Technology Programs at UCSD Extension

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Agenda

- General Introduction to UCSD Extension
- Business , Technology and Science Brief Overview
- Technology Programs – Engineering and IT
- Engineering Certificates and Courses
- Future Plans
- Get involved with the Extension

General Introduction to UCSD Extension

- In existence for 51 years
- Programs in Arts and Humanities, Digital Arts, Languages, Life Sciences, Law and Writing, …
- Over 4,500 Continuing Education Courses
- Around 100 Certificate Programs

Business, Science and Technology by the Numbers

- 56 Certificates (Professional and Specialized)
- 45% of certificates awarded by Extension
- 14913 enrollments for FY '15/16 (25 % of total enrollments)
- We have more than 200 instructors just in the business, tech and science area

LEGAL EDUCATION
PROFESSIONAL AND SPECIALIZED CERTIFICATES

UC San Diego Paralegal Program

➢ **American Bar Association approved since 1990**.

  ➢ Program is reviewed and records are audited on a regular basis by the American Bar Association

  ➢ Both our Accelerated and Part-time programs are ABA-approved

➢ Our curriculum combines practical skills with legal theory and analysis.

➢ Classes are taught by prominent attorneys and experienced paralegals, who provide students with balanced perspective and expertise into the tasks paralegals perform.

Professional Certificate in Intellectual Property

Provides an educational foundation necessary for legal employment in law firms or corporations involved in securing and maintaining patents, copyrights, and trademarks.

- Intellectual property refers to creations of the mind … used in commerce.

E-Discovery and Litigation Technology Specialized Certificate

- Litigation technology professionals help identify, preserve, collect, produce, and manage electronically stored information (ESI) in litigation.
- The specialized certificate is designed for legal professionals with litigation or equivalent experience who are interested in learning cutting-edge legal technology in an interactive online environment.
- *The* in-demand legal job skill.

SCIENCE

Environmental, Life and Data

Environment and Sustainability Program

- Specialized Certificate in CEQA Practice - The California Environmental Quality Act (CEQA)
- Specialized Certificate in Sustainability and Behavior Change

How do we change behavior and improve the effectiveness of environmental programs and projects?

- **Launched Summer 2016**
- 4 Courses:
  – Conservation Psychology
  – Behavior Change Strategies for Sustainability
  – Community Engagement
  – Behavior Change Capstone Project

TECHNOLOGY

Engineering and IT

https://extension.ucsd.edu/courses-and-programs/technology

Certificates

Android Programming	Data Mining for Advanced Analytics	HVAC Systems Design and Control
C# Programming	Digital Signal Processing	Mechanical Analysis and Design
C/C++ Programming	Embedded Computer Engineering	Embedded Computer Software
Front End Web Development	Geographic Information Systems	Power Systems Engineering
iOS Programming	UNIX & Linux System Administration	RF Engineering
Java Programing	Software Engineering Management	Software Quality Assurance
SAS Programming	Systems Engineering	Wireless Engineering

Certificates and Role of an Advisory Board

- UCSD Faculty Senate requires that the engineering certificates be approved by a board of experts representing industry and UCSD faculty.

- The Board gives suggestions on the courses and the course content. It can approve or not the certificate.

- What is a certificate? A set of a few (usually three or more) courses designed in such a way to allow the students to became proficient in one specific area of their chosen profession. Certificates are meant to cover a gap between undergraduate education and constantly evolving companies needs.

- Companies expressed interest in shorter more intensive programs so we created a new 6 unit certificate called a proficiency. We are also lowering the minimum number of units for a professional certificate from 15 to 12 units. Both changes align us more closely with the other UC Extension campuses.

Software Quality Assurance

- *"Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives."* - William A. Foster.

- In recent years, Quality Assurance (QA) has developed a well-defined set of methodologies, and techniques, and has grown into a field of its own.

- The Quality Assurance professional must be skilled not only in what was before recognized as software testing, or other testing areas like integration testing, but in variety of very special skills. These skills range from scripting languages, system and web administration, and certain aspects of project management, to unit testing.

- The Software Quality Assurance certificate provides effective tools and knowledge for those involved in all stages of Software Development and testing process: Unit testing, Feature testing, Integration testing and Regression testing. The program will teach the skills necessary to ensure that testing is well documented, processes established, and results are correctly interpreted and are repeatable.

SW Quality Assurance Certificate Goals

- Understand and apply Software Development Process (both traditional and Agile)
- Develop practical understanding and differences between black box and white box testing
- Learn and apply different stages of testing: Unit testing, Integration testing and Regression testing
- Understand and apply the Fundamentals of Software Release Management
- Gain practical knowledge of the web architecture, web protocols and web performance testing
- Learn how to run web load tests (when to test, how to plan tests, how to interpret the results)
- Understand Unit test details and how to apply it in the SW development process
- Data collection and interpretation of User Experience Metric
- Learn Agile methodologies for Project Management

SW Quality Assurance Courses

REQUIRED COURSES

- MANAGING SOFTWARE QUALITY ASSURANCE AND TESTING

- SOFTWARE TESTING FOR QUALITY ASSURANCE

- WEB PERFORMANCE TESTING AND TEST AUTOMATION

ELECTIVE COURSES

- AGILE POWER PRACTICES

- UNIT TESTING - SUPPORTING MODERN SOFTWARE DEVELOPMENT METHODS

- USER EXPERIENCE (UX) METRICS

Managing Software Quality Assurance and Testing

- Quality Assurance is defined as part of quality management that ensures that quality requirements are met. The requirements for high-quality, reliable, predictable software become increasingly necessary when we strive to meet the customer's quality expectations.

- These activities start before the product is developed and continue during the product development, and through the release cycle.

- This course introduces methods on how to produce and implement standards to improve the development life cycle and ensure the QA processes are followed.

- It also describes how these processes fit into the overall software development process.   Specific topics discuss how to implement organizational quality policy; how to build an effective SQA organization and employ the right people.

- The basic concepts of risk management and metrics collection for such things as: reworks, cost estimate, and code coverage are also covered

Embedded Robotics Course

In a typical mechanical oriented task, robots use sensors, actuators, and software to perceive their environment and safely perform programmed goals. An embedded system resides inside the robot tying together the different subsystems. Without an embedded system, robots would need to rely on external computing systems which can increase the safety risks due to delay and failure in the communication link between the robot and its external control system.

In this hands-on, laboratory course, you will learn the basic skills necessary to develop and implement embedded systems that control a typical robot. You will explore embedded computer hardware that interfaces with sensors, embedded software that reads and processes sensor data, and actuators for physical motions. Upon course completion, participants will take home an embedded system development board based on the ARM architecture compatible with the mbed development environment.

- **Course Highlights**
- Microcontrollers, Digital I/O
- Analog to Digital Converter, Digital to Analog Converter
- Encoders, Infrared for measuring distance
- Ultrasound for measuring distance, Laser Scanner LADAR/LIDAR
- Gyroscope, Accelerometer
- Magnetometer, RC Servo Motor
- Stepper Motors, DC motors with encoders

Certification of Courses

- We have recently started to work with other organizations to have our courses certified and delivered as part of a wider education network.

- Our programs are IEEE certified

- Another example is the Amazon cloud course where the instructors are Amazon certified and the material is provided by Amazon.

- We are working on a similar program with Apple.

AWS Course

- Develop technical expertise in cloud computing architecture using Amazon Web Services (AWS). AWS is a secure cloud services platform that is used in almost 200 countries.

- With infrastructure services inclusive of computing power, storage options, networking and databases, AWS offers flexibility, scalability, and reliability useful to building sophisticated applications. This course will give students an understanding of business and technical tools, and architecting on AWS.

- It will include practical hands-on experience solving real-world cloud computing problems with AWS.

- These tools can be useful to managing your business' IT infrastructure, and an understanding of how this cloud platform can help your company meet compliance, governance,

- and regulatory requirements.

Topics Include

- AWS Cloud,   AWS Platform, Security and Compliance, Cloud Financials

- Migrating to the Cloud, AWS Infrastructure: Compute, Storage, and Networking

- AWS Security, Identity, and Access Management, AWS Databases

- AWS Management Tools, AWS Certification Exam Readiness Workshop

Other Things we are Working on

- Road to the "Artificial intelligence" program to start with a linear algebra course.
- "intro" courses or "refreshers", the first one may be a Pre-Calculus Refresher
- Engineering courses for non-engineers – "How things work".

Linear Algebra for Machine Learning

- Linear algebra provides a mathematical framework for organizing information and then using that information to solve problems, especially physics, math, engineering, or data analytics problems.

- Linear algebra is essential for understanding and creating machine learning algorithms, especially neural network and deep learning models.

- The course teaches linear algebra skills necessary for machine learning and neural network modelling. It begins by learning overview of basic matrices and vector algebra as applied to linear systems.

- It continues with discussing advanced skills for finding the highest and lowest points of systems, quantifying the degree of learning, and optimizing the speed of learning in vector spaces and linear transformations. The hands-on lessons and assignments will equip students with the mathematical background required to build and train simple neural networks.

Nice to have Courses

- Topics in 5G

- Rapid Prototyping

- M-health

- Information Security

- Robot Operating System as part of Robotics Program

The 5G Use Cases
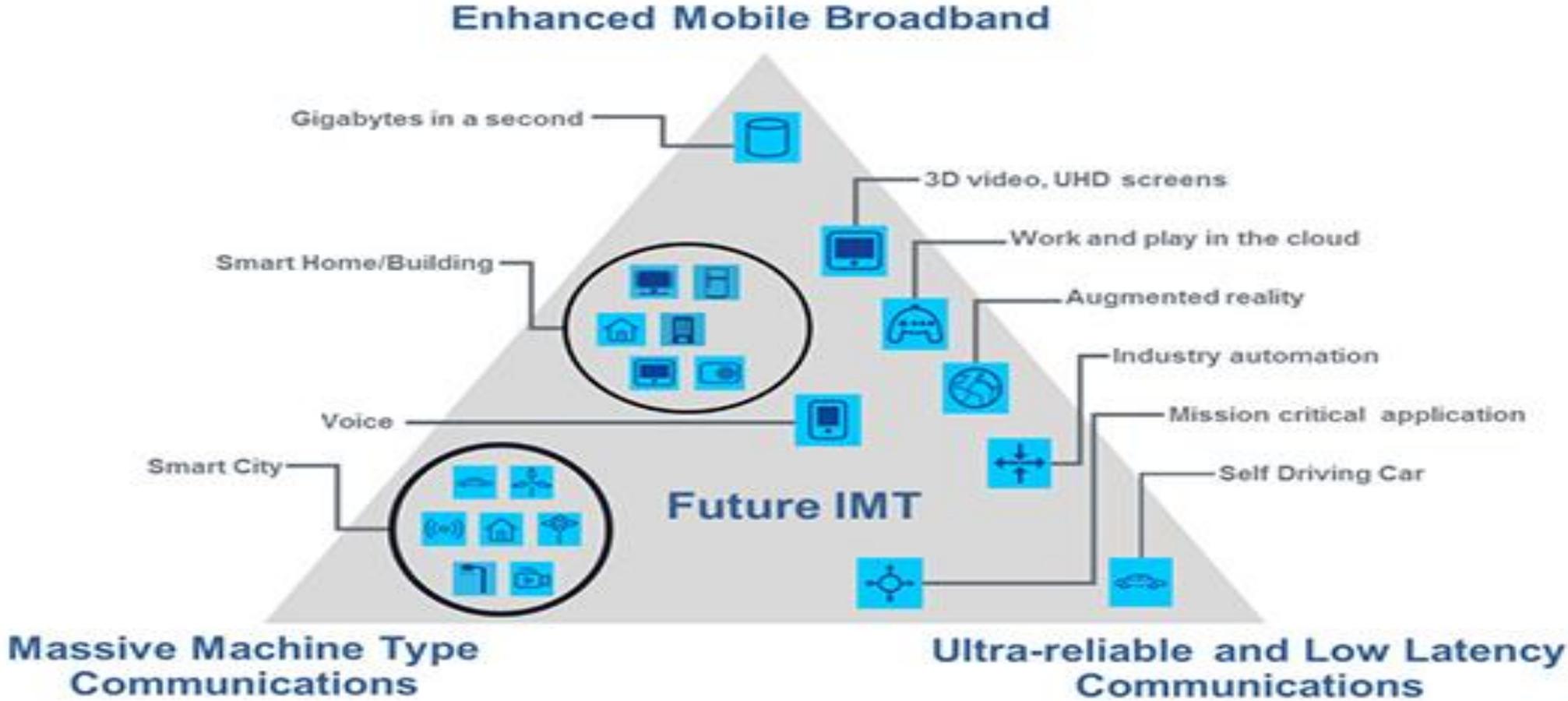
V2X

Vehicle-to-Pedestrian (V2P)

e.g. pedestrian in walkway ahead

Vehicle-to-Network (V2N)

e.g. traffic queue five kilometers ahead

Vehicle-to-Vehicle (V2V)

e.g. emergency vehicle approaching

Vehicle-to-Infrastructure (V2I)

e.g. traffic signal ahead turning red

Teach for the Extension

Corporate Programs

- Customized Material
- Intensive Format
- Usually on-site

Conclusion

- We try to fulfil the Extension mission by development of real world knowledge and teaching current cutting edge skills.

- We are also engaged with the community by helping UCSD Extension K-12 programs, working with CONNECT, downtown partnership, etc.

- So let me know if you would like to work with us either as an instructor, advisor, or in any other way that you find interesting and can also be of interest to the Extension.

Backup

Process Improvement

- Lean Six Sigma
  - Green Belt
  - Black Belt
- Office of Operational Strategic Initiatives
  - 27 have completed the Green Belt Program
  - Results in concrete improvements for UC San Diego
    - Marketplace, HR Applications processing examples
  - 7 in the Black Belt program
- Product Management
  - Managing the product life cycle