BERKELEY MASTER OF ENGINEERING PROGRAM

CAPSTONE PROJECT PREVIEW 2016-17

CAPSTONE PROJECT SUMMARY

The capstone project is a 5-unit course (ENGIN 296) over both the fall and spring semesters. Students work in teams of 3 to 5 to solve a real-world problem through integration of the depth of knowledge from their technical coursework, with the breadth of knowledge from core leadership curriculum. The capstone projects require teams to develop a solution that meets an industry, market or social need through the use of a new technology or a new application of an existing technology.

Berkeley faculty or industry partners propose capstone projects, and serve as technical advisors for the project teams. Incoming students will apply to projects during the first few weeks of the fall semester through a process similar to applying for a job. The sponsoring faculty advisor or industry mentors will review applications and then choose their project teams.



CAPSTONE DELIVERABLES

Each team will be required to give a 10-minute oral presentation as part of the Final Capstone Project Showcase in May, and to develop an interactive display for the Capstone Expo in December. Each student will also be required to submit an individual final capstone report that serves as the required Master's Project report for the M.Eng. program. In addition to these reporting deliverables, teams must provide three interim project deliverables and one final project deliverable to their project advisors. The nature and form of these deliverables depend on the project and are defined in collaboration with the advisors at the beginning of the project.

2016-2017 CAPSTONE PROJECTS: PARTIAL PREVIEW

We have started soliciting Capstone Project proposals from faculty and industry for the 2016-17 academic year. The following projects are a preview of what is being proposed for next year. A complete list with project details will be released to incoming students over the summer. All project ideas are currently tentative and are not guaranteed offered for fall 2016.

EECS 2016-2017 CAPSTONE PROJECTS

The Electrical Engineering and Computer Science (EECS) department believes that their M.Eng. students will have the best capstone experience if the projects are followed closely by an EECS professor throughout the academic year. To ensure this, they have asked the faculty in each concentration for which the Master of Engineering is offered in EECS to formulate one or more project ideas from which the incoming students will choose. Depending on the number of enrolled students in each concentration, only a subset of these project ideas may run.

Faculty Advisor Dept	Project Name	Faculty or Partner- Proposed	Faculty Contact Name	Partner Organization (if applicable)	Project Keywords/Phrases	Depts Accepted
BIOE	Gene mediating plant-microbe interactions	Faculty	Adam Arkin			BIOE
BIOE	Environmental effect on microbia	Faculty	Adam Arkin			BIOE
BIOE	Bioinstrumentation for Quantitative Biology & Medicine: Design	Faculty	Amy Herr		Design, prototyping, control, microfluidics, optical systems, interfaces	BIOE
BIOE	Cellscope: mobile phone-based medical devices for digital health and point-of-care diagnostics	Faculty	Daniel Fletcher			BIOE
BIOE	Design of MEMS and Microfluidic Devices, Components and Systems,	Faculty	Dorian Liepman		Microfludics	BIOE
BIOE	BioMEMS and the application of MEMS to Biomedical Problems,	Faculty	Dorian Liepman		Microfludics	BIOE
BIOE	Fundamental studies of fluid mechanics at very small scales, and	Faculty	Dorian Liepman		Microfludics	BIOE
BIOE	Stem-cell niche engineering to boost tissue repair	Faculty	Irina Conboy			BIOE
BIOE	CRISPR aaproaches to treat genetic disorders	Faculty	Irina Conboy			BIOE
BIOE	Novel clinical modalities for FDA approved therapies.	Faculty	Irina Conboy			BIOE
BIOE	Delivering Cas9 protein in vivo	Faculty	Niren Murthy		new materials for drug delivery and molecular imaging	BIOE
BIOE	Development of new antibiotics	Faculty	Niren Murthy		new materials for drug delivery and molecular imaging	BIOE
BIOE	Development of new assays for rapid screening of bacterial drug resistance	Faculty	Niren Murthy		new materials for drug delivery and molecular imaging	BIOE
BIOE	Mechanics amd material affects on cell and tissue behavior	Faculty	Sanjay Kumar		Stem cell engineering, microfluidics, single-cell analysis, atomic force microscopy, femtosecond laser ablation	BIOE
CEE	Advanced Technologies for Complete Streets	Faculty	Alexander Skabardonis	San Francisco Metropolitan Transportation Authority (SFMTA)	multimodal travel, traffic control, connected vehicles	CEE, IEOR
CEE	What will happen when the government loses control of mobility?	Faculty	Alexandre Bayen	Department of Energy, LBNL	Machine learning, optimization and control; shared mobility and mobility on demand; large scale simulation, data driven policy	CEE, IEOR, ME
CEE	How would you fix traffic in Los Angeles?	Faculty	Anthony Patire, Francois Dion, Alex Bayen	Caltrans	transportation; traffic engineering; analysis, modeling, and simulation; big data and data analytics; sustainability; mobile applications; emerging cooperative transportation services	CEE, IEOR, ME

Faculty Advisor Dept	Project Name	Faculty or Partner- Proposed	Faculty Contact Name	Partner Organization (if applicable)	Project Keywords/Phrases	Depts Accepted
CEE	Vulnerability and Resilience of the National Airspace System (NAS): Equipment Outages of the Air Traffic Control System	Faculty	Jasenka Rakas	Federal Aviation Administration	air traffic control, availability, equipment, extreme events, outages, resilience	CEE, IEOR, ME, MSE
CEE	Benefits of Satellite Navigation to US Airports using Ground Based Augmentation System (GBAS)	Faculty	Jasenka Rakas		Airport, system availability, capacity, aviation big data, reliability, resilience, runway configurations	CEE, IEOR, ME, MSE
CEE	City-Wide Real-Time Water Quality Monitoring: the PAX SmartSystem(TM) Technology	Partner	David Sedlak	PAX Water Technologies, Inc.	big data, analytics, software design, water quality, product design,	CEE, IEOR
EECS	System Design for a 94GHz FMCW Radar/Sensor for Mobile Phones	Faculty	Ali Niknejad			EECS: SPC
EECS	Simulating Spectrum Access Systems	Faculty	Anant Sahai			EECS: SPC
EECS	Controls for Assistive Robots	Faculty	Anca Dragan			EECS: RES
EECS	Design Tools for Maker Movement	Faculty	Bjoern Hartmann			EECS: VCCG
EECS	User Interface and Data Visualization for Environmental Assessment		Bjoern Hartmann			EECS: VCCG
EECS	Vision Correcting Displays	Faculty	Brian Barsky			EECS: VCCG
EECS	Forensic Methods for Detecting Image Manipulation		James O'Brien			EECS: VCCG
EECS	Scaling up Deep Learning on Clusters	Faculty	John Canny	Yahoo, Databricks		EECS: DSS
EECS	Understanding Deep Learning through Visualization	Faculty	John Canny			EECS: DSS
EECS	Portable Computational Imagers	Faculty	Laura Waller			EECS: SPC
EECS	Classifying All Technology: Improving the Patent Office's Patenting Schema	Faculty	Lee Fleming	UPSTO		EECS: DSS
EECS	Predicting Bad Patents: Applying Machine Learning to Improve US Patent Accuracy	Faculty	Lee Fleming	Google		EECS: DSS
EECS	Machine Learning and Predictive Financial Models	Faculty	Lee Fleming			EECS: DSS
EECS	Extended Platform for Android tele- monitoring	Faculty	Ruzena Bajcsy	Philippine Department of Rehab Medicine		EECS: RES
EECS	Modern High-Speed Link Design	Faculty	Vladimir Stojanovic			EECS: PEIC
IEOR	Machine learning and Natural Language Processing of Patent Data for Financial Evaluation	Faculty	Lee Fleming	Google	patents, machine learning, natural language processing, valuation	BIOE, CEE, IEOR, ME, MSE, NE
IEOR	Propser Data Mining Project	Partner	TBD	Prosper Marketplace	machine-learning, data- science, applied, programming	CEE, IEOR, ME
IEOR	Design an assessment algorithm for using RFID to optimize clinic workflow	Partner	Philip Kaminsky	UCSF	clinic, workflow, RFID, healthcare, UCSF	IEOR
IEOR	Optimization of Surgical Clinical Pathway at UCSF Health	Partner	Philip Kaminsky	UCSF	Clinical Decision, Patients, Healthcare, UCSF, communications, Real-time rounds	IEOR

Faculty Advisor Dept	Project Name	Faculty or Partner- Proposed	Faculty Contact Name	Partner Organization (if applicable)	Project Keywords/Phrases	Depts Accepted
IEOR	Create a model to quatify throughput of a clinical pathway	Partner	Philip Kaminsky	UCSF	Sugical home, surgery, clinical pathway, patients, care coordination, healthcare, UCSF	IEOR
IEOR	Prescriptive Analytics for Cyber Secuirty	Partner	TBD	Innvo Solutions LLC	Operations Research, Rule Engine, Complex Event Processing, Cyber, Sensor, Analytics, Workflow	IEOR
ME	The ULTRA Spine, A Tensegrity Robot for Flexible Quadruped Backbones	Faculty	Alice Agogino	NASA Ames Research Center	robotics control mechanisms design bio-inspired tensegrity simulations	BIOE, IEOR, ME
ME	Design Of Oscillating Wind Power	Partner	Alice Agogino	TSF Group	Wind power, clean energy, renewable energy, sustainability	ME
ME	Street Nature Score	Partner	Alice Agogino	Faludi Design	Sustainability, Urban planning, Urban nature, satellite data, geographic information systems (GIS), mapping	ME, CEE, IEOR
ME	Spherical Tensegrity Soft Robots for NASA Missions	Faculty	Alice Agogino	NASA Ames, Intelligent Robotics Group	tensegrity robots, NASA, space exploration, design, controls	ME
ME	Automating Workflow from CAD to Control	Faculty	D. Auslander, G. Anwar	National Instruments. Autodesk	Robotics, mechatronics, control, CAD, design tools	BIOE, CEE, IEOR, ME, MSE, NE
ME	Autonomous Driving - An Open Source Platform	Faculty	Francesco Borrelli		Self- Driving Car, Control, Software, Robotic Operating System	IEOR, ME
ME	Fault Tolerant Control in Autonomus Driving	Faculty	Francesco Borrelli	Hyundai	autonomous driving	IEOR, ME
ME	Grace O'Connell	Partner	Grace O'Connell	QB3 Incubator (UCSF)	bioengineering, medical engineering, mechanical engineering	BIOE, IEOR, ME, MSE
ME	Designing an MRI Safe Catheter	Faculty	Grace O'Connell	QB3 at UCSF and Penumbra (biotech startup in Alameda)	biomedical device, magnetic resonance imaging, remote activation	BIOE, IEOR, ME, MSE
ME	American Jobs Project	Partner	Paul Wright	American Jobs Project	Policy, Manufacturing, Cleantech, Renewable Energy, Clean Energy	BIOE, CEE, IEOR, ME, MSE,
ME	CalWave Wave Carpet WEC	Partner	Reza Alam	CalWave LLC	Wave Power, MHK, Ocean Energy, Blue Tech	ME
ME	Supermaneuverable Unmanned Underwater Vehicle	Faculty	Reza Alam		Unmanned Underwater Vehicle (UUV), Maneuverability, Ocean Engineering,	CEE, IEOR,ME
ME	Diagnosing Rheumatic Heart Disease in Developing Economies	Faculty	Sara Beckman	Riley Lab: School of Public Health	heart disease, slums, medical device, affordability	BIOE, IEOR, ME
ME	Enabling Smart Energy Loads in a Resource-Constrained Environment	Faculty	Sara Beckman	Laboratory for Manufacturing and Sustainability	energy efficiency, energy efficient device design, developing economies	CEE, IEOR, ME, MSE

Faculty Advisor Dept	Project Name	Faculty or Partner- Proposed	Faculty Contact Name	Partner Organization (if applicable)	Project Keywords/Phrases	Depts Accepted
ME	Modeling and Simulation of Advanced Manufacturing	Partner	Tarek Zohdi	Lawrence Berkeley National Labs	manufacturing, modeling and simulation	BIOE, CEE, IEOR, ME, MSE, NE
ME	Modeling and simulation of 3D printing and its industrial implementation	Faculty	Tarek Zohdi	Both LBNL and 3D systems	3D printing, modeling, simulation, implementation	BIOE, CEE, IEOR, ME, MSE,
ME	Low-Cost Disposable Battery for the Developing World	Partner	TBD	Lawrence Berkeley National Labs	3D printing, prototyping, circuit design, developing world, consumer device, battery	ME, MSE
MSE	Tool and Process Design for Recycling and Remanufacturing of Li- ion Batteries	Faculty	Andrew Minor	CEQ LLC	batteries, recycling, manufacturing, design, automotive, Li-ion	CEE, IEOR, ME, MSE
MSE	Ion Beam Processed High- Performance Thermoelectric Materials: from Lab to Market	Faculty	Junqiao Wu		thermoelectrics, irradiation, solid refrigeration, defect physics	CEE, ME, MSE, NE
MSE	Develop nanocarriers for neurological diseases	Faculty	Ting Xu	Xalud!	nanocarrier, neurological disease, blood-brain-barrier, drug formulation, drug delivery	BIOE, IEOR, ME, MSE
NE	Micro modular reactors as part of a distributed grid	Faculty	Massimiliano Fratoni		micro modular reactor, smart grid, distributed grid, nuclear reactor, load following, renewable energy, safety, remote control	CEE, IEOR, ME, MSE, NE
NE	Coupling of advanced nuclear energy systems with advanced borehole storage technology	Faculty	Per Peterson			CEE, IEOR, ME, MSE, NE
NE	Radiation Detection	Faculty	TBD	TBD		INE