 Schedule**

MAS
# Program Cost (Fall 2018 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 |
|         |             | • Parking (10 days/quarter) |
|         |             | • Does NOT include mandatory health coverage (~$3500. per academic year) |
| WES     | $37,000.    | • Payment options  
|         |             | • Pay by quarter (standard) |
|         |             | • Annual payment options (*MAS only*) |
| DSE     | $39,000.    |          |
|         |             |          |

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

• Program Calendars
  JacobsSchool.ucsd.edu/MAS/<PROGRAM> ➔ Curriculum
  – “Download 2018-20 Schedule” (DSE, WES)
  – “Download 2018-19 Schedule” (AESE)

• Program Cost
  JacobsSchool.ucsd.edu/MAS/<PROGRAM> ➔ Cost
  – “Total Program Cost”
  – Breakdown of costs by quarter and course
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
What is a “System”?

• A “system” is an interconnected set of elements that is coherently organized in a way that achieves something.
  – If you look at that definition closely for a minute, you can see that a system must consist of four kinds of things: elements, interconnections, organizational processes, and a function or purpose.

• Donella Meadows, Thinking in Systems: A Primer (p. 11), Chelsea Green Publishing
What is “Systems Engineering”? 

• Function 
• Requirements 
• Trade-off analysis 
• 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 project strategy  
- Identify Required Capabilities  
  - Including decision-making  
- Create Business Process Models/Use Cases  
- Develop Architectural Models  
- Verify Logic, Behavior, and Performance of Models  

This is what we do in AESE!
Understand Enterprise Landscape

• What is changing?
  – Enterprise Systems are becoming increasingly synonymous with the Enterprise itself. (Examples include Amazon, Google, Uber, Facebook, etc...)
  – Most Enterprises are becoming Global, Socio-Technical, and Information-Intensive, evolving in a Volatile, Uncertain, Complex, and Ambiguous (VUCA) environment.
Consequences and Responses

1. Teach executives “engineering”
   or
   Teach engineers “management and leadership”

2. Engineer's role grows

3. Enterprise systems thinking is mostly about creating and leading, not only fixing and following
Basic Objective of AESE Leadership Program

- Educate engineers with broader interests than the narrow perspectives of their technical specialties to
  - Understand enterprise leadership and the art of decision making
  - Interact with diverse stakeholders in the context of business strategy, finance, and operations
  - Use this broadened perspective for the development of enterprise systems.
AESE Application Areas

- Defense Systems
- Intelligence Systems
- Aviation Systems
- Financial Systems
- Homeland Security Systems
- Judiciary Systems
- Health Systems

... And the list goes on!

DoDAF 2.02 Architecture Viewpoints

- Capability Viewpoint: Articulate the capability requirement, delivery timing, and deployed capability
- Operational Viewpoint: Articulate operational scenarios, processes, activities & requirements
- Services Viewpoint: Articulate the performers, activities, services, and their exchanges providing for, or supporting, DoD functions
- Systems Viewpoint: Articulate the legacy systems or independent systems, their composition, interconnectivity, and context providing for, or supporting, DoD functions
MITRE Operates FFRDCs

- National Security Engineering Center (DoD)
- Center for Advanced Aviation System Development (FAA)
- Center for Enterprise Modernization (Treasury/IRS/VA)
- Homeland Security Systems Engineering and Development Institute (DHS)
- Judiciary Engineering and Modernization Center (Federal Judiciary)
- CMS Alliance to Modernize Healthcare (CMS/HHS)
- National Cybersecurity FFRDC (NIST)
Basic Educational Cornerstones

1. Systems are being progressively integrated and made interoperable to achieve new capabilities

2. Participative management across varied stakeholders enhanced by enterprise decision-making capabilities

3. “Systems thinking” and its strong ties to “complex adaptive systems”

4. Resulting complex systems are inherently non-linear, dynamic, discrete-event and adaptive
5. Synthesize interoperable systems to development using a sequence of small or agile steps that requires continual involvements among engineers, managers, and users and a deep understanding of leadership.

6. Dynamic, discrete-event systems that must be developed to achieve well-defined goals and objectives are modeled from basic descriptions of the ways the system is to be used.

7. Need for team projects that focus on a substantial (i.e., a BHAG -- Big Hairy Audacious Goals) enterprise problems as the capstone for the program.
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.

• Joint Program in Jacobs School of Engineering and Rady School of Management

• Faculty directors
  – Director, Hal Sorenson, Professor, Mechanical and Aerospace Engineering
  – Associate Director, Joseph Engelberg, Associate Professor, Rady School of Management

• Intended audience
  – Senior engineers
  – Engineering managers

• One year program (September 2017 – August 2018)
  – Classes on alternating Friday/Saturdays; 8 AM to 5 PM
  – Plus one Wednesday-Saturday workshop each quarter
Learn the appropriate management and engineering domains, methodologies, technologies, and tools for developing the complex distributed systems that support effective and knowledgeable decisions for an enterprise.
Program Characteristics

• Duration and overall schedule
  – One year graduate program (end of September – end of August)
• Distance learning option available
• Graduate credits
  – 9 courses, each 4 units, and 6 units for Team Project courses for a total of 42 graduate units
• Course scheduling
  – Two courses/quarter meet on Friday and Saturday
  – One workshop/quarter meets Wednesday through Saturday
• Course grading:
  – Every course has a “take home” individual final and a team project final
• Class duration:
  – Each class meets for four days, 8am – 5pm
# AESE Curriculum

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essentials of Business Practice (Rady)</td>
<td>Enterprise Architecting (Jacobs)</td>
<td>Patterns for Enterprise Architecting (Jacobs)</td>
<td>Team Project Workshop &amp; Final Presentation</td>
</tr>
<tr>
<td>Leadership Skills, Values, and Team Building Workshop (Rady)</td>
<td>Engineering Essentials for Distributed Systems Workshop (Jacobs)</td>
<td>Decision and Risk Analysis (Rady)</td>
<td></td>
</tr>
<tr>
<td>Complexity and Large-Scale Systems (Jacobs)</td>
<td>Modeling, Simulation &amp; Analysis (Jacobs)</td>
<td>Managing Stakeholder Relationships Workshop (Rady)</td>
<td></td>
</tr>
<tr>
<td>Team Project 1</td>
<td>Team Project 2</td>
<td>Team Project 3</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL: 42 units**
## Program Characteristics - 2

<table>
<thead>
<tr>
<th></th>
<th>Total Cost*</th>
<th>Includes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AESE</strong></td>
<td><strong>$33,000</strong></td>
<td>• Tuition</td>
</tr>
<tr>
<td>42 units (1 year)</td>
<td></td>
<td>• Books</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Software</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Breakfast and lunch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mandatory UC Graduate Student Fees</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Parking (10 days/quarter)</td>
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<td></td>
<td></td>
<td>• Does NOT include mandatory health coverage (~$3500. per academic year)</td>
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<td></td>
<td></td>
<td>• Payment options</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pay by quarter (standard)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Annual payment options</td>
</tr>
</tbody>
</table>

*UC Graduate Student Fees are estimated pending State of California final budget*
Program Characteristics - 3

- Admission Guidelines:
  - Bachelor’s Degree
    - Engineering
    - Science
    - Mathematics
    - Physics
- GPA: 3.0 Minimum
- Statement of Purpose
- 3 Letters of Recommendation
- No GRE required: 5 Years experience
- Applications by ASAP
Summary of AESE Offerings

• The AESE Leadership Program has been offered for twelve years
  – Master of Advanced Study (MAS) degree approved by UC President in August 2010

• A total of 288 students have completed the program over the course of these twelve offerings

• Including AY2017, a total of 242 students will have earned the Masters degree
# Participating Organizations

<table>
<thead>
<tr>
<th>Anritsu</th>
<th>Harper Construction</th>
<th>Sentek Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthea Mobile</td>
<td>Hewlett Packard</td>
<td>Social Nightlife</td>
</tr>
<tr>
<td>BAE Systems</td>
<td>Honeywell Systems</td>
<td>Solar Turbines</td>
</tr>
<tr>
<td>Booz Allen Hamilton</td>
<td>Integrant, Inc.</td>
<td>Sophrosyne Youth Development Foundation</td>
</tr>
<tr>
<td>Cubic Defense</td>
<td>Lockheed Martin</td>
<td>SSC Pacific</td>
</tr>
<tr>
<td>Cubic Transportation</td>
<td>MITRE</td>
<td>SPAWAR PEO C4I</td>
</tr>
<tr>
<td>Domenix Corporation</td>
<td>Northrop Grumman AS</td>
<td>Stellar America</td>
</tr>
<tr>
<td>EMN Defense Services</td>
<td>Northrop Grumman IS</td>
<td>Thermo Fisher Scientific, Inc.</td>
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<td>EnGenius</td>
<td>Northrop Grumman MS</td>
<td>UCSD IT</td>
</tr>
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<td>Englue, Inc.</td>
<td>Paychex</td>
<td>UCSD Medical Center</td>
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<td>ESRI</td>
<td>Qualcomm</td>
<td>US Navy</td>
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<tr>
<td>Forward Slope, Inc.</td>
<td>Qualcomm Institute/Calit2</td>
<td>ViaSat</td>
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<tr>
<td>General Atomics Aero</td>
<td>QinetiQ-NA</td>
<td>X-Feds</td>
</tr>
<tr>
<td>Goodrich Aerospace</td>
<td>SAIC</td>
<td></td>
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<tr>
<td>Grapecity Mongolia, LLC</td>
<td>SDSC</td>
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</tbody>
</table>
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

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

Wireless Embedded Systems

Professor Truong Nguyen
Department Chair, Electrical and Computer Engineering
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 2017 – June 2019)
  - 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

**Software**
- Introduction to Embedded Systems Design
- Validation and Prototyping of Embedded Systems
- Wireless Embedded System on Chip
- Digital Communication Systems
- Digital Signal Processing

**Hardware**
- Wireless Communication Systems

**Capstone Project**
- Software for 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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Y2 Fall</th>
<th>Y2 Winter</th>
<th>Y2 Spring</th>
</tr>
</thead>
</table>
Master of Advanced Study Degree

Data Science and Engineering

Faculty Directors
Professor Ilkay Altintas de Callafon
Professor Yoav Freund
Professor Yannis Papakonstantinou
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 Yannis Papakonstantinou, 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 2017 – June 2019)
  – Alternating Fridays or Friday/Saturdays
What is Big Data?

• A gigabyte, a terabyte, a petabyte?
  – Changes over time as technology improves.

• The spread-sheet definition:
  – The spread-sheet does not fit in the memory of one machine.

• The data-transport definition:
  – The fastest and cheapest way to transport 5TB from San Diego to LA is by FedEx.
The Education of a Data Scientist

Hacking Skills

Math & Statistics Knowledge

Machine Learning

Data Science

Danger Zone!

Substantive Expertise

Traditional Research

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

• **MAJOR** (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** (Strengthens your application)
  1. **MATH**: Linear Algebra, Probability and Statistics
  2. **Distributed Systems**: Hadoop, Spark ...
## MAS DSE: Coursework

<table>
<thead>
<tr>
<th>Y1 Fall</th>
<th>Y1 Winter</th>
<th>Y1 Spring</th>
</tr>
</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>
</tr>
<tr>
<td></td>
<td>Case Studies</td>
<td></td>
</tr>
</tbody>
</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>
<td></td>
<td>DSE 260 (2 units) – Altintas de Callafon</td>
</tr>
<tr>
<td></td>
<td>Data Science Design Capstone Project</td>
<td>DSE 260 (2 units) – Altintas de Callafon</td>
</tr>
</tbody>
</table>
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

**Elective 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
Questions?
Master of Advanced Study Degree

Next Steps
Next Steps – All Programs

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

• To apply:
  – JacobsSchool.ucsd.edu/PROGRAM/admissions

• Questions:
  – Ask today!

• More questions:
  – JacobsMAS@eng.ucsd.edu
  – Specify program
Download 2016-17 PDF from: JacobsSchool.ucsd.edu/MAS/AESE
Download 2017-19 PDF from:
JacobsSchool.ucsd.edu/MAS/DSE
Download 2017-19 PDF from: JacobsSchool.ucsd.edu/MAS/WES
# AESE Program Costs 2017-18

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Class #</th>
<th>Class Name</th>
<th># Units</th>
<th>Class Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall 2017</strong>&lt;br&gt;due: Sept 2017</td>
<td>MGT 291</td>
<td>Essentials of Business Practice</td>
<td>4</td>
<td>$2,940.00</td>
</tr>
<tr>
<td></td>
<td>MGT 406</td>
<td>Leadership Values, Skills &amp; Team Building</td>
<td>4</td>
<td>$2,940.00</td>
</tr>
<tr>
<td></td>
<td>AESE 278A</td>
<td>Complexity and Large Scale Systems</td>
<td>4</td>
<td>$2,940.00</td>
</tr>
<tr>
<td></td>
<td>AESE 279A</td>
<td>AESE Quarterly Team Project</td>
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* Fall Quarter 2017 fees include a $100 New Student One-Time Document Fee
** 2017-2018 UCSD Graduate Student Fees are estimated, subject to change

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## DSE Program Costs 2017-19

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Class #</th>
<th>Class Name</th>
<th># Units</th>
<th>Class Fee</th>
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*Electives

- DSE 231: 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

**2017-2018 UCSD Graduate Student Fees are estimated pending State of California final budget

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## WES Program Costs 2017-19

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Class #</th>
<th>Class Name</th>
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<th>Class Fee</th>
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