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MS PROGRAM IN
MATERIALS SCIENCE & ENGINEERING
College of ECST

Mohsen Eshraghi & ***Travis Hu***

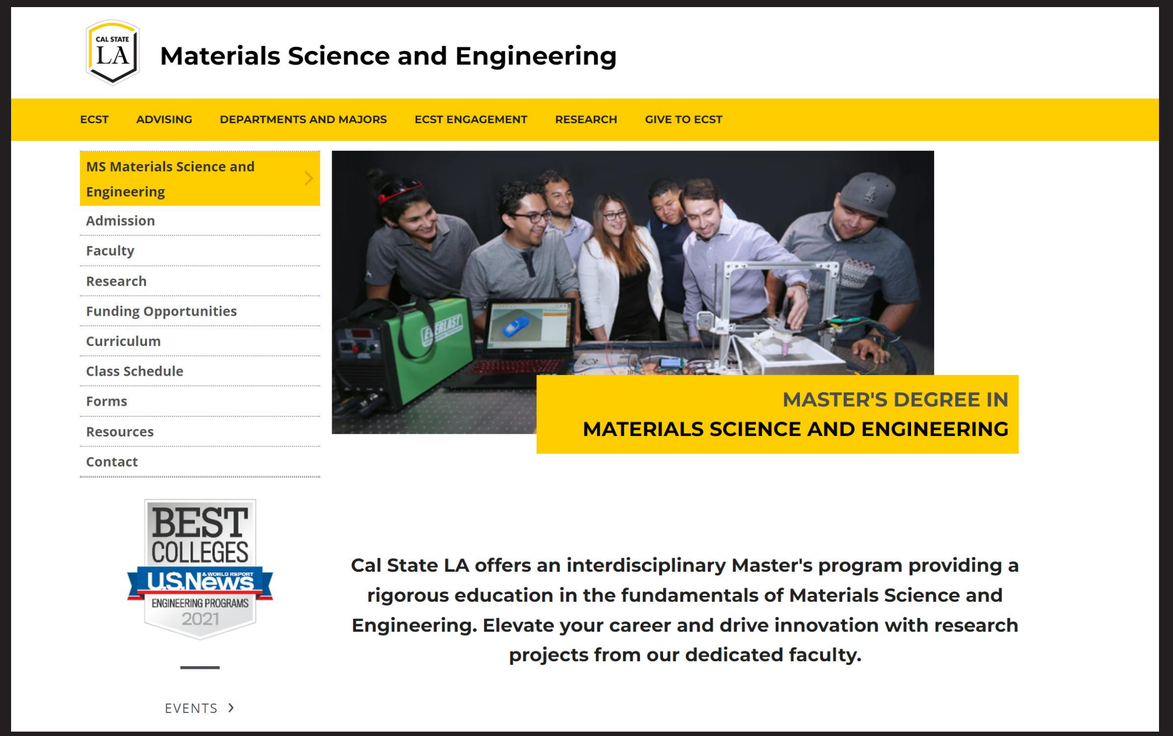
Assessment Fair - 2024

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Materials Science and Engineering Program

https://www.calstatela.edu/ecst/mse





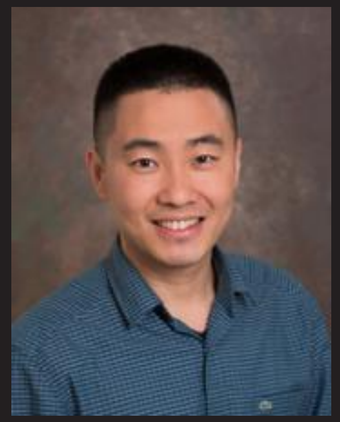


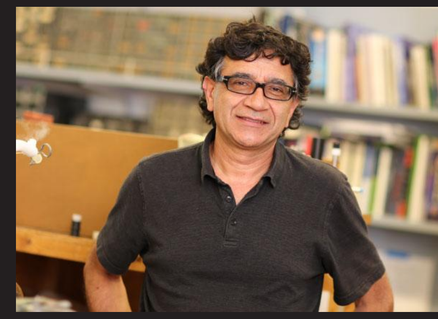
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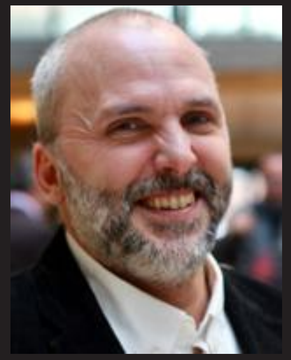
- Interdisciplinary program housed in the College of ECST
- faculty from ME, Phys, Chem, among others
- Launched in Fall 2019
- Initiated as a part of PREM grant in partnership with Penn State

Interdisciplinary Faculty from Two Colleges and Five Departments













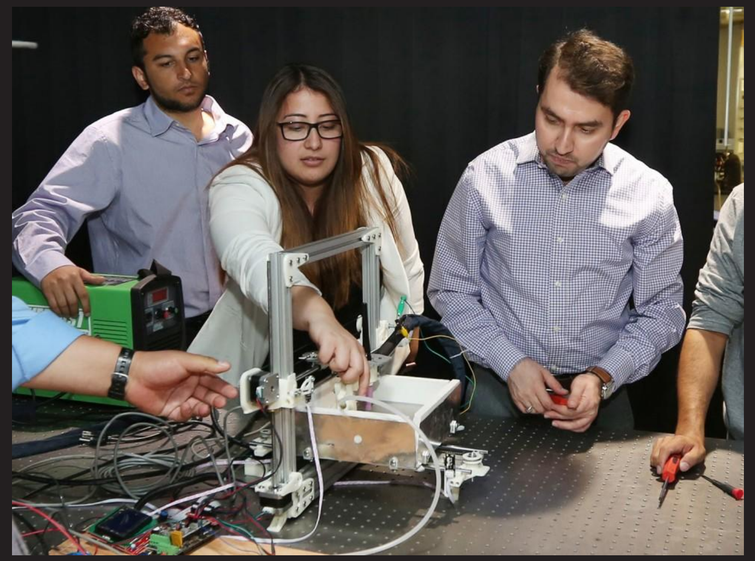
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Program Highlights

- *Well-prepared for industrial or governmental positions*
- *Gateway to a PhD program in MSE*
- *Equipped with advanced knowledge of topics related to MSE*
- *Well-equipped to work towards solving environmental challenges through innovations in MSE*







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Admission

- Anyone with a B.S. degree in engineering, mathematics, physics, chemistry, or other natural sciences is eligible for our program - from recent graduates to early and mid-career engineering, science and research professionals.

- 31 applications for Fall 2024

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NEW Curriculum – effective Fall 2021

30 semester units: 18 units are common cores and 12 units are electives

Core Classes:

- MSE/ME 4141, Engineering of Materials (3 units), Prerequisite: MATH 2150
- MSE/CHEM/PHYS 4142, Chemistry and Physics of Materials (3 units) Prerequisite MATH 2150
- MSE/ME5140, Mechanical Behavior of Materials (3 units), Prerequisite: ME 4141
- MSE/PHYS 5330, Electronic and Magnetic Properties of Materials (3 units) ,
  Prerequisite: CHEM/PHYS 4142
- MSE/CHEM 5510, Thermodynamics and Kinetics of Materials (3 units),
  Prerequisite: CHEM/PHYS 4142
- MSE 5350, Materials Characterization (3 units)

Electives must include at least 6 units of 5000-level courses.

- MSE 5540 Special Topics in Materials Science and Engineering (3)
- CHEM 4410 Physical Chemistry: Quantum Mechanics (4)
- CHEM 4420 Physical Chemistry: Thermodynamics (3)
- CHEM 4430 Quantum Chemical Methods (1)
- CHEM 5600 Advanced Inorganic Chemistry (3)
- MSE/ME 4020 Advanced Mechanics of Materials (3)
- ME 4140 Machine Design II (3)
- MSE/ME 4300 Selection and Properties of Materials (3) –Offered in summers
- MSE/ME 4510 Biomaterials (3) – Spring
- ~~MSE/ME 5130 Advanced Structure of Materials (3) –~~ IT'S NOT BEING OFFERED FOR NOW.
- ME 5300 Advanced Manufacturing Processes (3) – Fall 2020
- PHYS 4200 Computational Physics (3)
- PHYS 4251 - Introduction to Theoretical Physics
- PHYS 4261 Electricity and Magnetism (2)
- PHYS 4280 Statistical Thermodynamics (3)
- PHYS 4321 Introductory Quantum Mechanics I (3)
- PHYS 4330 Solid State Physics (3)
- PHYS 4700 Advanced Physics Laboratory (3)
- PHYS 5101 Mathematical Methods of Physics (3)
- PHYS 5731 Theory of Nuclear Magnetic Resonance and its Applications to Materials Physics (3)
- PHYS 5732 Practical Implementation of Nuclear Magnetic Resonance and Applications to Materials Physics (1)

Additional courses :

1. Advanced Experimental Methods
2. Advanced Numerical Methods

Students may also elect up to 6 units of Supervisory Courses in consultation with their advisors:

ME 5960 - Comprehensive Examination (0)

OR

ME 5970 - Graduate Research (3)
ME 5990 - Thesis (3)

- Students have the option of choosing either the comprehensive examination or thesis option for their culminating experience.
- Advancement to candidacy is required of all students to be eligible to register for the culminating experience supervisory courses
- Thesis Option ME 5990 and Comprehensive Examination ME 5960.

The MSE MS program aims to help students achieve the following **learning outcomes**:

1. Ability to acquire and apply new knowledge [ILO 1,2]

2. Ability to perform in-depth analysis, experimentation, and design to solve contemporary materials science and engineering problems [ILO 3, 3, 4]

3. Ability to communicate effectively, and work independently and in collaboration with others in an ethical and professional manner [ILO 3, 4]

The MSE Curriculum Map identifying Program Learning Outcomes (PLOs) and where they are introduced, developed and mastered.

PLO	Courses								
	MSE 4141	MSE 4142	MSE 5140	MSE 5330	MSE 5350	MSE 5510	MSE 5960	MSE 5970	MSE 5990
Ability to acquire and apply new knowledge	D	D	M	D	M	D	M	M	M
Ability to perform in-depth analysis, experimentation, and design to solve contemporary materials science and engineering problems	I	I	M	D	M	D	M	M	M
Ability to communicate effectively, and work independently and in collaboration with others in an ethical and professional manner	I	I	M	D	M	D	D	D	M

Direct Assessment results for thesis work based one feedback from faculty. The numbers in the table represent the number students in that satisfaction level.

Learning Outcome	Attribute	1	2	3	4
		Below standard	Progressing to standard	Satisfactory	Exceeding Standard
1	Ability to acquire new knowledge	0	0	3	4
	Ability to apply new knowledge	0	0	4	3
2	Ability to perform in-depth analysis to solve contemporary Materials Science and Engineering problems	0	0	4	3
	Ability to perform experimentation to solve contemporary Materials Science and Engineering problems	0	1	2	4
	Ability to perform design to solve contemporary Materials Science and Engineering problems	0	1	3	3
3	Ability to effectively communicate to a broad range of audiences	0	0	4	3
	Ability to work independently and in collaboration with others	0	1	2	4
	Ability to communicate and work in an ethical and professional manner	0	0	2	5

Direct Assessment results for MSE 5140 – Mechanical Behavior of Materials.

PLO	Courses	
	MSE 5140 – Spring 2020 Total Students: 26	ME/MSE 5140 – Spring 2022 Total Students: 12+10=22
1. Ability to acquire and apply new knowledge	Exam-1 (Conceptual; Synthesis) Level 1 – 1 Level 2 – 8 Level 3 – 14 Level 4 – 3	Exam-1/Quiz-1(Conceptual; Synthesis) Level 1 – 3 Level 2 – 6 Level 3 – 10 Level 4 – 3
2. Ability to perform in-depth analysis, experimentation, and design to solve contemporary materials science and engineering problems	Final Exam (Calculation; Analysis) Level 1 – 1 Level 2 – 10 Level 3 – 11 Level 4 – 4	Final Exam (Calculation; Analysis) Level 1 – 4 Level 2 – 3 Level 3 – 10 Level 4 – 5

Direct Assessment results for MSE 4141 – Engineering of Materials

PLO	Courses
	MSE 4141 – Fall 2019 Total Students: 21
1. Ability to acquire and apply new knowledge	Exam-2 (Conceptual; Calculation) Level 1 – 6 Level 2 – 6 Level 3 – 6 Level 4 – 3
2. Ability to perform in-depth analysis, experimentation, and design to solve contemporary materials science and engineering problems	Exam-3 (Calculation; Analysis) Level 1 – 6 Level 2 – 6 Level 3 – 3 Level 4 – 6

Alumni’s Post-Graduation Education and Careers

Among the MSE alumni who graduated over the past five years, two are currently pursuing doctoral degrees:

- Patricia Barron, UCLA, pursuing a PhD in Chemistry
- Arnaldo Rendon, Penn State University, pursuing a PhD in Mechanical Engineering

Most of the students graduated from the MSE program are currently employed in industr on roles relevant to their MSE studies:

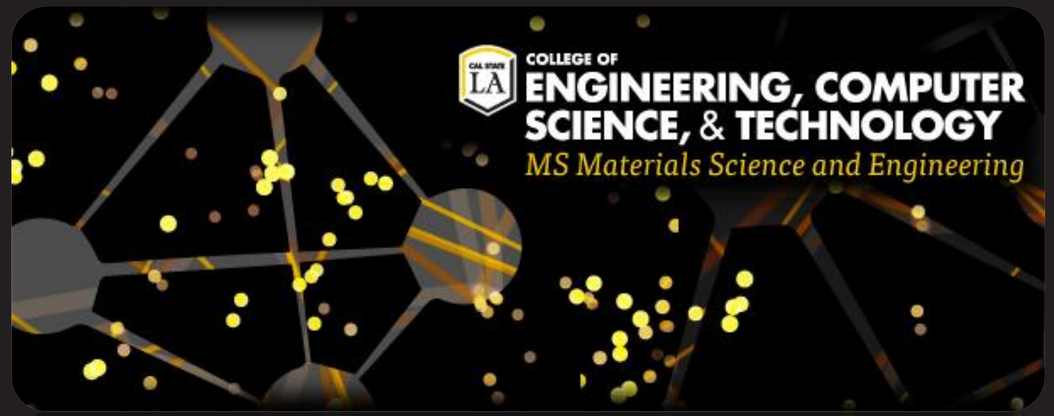
- Miray Ouzounian, Materials and Process Engineer, Northrup Grumman
- Marcos Saavedra, Senior Quality Control Chemist, Grifols
- Brian Martinez, Senior Process Development Associate, Amgen
- Akshay Palagani, Control System Engineer, Hyster-Yale Group
- Melvin Ramos, Manufacturing Engineer, Alpha Aviation Components Inc.
- Hyera Son, KOGAS, South Korea
- Patricia Barron, UCLA, pursuing a PhD in Chemistry
- Arnaldo Rendon, Penn State University, pursuing a PhD in Mechanical Engineering

Recommendations and Future Actions

- Implementing both mid-program and exit survey
- Creating a LinkedIn group for MSE graduates to keep track of their career path and success
- Improve Alumni Network and Career Services, such as job placement assistance, resume workshops, and career counseling.
- Continue to improve and develop a well-rounded curriculum that covers both core principles and specialized areas of interest. Consider whether the program offers course electives that align with the career goals and interests of potential students.
- Assess the availability of student support services such as academic advising, tutor mentorship programs, and counseling. These resources can contribute to your overall academic success and well-being.
- Enhance the assessment of the program outcomes with more cumulative data, such graduation rates, job placement rates, and starting salaries of graduates. This multi-year information gives an indication of the program's effectiveness in preparing students for successful careers in materials research and engineering.

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ECST - MSE

College of Engineering, Computer Science and Technology

CALIFORNIA STATE UNIVERSITY, LOS ANGELES

5151 State University Drive, Los Angeles, CA 90032

Web

http://www.calstatela.edu/ecst/mse

Email

MSE-ECST@calstatela.edu