INFORMATION SESSION

Wednesday, April 7, 2021

UC San Diego
JACOBS SCHOOL OF ENGINEERING

WELCOME & INTRODUCTION

Program Director: Phillip McMullen

AGENDA

- Master of Advanced Study Overview
  - MAS vs MS
  - Application Process/Requirements, Schedule and Costs
- Architecture-based Enterprise Systems Engineering (AESE)
- Wireless Embedded Systems (WES)
- Data Science and Engineering (DSE)
- Next Steps
- Breakout Rooms by Program



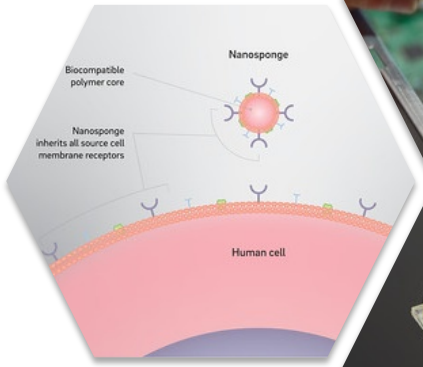


UC SAN DIEGO JACOBS SCHOOL OF ENGINEERING

- Jacobs School of Engineering (largest in CA among public universities)
- Ranked 9th top engineering school in the nation
- Distinguished faculty (>230 research-active faculty)
- Commitment to serving needs of industry for latest in research and education

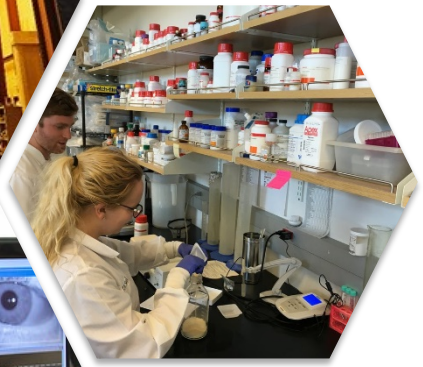
Computer Science

Structural Engineering

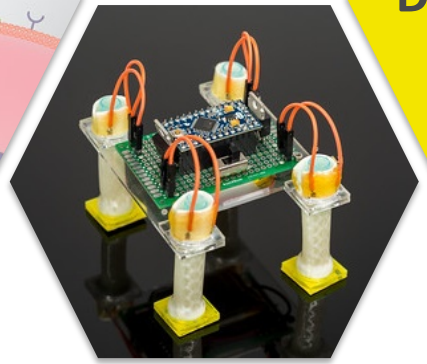


Nanoengineering

Engineering Departments @Jacobs



Bioengineering



Electrical Engineering

Mechanical Engineering

Images: David Baillot/UC San Diego

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
  - AESE - Architecture-Based Enterprise Systems Engineering (since 2010)
  - WES - Wireless Embedded Systems (since 2011)
  - DSE - Data Science and Engineering (since 2014)

200+ 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 Services
Callaway Golf
Caltrans
Caradigm
Carefusion
Carollo Engineers
Catheter Connections
CeloNova BioSciences
Circadence
Clarity Design
Classic Wire Cut
CodeMetro
Cognex Corporation
CoStar Group
Covidien
Coway USA
Crafter Brothers
Cubic Global Defense
Cubic Mission Systems
Cubic Transportation Systems
Cymer
D&K Engineering
Deccan International
Dexcom
EMN Defense Services
Encore Capital Group
Endologix
EnGenious Technologies
Entropic Communications
Epic Systems
ESRI
Fallbrook Engineering
FICO
FloQast
Forcepoint
Ford Motor Company
Forward Slope
Future Education
Galaxy
Gas and Power Technologies
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
Integrant
INTEGRIS Group
Intel
Intuit
JMJ Financial
John Wayne Cancer Institute
KAB Laboratories
KEDZIG
Kelpac Medical
Kiran 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 AS
Northrop Grumman MS
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 Quirugicos S.A.
Shutterfly
Skillnet Solutions
SkySurgery
Slacker Radio
Social Nightlife
Solar Turbines
SPAWAR SSC Pacific
Stanford University
Stonehenge Financial Partners
Service Engineering
Sycuan Casino
SynteractHCR
Tandem Diabetes
TASC
Teco Diagnostics
Teradata
Texas Instruments
Thermo Fisher Scientific
Ticom Geomatics
TrellisWare
Triage Consulting Group
Turn Key
Ubiqomm
UCSD Health
UCSD Info Technology Services
UCSD Medical Center
UCSD Research Administration
UCSD SIO
UCSD SDSC
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

Program	Work Experience	2021 Application Deadlines	General Requirements For All Programs
AESE	5 years	May 5th: early consideration	Bachelor's degree in engineering, science, mathematics, physics, etc.
WES	2 years	July 7th: standard	No GRE
DSE	2 years		3.0 minimum GPA*
			No TOEFL if working in US for more than 1 year*
			$120 ($140 international) application fee*

**Some exceptions. Veterans may request fee waiver*

PROGRAM SCHEDULE

	Schedule	Fall	Winter	Spring	Summer	Fall	Winter	Spring
AESE	1 Year (Part-time) 42 units total	13 units ----- 3 classes + project	13 units ----- 3 classes + project	13 units ----- 3 classes + project	3 units ----- capstone project	**program complete**		
WES	2 Years (Part-time) 36 units total	4 units ---- 1 class	4 units ---- 1 class	4 units ---- 1 class	4 units ---- 1 class	8 units ---- 2 classes	8 units ---- 2 classes	4 units ---- capstone
DSE	2 Years (Part-time) 38 units total	6 units ----- 1 class 1 seminar	8 units ----- 2 classes	8 units ----- 2 classes	**no summer classes**	8 units ----- 2 classes	6 units ---- 1 class	2 units

FALL 2021 COHORTS PROGRAM COST

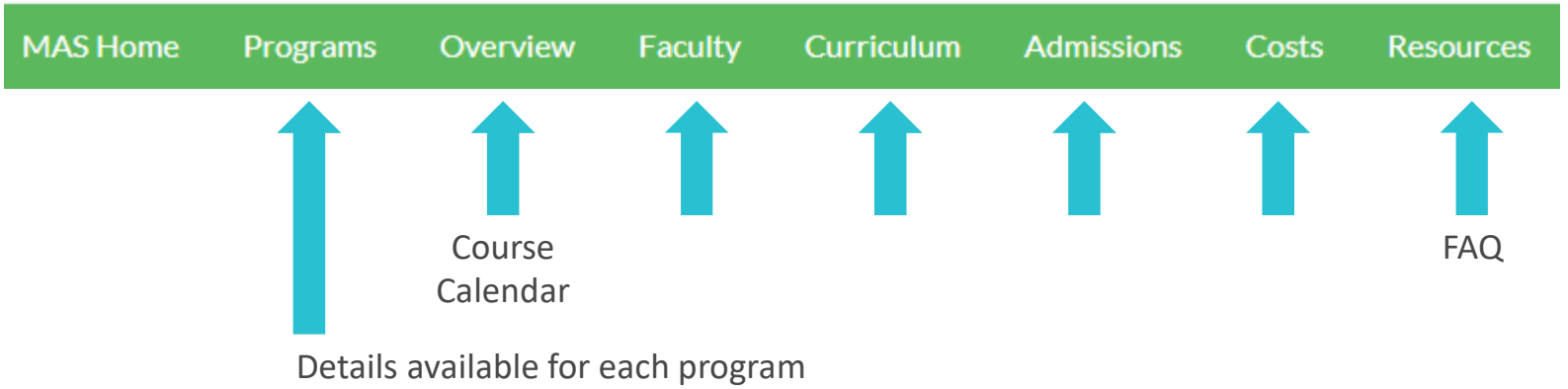
Program	Units	Total Cost*	Includes
AESE	42 (1 yr)	$34,007.68	Tuition Books Software Parking Breakfast and lunch Mandatory UC graduate student fees*
WES	38 (2 yr)	$38,656.66	
DSE	36 (2 yr)	$41,133.96	

** Does NOT include mandatory health coverage (~$3500. per academic year) – can be waived with proof of insurance*

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

SPECIFIC PROGRAM INFORMATION

Master of Advanced Study Degree



https://jacobsschool.ucsd.edu/mas

In the interest of time, questions will be answered in the breakout rooms after the presentation.

ARCHITECTURE-BASED ENTERPRISE SYSTEMS ENGINEERING LEADERSHIP PROGRAM

Founding Director: Dr. Hal Sorenson

Develop "systems thinking" capabilities which incorporates enterprise landscape, enterprise stakeholders, and enterprise goals/missions

OVERVIEW

Faculty Directors

Dr. Hal Sorenson – Professor Emeritus of Mechanical and Aerospace Engineering

Dr. Jon Wade – Professor of Practice in Mechanical and Aerospace Engineering

Intended Audience

Engineers with five+ years of relevant professional experience who are in a position to drive enterprise systems

Courses

1-year program (Sep 2021 – August 2022)

Alternating Fridays/Saturdays + 1 four-day workshop per quarter

Mechanical and Aerospace Engineering
+
Rady School of Management

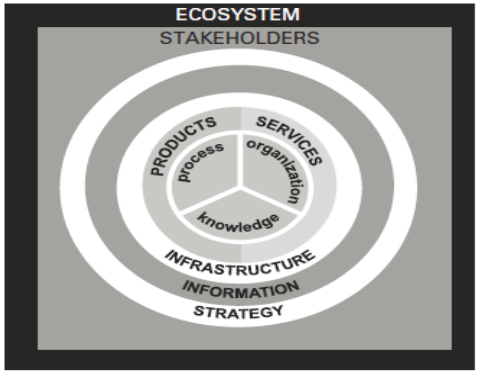
ORIGINS

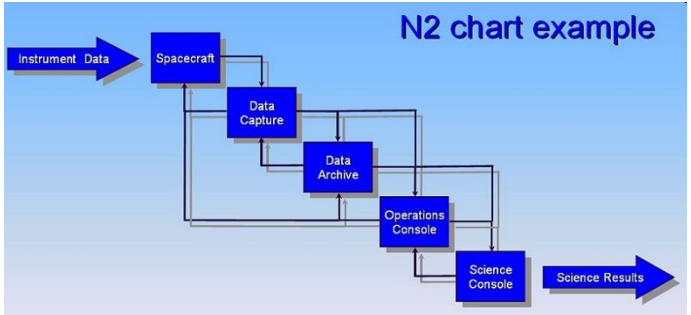
Rady School of Management

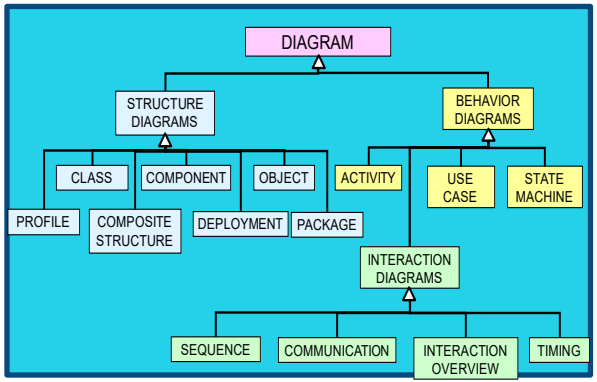
Architecture-Based Enterprise Systems ~~Engineering~~

Thinking & Leadership Program

Jacobs School of Engineering







ORIGINS

“Information Age” Components

- Legacy mainframe systems
- The internet
- Digital capabilities
- Mobile devices
- Internet of Things (IoT)
- The Cloud
- Big data
- AI / machine learning…

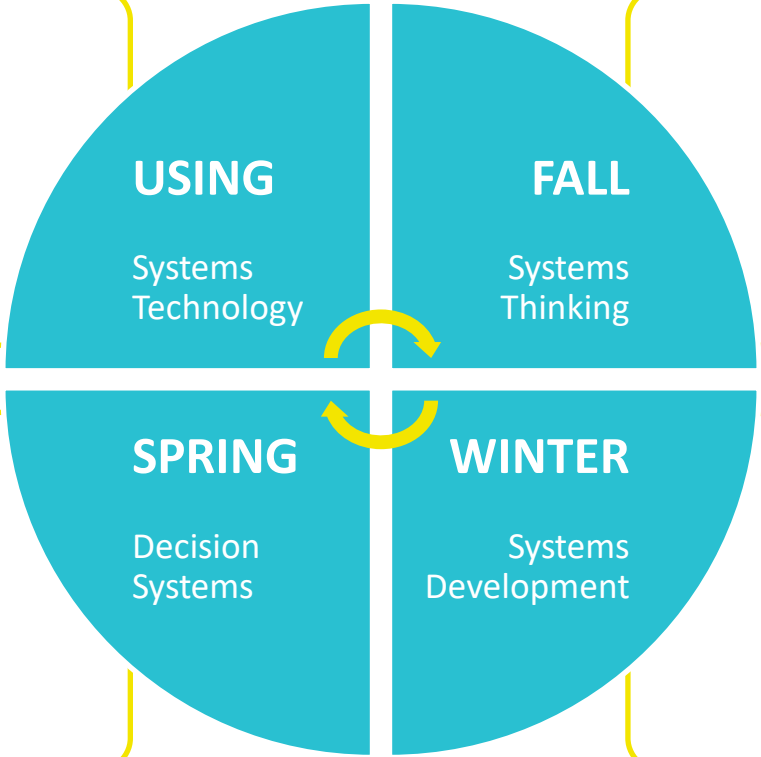
Systems of Systems

We focus on the integration of previously unconnected systems and their interoperation to accomplish previously unavailable tasks

CURRICULUM

Team Project: Fall - Summer

- Concept Maps
- Planning Tools (eg., NOV)
- Use Case Template
- SysML and UAF
- Data Analytics Tools
- Cybersecurity Tools



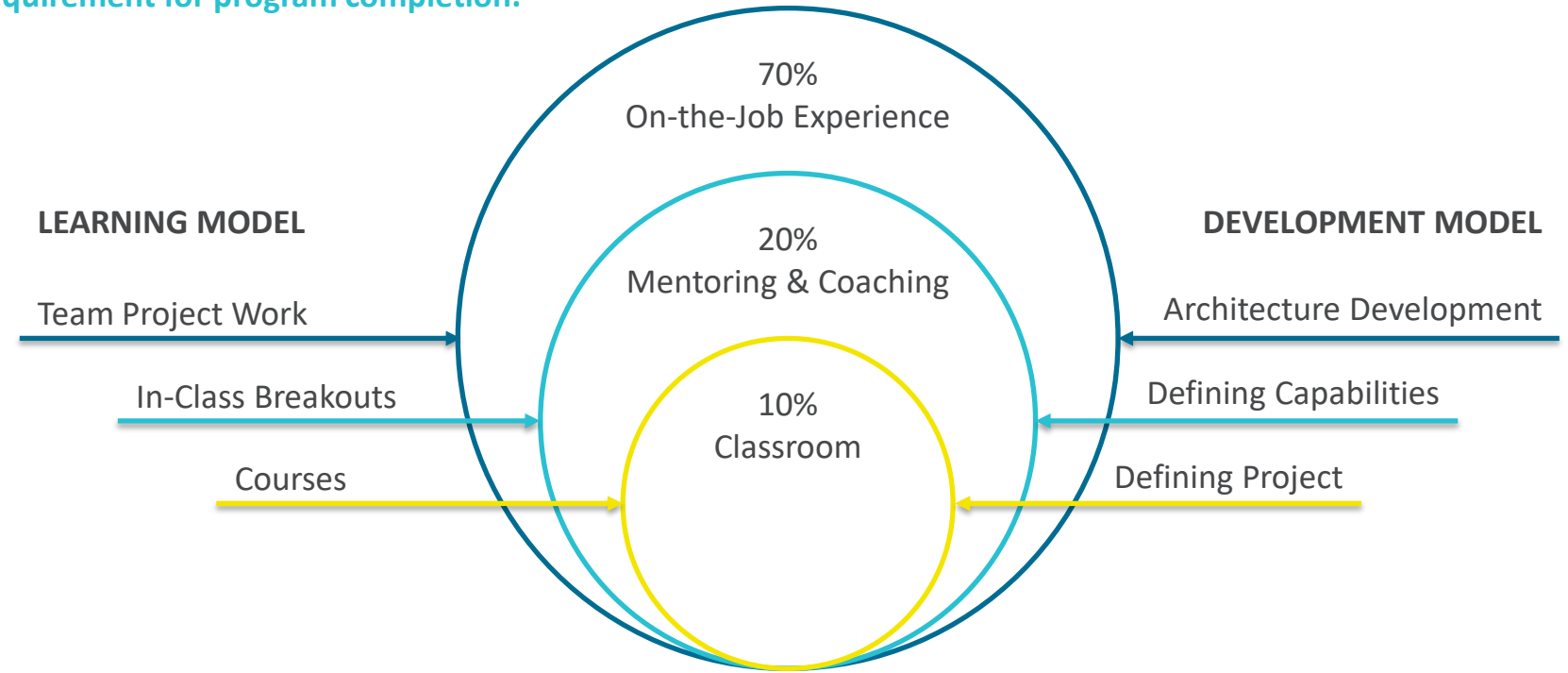
- Leadership
- Goals & Strategy
- Finance / Accounting
- Complex Systems
- Agile Development
- DevOps

- MOPs and MOEs
- Event-driven Architectures
- Art of Decision Making
- Data Analytics
- Big Data and Deep Learning
- Investment Valuation and NOV
- Managing Stakeholder Relationships

- Enterprise Architectures
- Architecture Frameworks
- Use Cases/Capabilities
- Domain Modeling
- Service-Oriented Architecture
- SOA Governance
- Enterprise Cybersecurity
- Functional & Physical Architectures

70:20:10 MODELS

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 a major requirement for program completion.



DEVELOPING SYSTEMS THINKING CAPABILITIES?

- 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 Experience
- Become Leaders and Team Builders

This is what we do in AESE!

DELIVERY

- One-year program (September 2021 – August 2022)
  - Classes scheduled on alternating Fridays/Saturdays
  - One Wednesday – Saturday **workshop** per quarter
  - Class from 8:00a PT to 5:00p PT
  - Breakfast and lunch provided
- Classes offered **sequentially**
  - Three courses per quarter
  - One two-day **Team Project** meeting per quarter
- Each class has 32 contact hours (8 hours x 4 days)
- Final four-day Team Project / Capstone class at the end of August

ADMISSIONS REQUIREMENTS

- Bachelor's Degree
  - Computer Science
  - Electrical Engineering
  - Mathematics
- 3.0 minimum undergraduate GPA
- Statement of Purpose
- 3 Letters of Recommendation
- Typically, 5 years of relevant work experience or equivalent
  - Informative Resume
- No GRE if at least two years' relevant experience

In the interest of time, questions will be answered in the breakout rooms after the presentation.

WIRELESS EMBEDDED SYSTEMS

Faculty Directors: Dr. Ryan Kastner and Dr. fred harris

Learn the fundamentals of wireless communications and embedded system design and build advanced wireless embedded systems using modern design tools.

Computer Science and Engineering
+
Electrical and Computer Engineering

OVERVIEW

Faculty Directors

Dr. Ryan Kastner – Professor of Computer Science and Engineering

Dr. fred harris – Professor of Electrical and Computer Engineering

Intended Audience

Engineering professionals with a background in computer science and/or electrical engineering

Courses

2-year program (Sep 2021 – June 2023) with classes on alternating Fridays or Fri/Sat

7 quarters, including summer 2022

WHY A MAS WIRELESS EMBEDDED SYSTEMS DEGREE?

Internet of Things (IoT)

- Connect everything to the internet
- 35 billion IoT devices ≈ four devices for every person on the planet

5G

- Provides unprecedented throughput and latency
- 1.7 billion subscribers by 2025

Next-Gen Embedded Wireless Devices

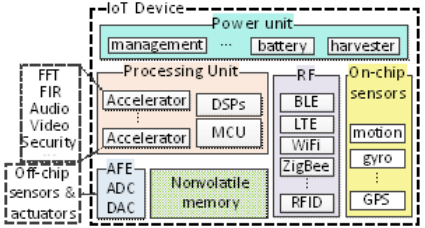
- Performance, cost, and power consumption are crucial.
- Design requires a unique interdisciplinary background in systems software, hardware, and communication theory.

Inherently interdisciplinary, residing at the boundary between Electrical Engineering and Computer Science

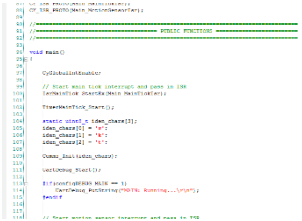
WES CURRICULUM

CS

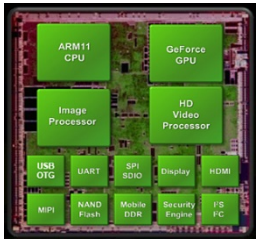
Embedded Systems Design



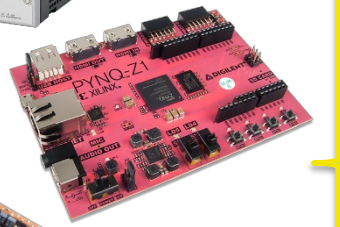
Software for Embedded Systems

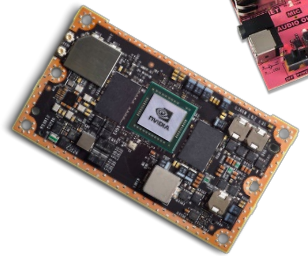


Hardware for Embedded Systems



Capstone Project

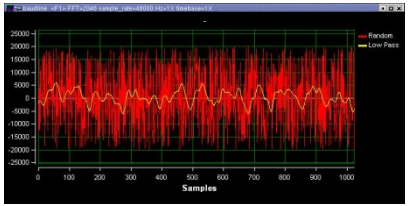




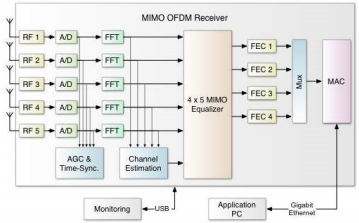
Validation and Prototyping of Embedded Systems

EE

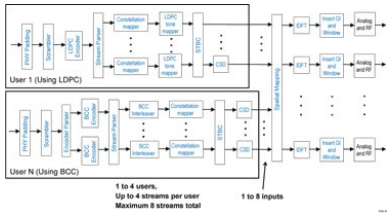
Digital Signal Processing



Digital Communication Systems



Wireless Communication Systems



WES COURSEWORK

Fall Year One	Winter Year One	Spring Year One	Summer Year One
Digital Signal Processing	Intro to Embedded Systems	DSP II / Wireless Communication Circuit Systems	Software for Embedded Systems

Fall Year Two	Winter Year Two	Spring Year Two
Digital Communication Systems I	Digital Communication Systems II	Capstone Project
Validation and Prototyping of Embedded Systems	Wireless Embedded Systems on a Chip	

ADMISSIONS REQUIREMENTS

- Bachelor's Degree
  - Computer Science
  - Electrical Engineering
- 3.0 minimum GPA
- Statement of Purpose
- 3 Letters of Recommendation
- No GRE if at least two years' relevant experience

In the interest of time, questions will be answered in the breakout rooms after the presentation.

DATA SCIENCE AND ENGINEERING

Faculty Directors: Dr. Ilkay Altintas and Dr. Alin Deutsch

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

OVERVIEW

Faculty Directors

Dr. Ilkay Altintas – Chief Data Science Officer, San Diego Supercomputer Center

Dr. Alin Deutsch – Professor of Computer Science and Engineering

Intended Audience

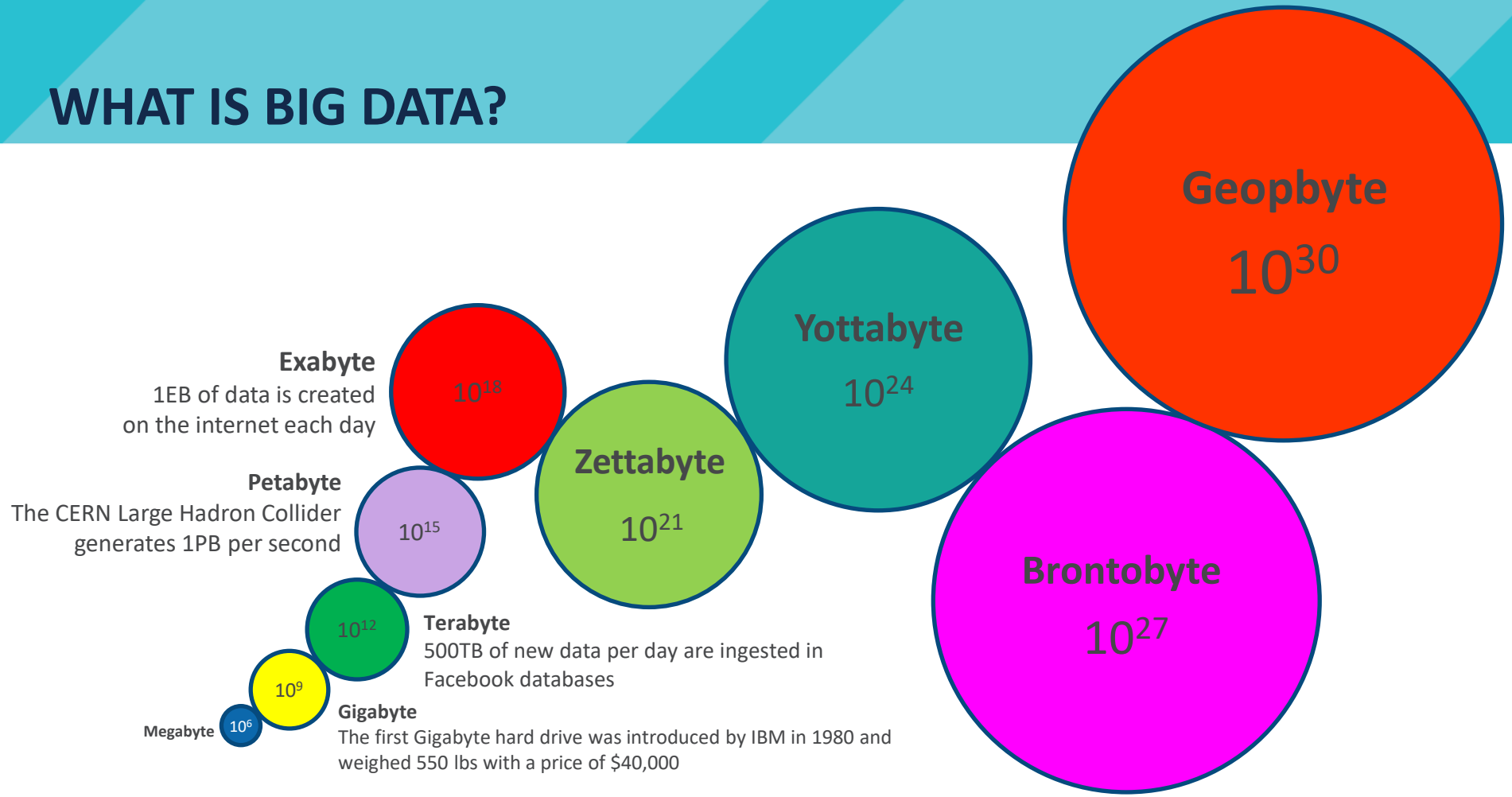
Engineering professionals with a background in computer science or other engineering or mathematics with substantial experience in data analysis.

Courses

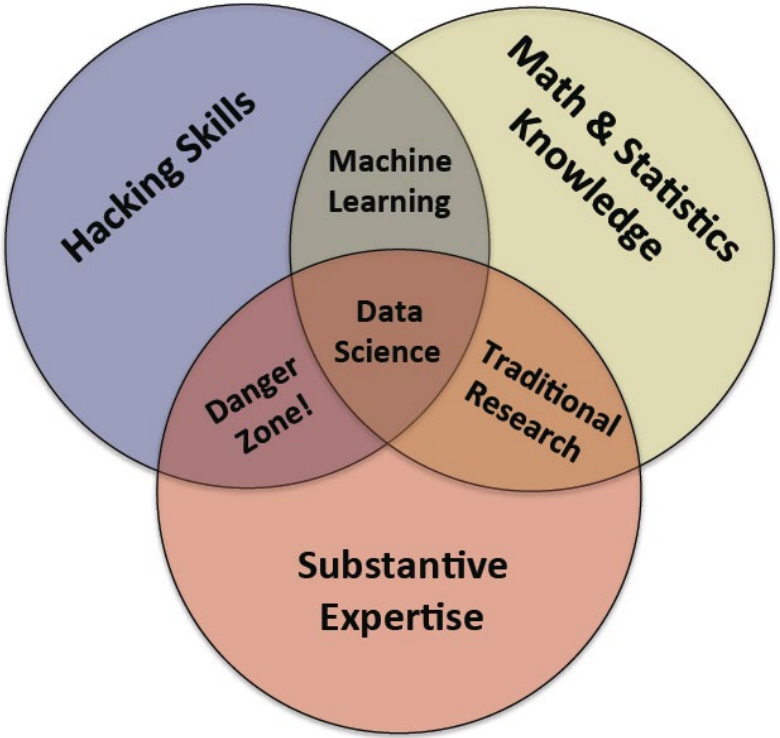
2-year program (Sep 2021 – June 2023) with classes on alternating Fridays and Saturdays

Computer Science and Engineering
+
San Diego Supercomputer Center

WHAT IS BIG DATA?



THE EDUCATION OF A DATA SCIENTIST



Doing Data Science: Straight Talk from the Frontline
Rachel Schutt & Cathy O'Neil

DSE COURSEWORK

Fall Year One	Winter Year One	Spring Year One
DSE 200: Python for Data Analysis (4 units)	DSE 201: Data Management Systems (4 units)	DSE 220: Machine Learning (4 units)
DSE 290: Case studies in Data Science (2 units)	DSE 210: Probability and Statistics using Python (4 units)	DSE 230: Data Science using Hadoop and Spark (4 Units)

CASE STUDIES

Fall Year Two	Winter Year Two	Spring Year Two
DSE 203: Data Integration & ETL (4 units)	DSE 241: Data Visualization (4 units)*	DSE 260B: Data Science Design Capstone Project (2 units)
DSE 250: Beyond Relational Data Models (4 units)*	DSE 260A: Data Science Design Capstone Project (2 units)	

*Additional coursework; subject to change

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…

In the interest of time, questions will be answered in the breakout rooms after the presentation.

NEXT STEPS

NEXT STEPS FOR ALL PROGRAMS

For more information
JacobsSchool.ucsd.edu/MAS

Applications
Open now! Each program has a detailed Admissions page

Questions
Ask today in the breakout rooms!

More questions?
jacobsmas@eng.ucsd.edu (specify program of interest)

THANK YOU!

JACOBSSCHOOL.UCSD.EDU/MAS

UC San Diego
JACOBS SCHOOL OF ENGINEERING