



INFORMATION SESSION

Wednesday, April 13, 2022

UC San Diego
JACOBS SCHOOL OF ENGINEERING



WELCOME & INTRODUCTIONS

Director, Engineering Executive Education: Gary Henderson

AGENDA

- 5:30p Master of Advanced Studies Overview
- 5:45p Wireless Embedded Systems (WES)
- 6:00p Architecture-based Enterprise Systems Engineering (AESE)
- 6:15p Data Science and Engineering (DSE)
- 6:30p Next Steps
 - Breakouts for each program

MAS STAFF



Gary Henderson
Director, Engineering
Executive Education



Yvonne Wu
Assistant Director &
Program Manager,
DSE and WES



Stacey Williams
Program Manager,
AESE



Kristin Liljestrom
MAS Ops and
Administration



Sage Longpre
MAS Fiscal
Operations

UC SAN DIEGO JACOBS SCHOOL OF ENGINEERING

- Jacobs School of Engineering (largest in CA among public universities)
- Ranked 10th top engineering school in the nation
- Distinguished faculty (>275 research-active faculty)
- Commitment to serving needs of industry for latest in research and education
- More rankings information can be found here: <https://jacobsschool.ucsd.edu/about/rankings>

Computer Science
and Engineering



San Diego
Supercomputer Center



Partnerships &
Collaboration

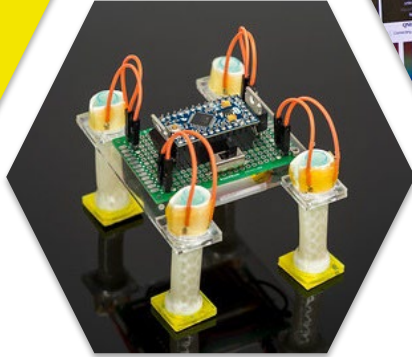


Mechanical and
Aerospace Engineering



Qualcomm Institute

Electrical and
Computer Engineering



Rady School of
Management

Images: David Baillot and Erik Jepsen
UC San Diego

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

MASTER OF ADVANCED STUDIES (MAS)

- Master's degree, conferred by the UC San Diego
- Professional degree programs designed for engineering and technical professionals
- Unique interdisciplinary 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)
 - More in development!

PROGRAM DESIGN

- Graduate degrees that meet the needs of engineering and technical professionals
- Designed to address skills that are most needed to solve today's most pressing challenges
- Delivers integrated interdisciplinary knowledge
- Optimized for working professionals

GENERAL ADMISSIONS REQUIREMENTS

Program	Work Experience	2022 Application Deadlines	General Requirements For All Programs
AESE	5 years	March 2nd: early consideration	Bachelor's degree in engineering, science, mathematics, physics, etc.
WES	2 years		No GRE
DSE	2 years	May 4th: standard	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 (full-time) 42 units total	13 units ----- 3 classes + project	13 units ----- 3 classes + project	13 units ----- 3 classes + project	3 units ----- capstone			
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 ---- 2 classes	2 units ---- capstone

FALL 2022 COHORTS PROGRAM COST

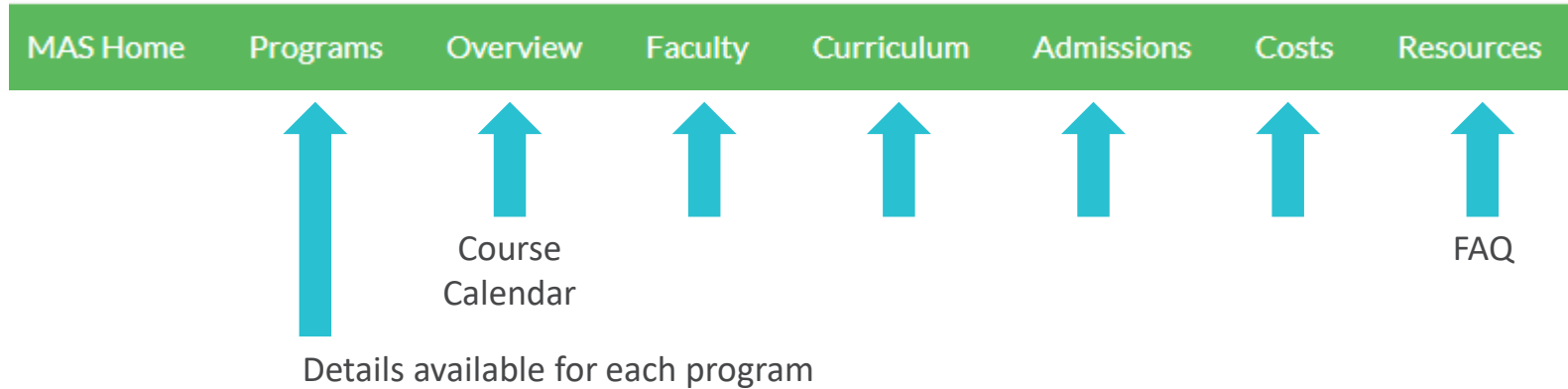
Program	Units	Total Cost*	Includes
AESE	42 (1 yr)	\$34,042.21	Tuition Course Materials
WES	36 (2 yr)	\$38,725.72	Software and Hardware Parking and Meals
DSE	38 (2 yr)	\$41,203.02	Mandatory UC graduate student fees**

* 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. Final per-unit tuition amounts are subject to change pending central campus approval.

SPECIFIC PROGRAM INFORMATION

Data Science & Engineering



<https://jacobsschool.ucsd.edu/mas>

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.

OVERVIEW

Faculty Directors

Dr. Ryan Kastner – Professor of Computer Science and Engineering

Dr. fred harris – Professor of Electrical and Computer Engineering

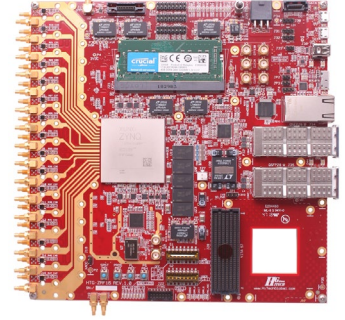
Intended Audience

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

Courses

2-year program (Sep 2022 – June 2024) with classes on alternating Saturdays or Fri/Sat

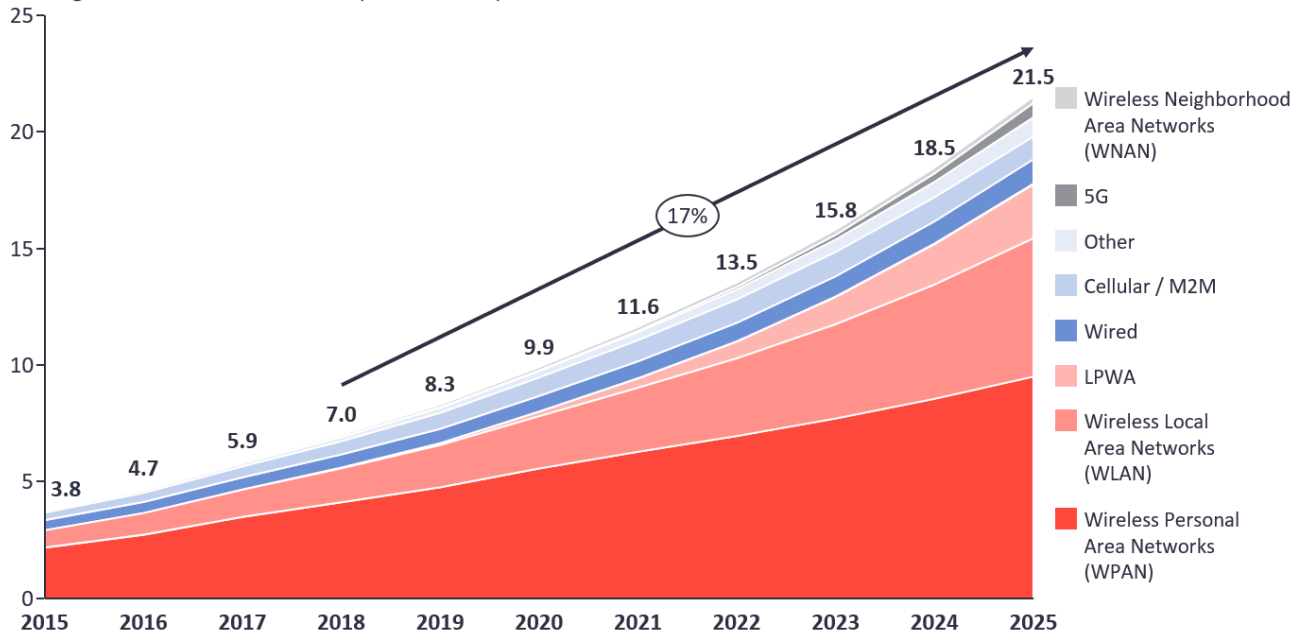
7 quarters, including summer 2023



Computer Science and
Engineering
+
Electrical and
Computer Engineering

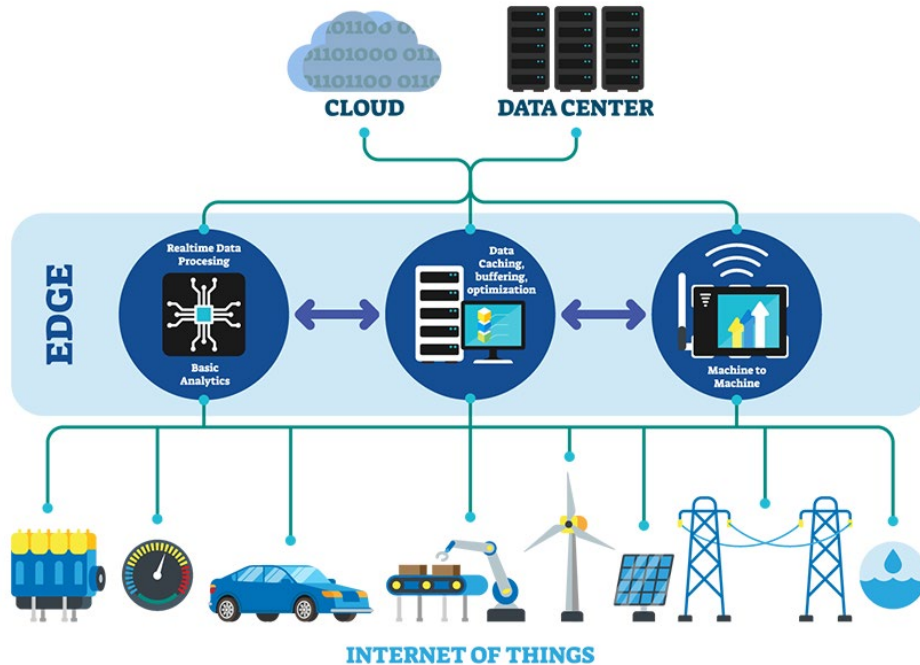
Global Number of Connected IoT Devices

Number of global active IoT Connections (installed base) in Bn



Note: IoT Connections do not include any computers, laptops, fixed phones, cellphones or tablets. Counted are active nodes/devices or gateways that concentrate the end-sensors, not every sensor/actuator. Simple one-directional communications technology not considered (e.g., RFID, NFC). Wired includes Ethernet and Fieldbuses (e.g., connected industrial PLCs or I/O modules); Cellular includes 2G, 3G, 4G; LPWAN includes unlicensed and licensed low-power networks; WPAN includes Bluetooth, Zigbee, Z-Wave or similar; WLAN includes Wi-fi and related protocols; WNAN includes non-short range mesh; Other includes satellite and unclassified proprietary networks with any range.
 Source: IoT Analytics Research 2018

NEXT-GENERATION IOT DEVICES



Source: <https://medium.com/dataseries/a-primer-on-edge-computing-3ef550c3d84e>

- Enable innovations across wide range of application domains
- Wireless and low power
- Complex system design tradeoffs: Performance, cost, form factor, and power consumption
- Heterogenous: mix of SW and HW
- Requires an interdisciplinary background in systems, software, hardware, and communication theory

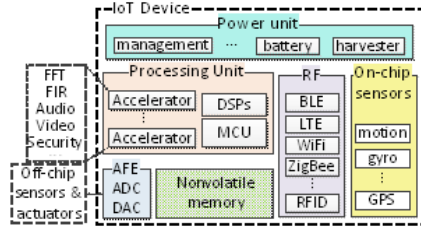
WES CURRICULUM

CS

Capstone Project

EE

Introduction to Embedded Systems

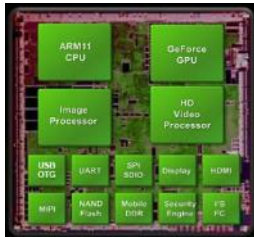


Software for Embedded Systems

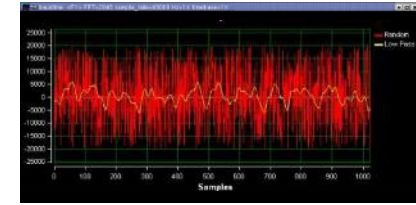
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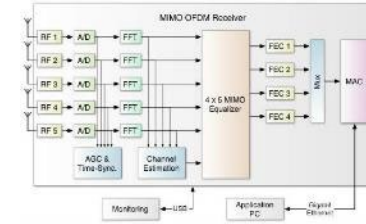
Hardware for Embedded Systems



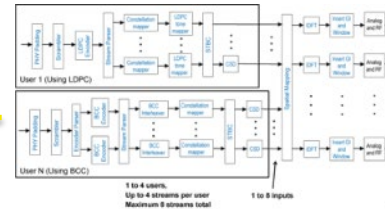
Validation and Prototyping of Embedded Systems



Digital Signal Processing



Digital Communication Systems



Wireless Communication Systems

WES CURRICULUM

Fall Year One

Digital Signal Processing

Winter Year One

Intro to Embedded Systems

Spring Year One

Digital Signal Processing II

Summer Year One

Software for Embedded Systems

Fall Year Two

Digital Communication Systems I

Hardware for Embedded Systems

Winter Year Two

Digital Communication Systems II

Wireless Embedded Systems on a Chip

Spring Year Two

Capstone Project

ADMISSIONS REQUIREMENTS


- Bachelor's Degree in engineering, science, physics, mathematics, etc.
- 3.0 minimum GPA
- Statement of Purpose
- 3 Letters of Recommendation
- Resume
- No GRE if at least two years' relevant experience



Yvonne Wu

yvwu@eng.ucsd.edu

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



ARCHITECTURE-BASED ENTERPRISE SYSTEMS ENGINEERING LEADERSHIP PROGRAM

Faculty Directors: Dr. Hal Sorenson and Dr. Jon Wade

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 2022 – August 2023)

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



Mechanical and
Aerospace Engineering
+
Rady School of
Management

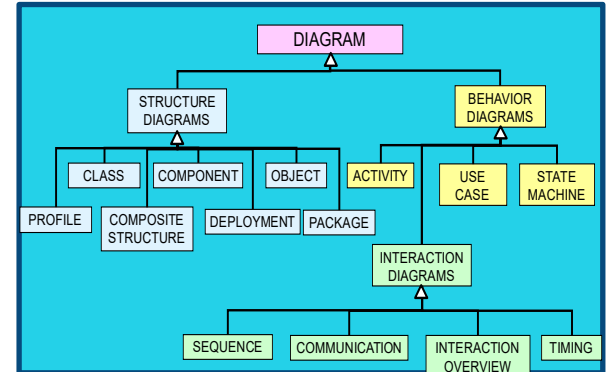
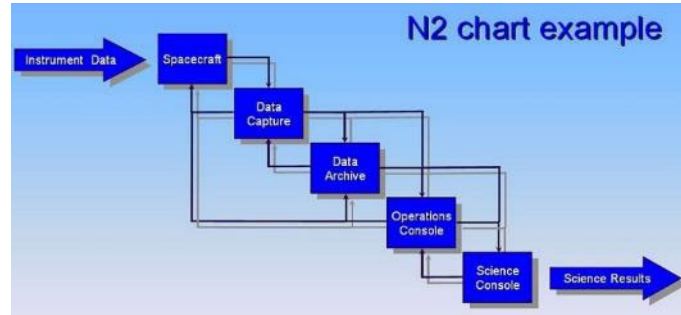
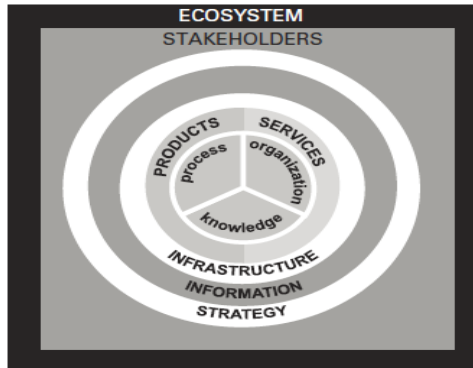


Rady School of Management

Architecture-Based Enterprise Systems Engineering Thinking & Leadership Program



Jacobs School of Engineering



“Information Age” Components

- Server farms
- The internet
- Digital capabilities
- Mobile devices
- Internet of Things (IoT)
- The Cloud
- Big data
- AI / machine learning...



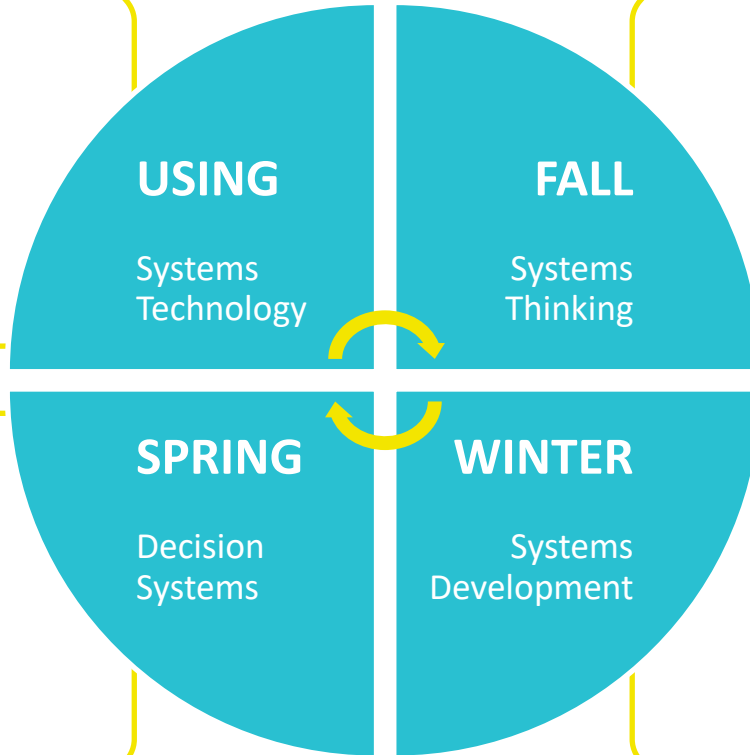
Systems
of
Systems



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

AESE CURRICULUM

- 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

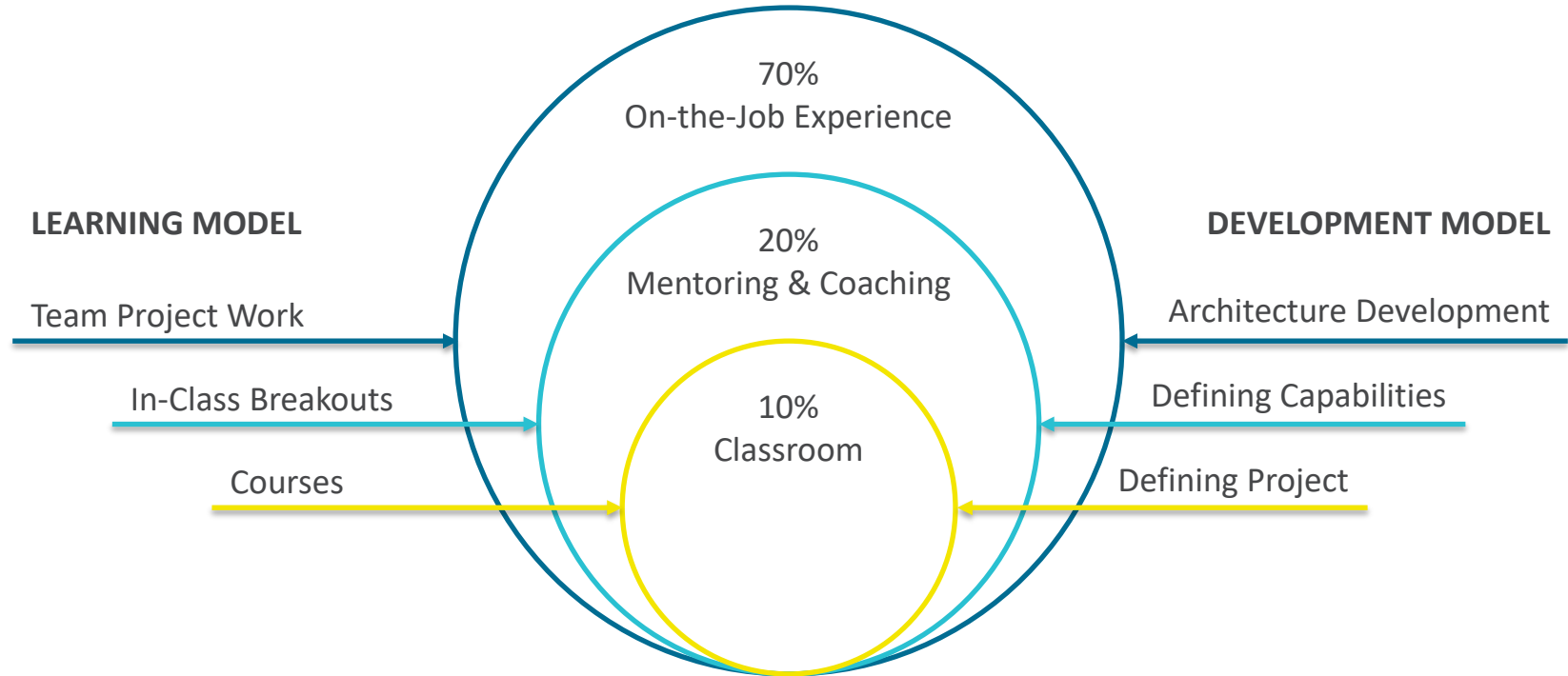
- MOPs and MOEs
- Event-driven Architectures
- Art of Decision Making
- Data Analytics
- Big Data and Deep Learning
- Investment Valuation and NOV
- Managing Stakeholder Relationships

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

Team Project: Fall - Summer

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.**

70:20:10 Models



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 2022 – August 2023)
 - 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 in engineering, science, physics, mathematics, etc.
- 3.0 minimum undergraduate GPA
- Statement of Purpose
- 2 Letters of Recommendation
- Typically, 5 years of relevant work experience or equivalent
- Informative Resume
- No GRE if at least two years' relevant experience



Stacey Williams
sdw008@eng.ucsd.edu

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.

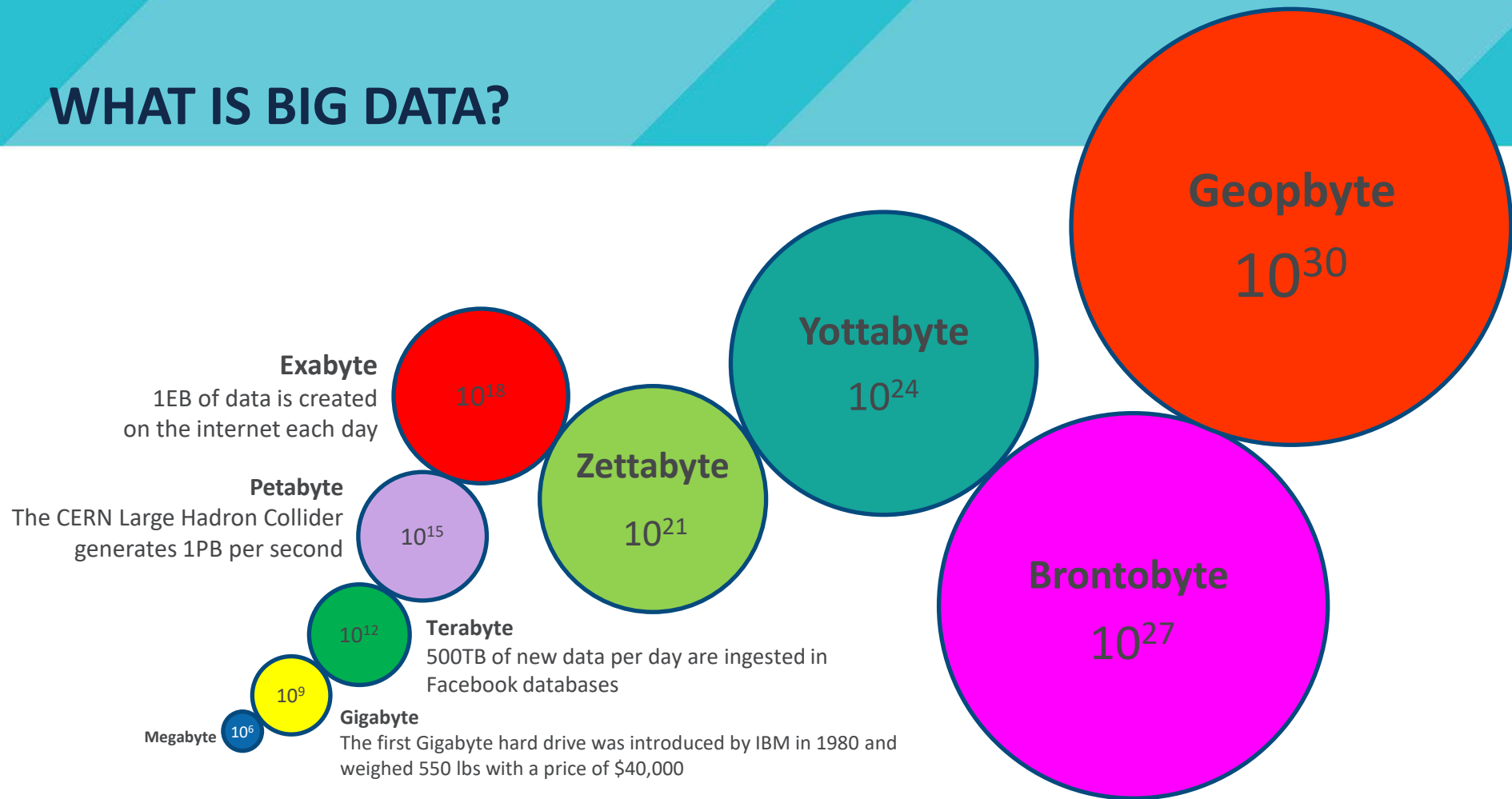
Courses

2-year program (Sep 2022 – June 2024) with classes on alternating Fridays and Saturdays

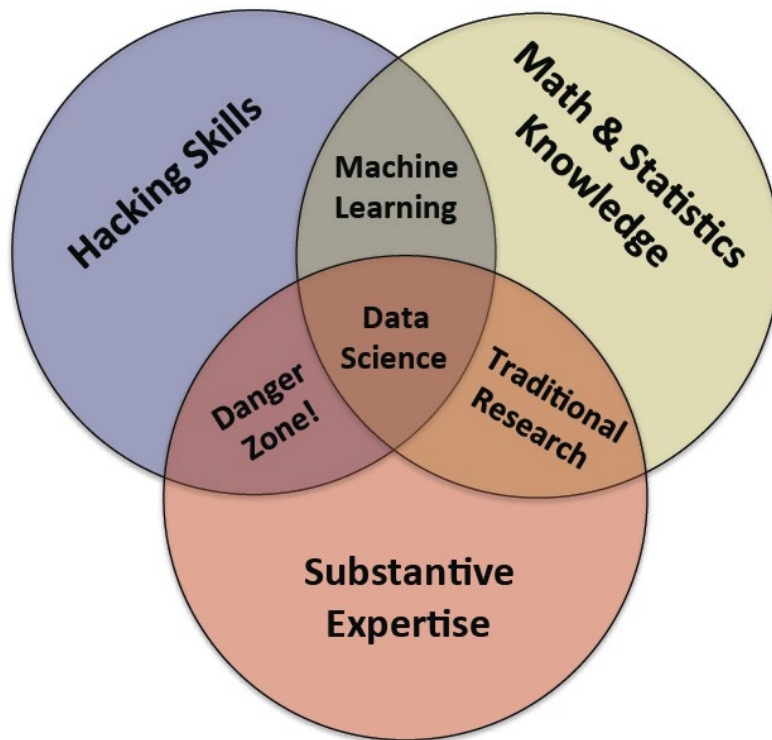


Computer Science and
Engineering
+
San Diego
Supercomputer Center

WHAT IS BIG DATA?



THE EDUCATION OF A DATA SCIENTIST



DSE COURSEWORK

Fall Year One

DSE 200: Python for Data Analysis
(4 units)

DSE 290: Case studies in Data
Science (2 units)

Winter Year One

DSE 201: Data Management Systems
(4 units)

DSE 210: Probability and Statistics
using Python (4 units)

Spring Year One

DSE 220: Machine Learning (4 units)

DSE 230: Data Science using Hadoop
and Spark (4 Units)



CASE STUDIES

Fall Year Two

DSE 203: Data Integration & ETL
(4 units)

DSE 250: Beyond Relational Data
Models (4 units)

Winter Year Two

DSE 241: Data Visualization
(4 units)

DSE 260A: Data Science Design
Capstone Project (2 units)

Spring Year Two

DSE 260B: Data Science Design
Capstone Project (2 units)

ADMISSIONS REQUIREMENTS

- Bachelor's Degree in engineering, science, physics, mathematics, etc.
- 3.0 minimum GPA
- Statement of Purpose
- 2 Letters of Recommendation (3 preferred)
- Resume
- No GRE if at least two years' relevant experience



Yvonne Wu

yvwu@eng.ucsd.edu

ADDITIONAL 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?

Contact Yvonne Wu or Stacey Williams



Yvonne Wu

Program Manager,
DSE and WES

yvwu@eng.ucsd.edu



Stacey Williams

Program Manager,
AESE

sdw008@eng.ucsd.edu

Please join Faculty Directors, Program Managers,
and Alumni in the breakout rooms
for further discussion



THANK YOU!

[JACOBSSCHOOL.UCSD.EDU/MAS](https://jacobsschool.ucsd.edu/mas)

Wednesday, April 13, 2022

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JACOBS SCHOOL OF ENGINEERING