

# Welcome to Berkeley MSE!



Orientation for New MSE Graduate Students  
August 20, 2020

# Hearst Memorial Mining Building, 1920





# the 'rona Years...

- an unusual time in our country's history
  - much uncertainty, stress
  - significant changes to how we live our lives
- good time to go to grad school?
  - Yes!!! The world needs you.
  - better yourself, and help us solve these problems.

# Our promise to you

- we will work with you to make you the best possible Materials Scientists and Engineers that you can be
  - we will work within the constraints we now face
  - we look forward to the relaxation of those same constraints
- in the end, we will look back on the 'rona years and know that they brought out the best in all of us

# Rankings 2018, 2019

- Academic Ranking of World Universities: **2,2**
- QS World University Rankings: **4,2**
- USN&WR Undergraduate Ranking: **2,7**
- USN&WR Graduate Ranking: **3,6,2**



# Programs and Numbers

- Bachelor of Science in MSE: **133**
- PhD in MSE: **135**
- BS/MS Program: **9**
- Master of Engineering: **9**

**Total: 286**

*Fall, 2020 numbers*

MSE at Berkeley  
*Faculty and Staff*

# Department Staff



- Catalina Estrada: Department Manager, Academic Personnel, Finances



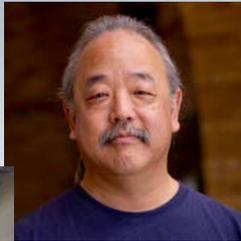
- Ariana Castro: Student Services Advisor (grads)



- Daisy Hernandez: External Relations Specialist, Events, GSI/Reader Hiring



- Medina Kohzad: MSE Student Services Advisor (undergrads)



- Chris Kumai: Principal Development Engineer (and sometimes Lecturer)



- Chad M. Southard: Principal Lab Mechanician



- Jennifer Teverbaugh: HMMB Building Manager

# MSE Core Faculty



Zakaria  
al Balushi



Mark Asta



Daryl Chrzan



Tom Devine



Gerd Ceder



Oscar Dubon



Kevin Healy



Andrew Minor



Lane Martin



Phil  
Messersmith



Kristin Persson



R. Ramesh



Robert Ritchie



Mary Scott



Junqiao Wu



Ting Xu



Jie Yao

# Some Faculty You Should Know

## Academic Advisor for 2020-21 Entering PhD Students



Professor Junqiao Wu  
wuj@berkeley.edu

## Five-Year BS/MS Advisor



Professor Lane Martin  
lwmartin@berkeley.edu

## Head Graduate Advisor



Professor Jie Yao  
yaojie@berkeley.edu

## Equity Advisor



Professor Mary Scott  
mary.scott@berkeley.edu

# Joint Faculty



A. Paul  
Alivisatos



Jillian  
Banfield



Robert  
Birgeneau



Frances  
Hellman



Peidong  
Yang

# Adjunct Faculty



Miguel  
Salmeron



Joel  
Ager



Haimei  
Zheng

# Lecturer



Matthew  
Sherburne

# 13 Faculty Emeriti

- George Brimhall
- James Evans
- Didier de Fontaine
- Lutgard de Jonghe
- Fiona Doyle
- Douglas Fuerstenau
- Andreas Glaeser
- Ron Gronsky
- Digby Macdonald
- Marshall Merriam
- [J.W. Morris, Jr.](#)
- Matt Tirrell
- Eicke Weber

# Materials Science and Engineering *Degree Requirements for MS/PhD Programs*

Information Available in Graduate Manual

[https://mse.berkeley.edu/wp-content/uploads/2020/08/mse.grad\\_manual.wtc\\_update-8\\_10\\_20.pdf](https://mse.berkeley.edu/wp-content/uploads/2020/08/mse.grad_manual.wtc_update-8_10_20.pdf)

# Master of Science

*For students in MS/PhD program entering w/out MS*

Two types of Master of Science degrees: Plan I and Plan II

**Plan I:** Requires a minimum of 20 semester units of coursework plus a thesis

**Plan II:** Requires a minimum of 24 semester units of coursework, and a comprehensive examination and a research project report.

Minimum GPA of 3.0

*Five-Year BS/MS Students:* Degree under Plan II with some additional requirements on courses (see grad handbook)

# Doctor of Philosophy

## Unit Requirements:

The required minimum number of semester units is 28, of which 16 must be graded graduate units in the major field. All course work must be graded work

## GPA Requirement

Students are required to maintain a 3.0 GPA in courses taken in the major area, and 3.0 GPA in courses taken in the minors

# PhD Core Course Requirements

A graduate degree program must include at least one course from each of the five following technical groups, which defines the minimum requirements for program approval. One course may not be used to satisfy two cores:

## 1) Thermodynamics

MSE 201A

## 2) Structure and Bonding

MSE 201B, MSE 202, MSE 215

## 3) Materials Characterization

MSE 204, MSE 241

## 4) Materials Properties

MSE 205, MSE C212, MSE 213, MSE 223, MSE 224, MSE C225,  
MSE 251, MSE 260, MSE 217, MSE 218

## 5) Materials Processing

MSE 121, MSE C216, MSE 221, MSE 223, MSE 224, MSE C225,  
MSE 227, MSE 251

# PhD Minors

**The Minors:** In addition to a major field, each candidate must select two minor fields. The minor fields should serve to broaden the base of the studies and lend support to the major field. The student is required to maintain a 3.0 average in each of the Minors

- Each minor program should be named and have an orientation different from the major program and the courses involved should be concerned with concepts not introduced in the major program.
- One minor program should consist of courses outside of the Department (Engineering requirement) and preferably outside of the College of Engineering.
- Graduate courses taken in a graduate program of another university may be used to satisfy at most one minor. The maximum number of units awarded for such a minor will be 8 units.
- Two courses represent a minimum program for a minor. In a few programs of study, a minor that consists only of a sequence of high-level upper division courses taken in a department outside of the College of Engineering may be acceptable. However, no more than two undergraduate courses will be allowed to fulfill the requirements for the minors. Thus, one minor may consist of a sequence of advanced undergraduate courses taken at Berkeley, or alternatively, there may be a combination of one advanced undergraduate and one graduate course in each minor, provided that the content of the minors is sufficiently different.

# Another Useful Course

## MSE 200A

Survey of Materials Science

4 Units

Professor J.W. Morris, Jr.

Required for MEng Students w/out MSE Degree  
Useful for PhD Students Entering w/out BS in MSE  
Good Preparation for Prelim Exam

# 298 and 299 Courses

## 298 = “Seminar” Courses (SU graded)

Required: 1 unit of MSE 298-001 (Dept. Colloquium) for first two years of grad school

Also: 1 unit of MSE 298-00x (Your advisor's group mtg)

## 299 = “Research” Units (SU graded)

If you are a GSR 49.5% sign up for at least 7 units

Sign up for enough 299 to ensure you have at least 12 units

*No more than 1/3 of units can be SU for graduation, excluding 299*

# An Example of 1<sup>st</sup> Semester Schedule

MSE 201A (4 units)

MSE 204 (3 units)

MSE 298-001 (1 unit)

MSE 298-00x (1 unit)

MSE 299-00x (at least 7 units)

# Comment about courses...

- Different groups have different approaches to the number of courses you should take each semester
  - Depends on the source of your funding
  - Depends on the group culture
- Discuss the course-load with your Research Adviser to make certain that you are taking the right number of courses

# PhD GSI Requirement

All students, whether on fellowship or not, are required to serve as graduate student instructor (GSI) at least one time, no exceptions.

You should serve either after becoming a resident of CA or after advancing to candidacy since Department will NOT cover non-resident tuition fees

# Academic Affairs Committee

Chair: Professor Rob Ritchie

Committee must approve all programs of study

Committee also approves all “petitions” for non-standard components of program of study  
(e.g., transferring graduate units)

# Prelim Exam

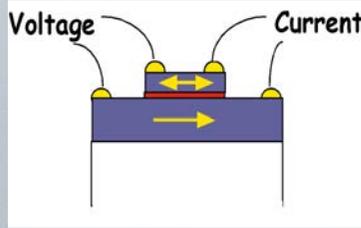
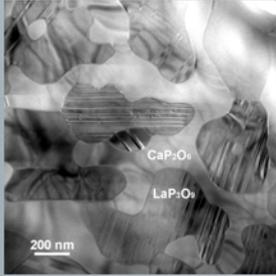
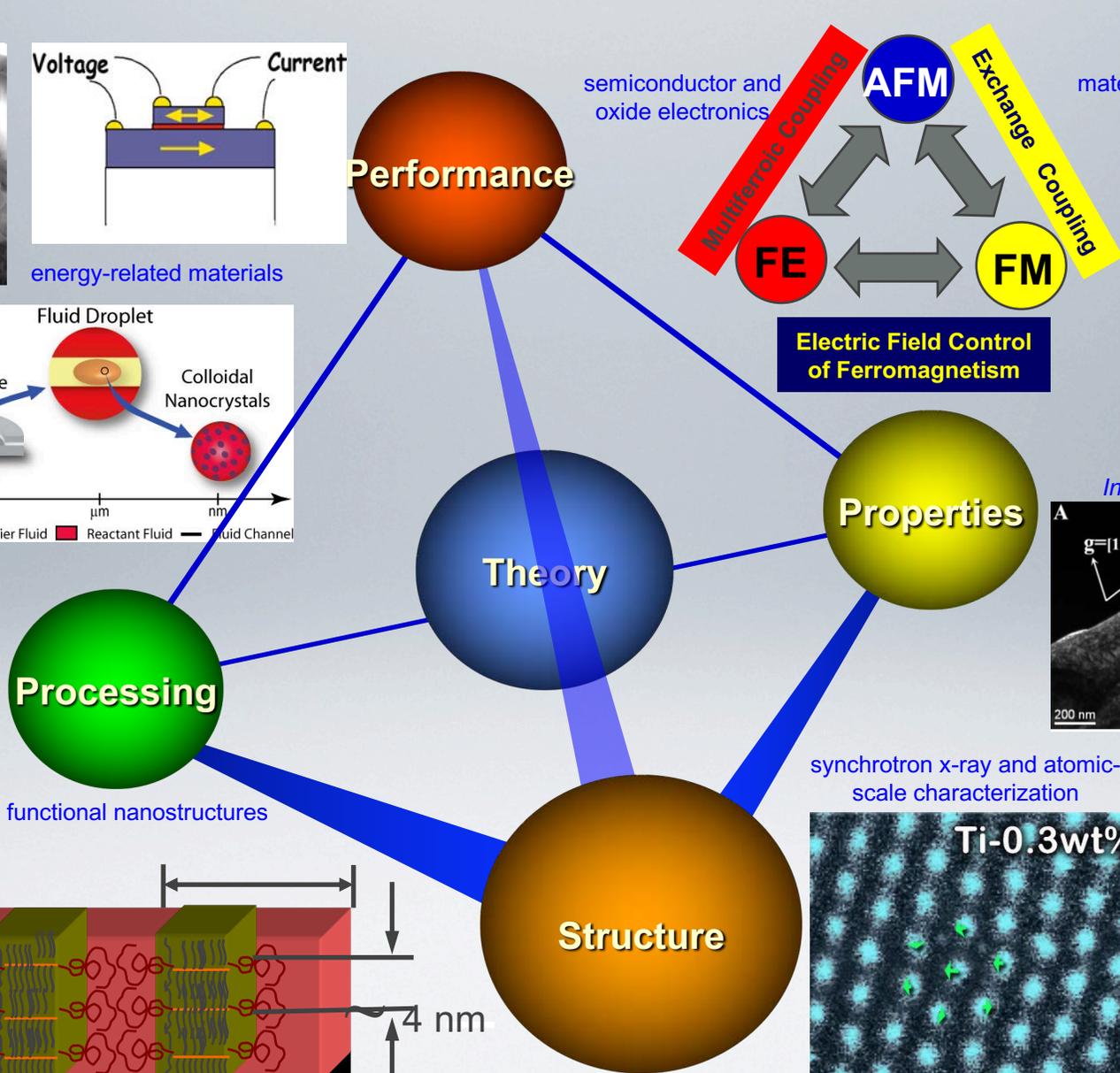
The purpose of the Preliminary Examination is to ensure that students have a sufficiently strong foundation in Materials Science and Engineering to qualify for formal entrance to the Ph.D. program.

The examination is divided into 6 topics germane to ceramic, metallic, semiconducting, and soft materials, including their appropriate composites. Faculty examiners are appointed each semester by the Department Chair. Exams are conducted orally, with two exams administered by two faculty within a ½ hour block of time.

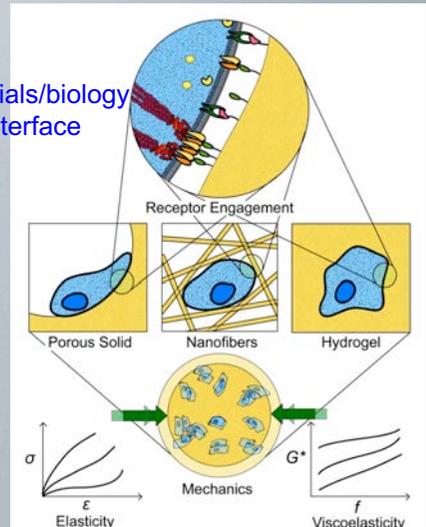
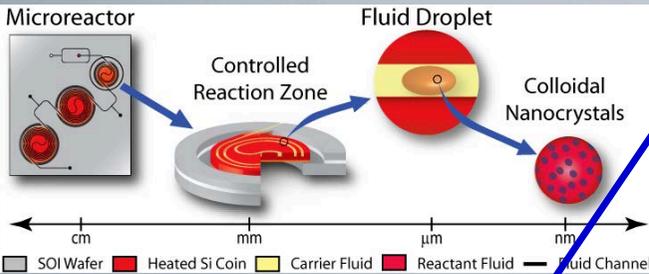
The examination areas are:

- 1) Thermodynamics
- 2) Phase Transformations
- 3) Bonding, Crystallography, and Crystal Defects
- 4) Materials Characterization
- 5) Mechanical Properties
- 6) Electronic Properties

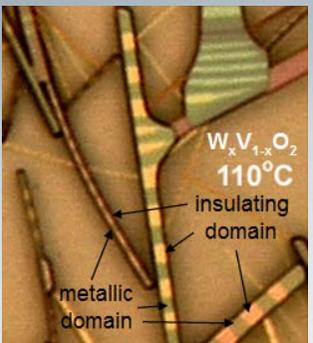
# Materials Research @ Berkeley



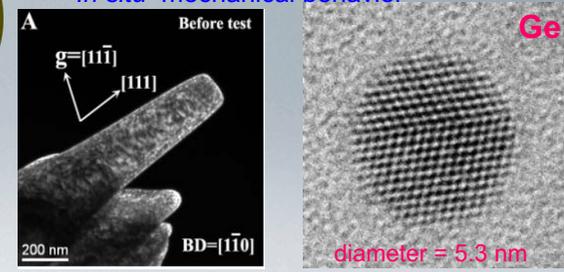
energy-related materials



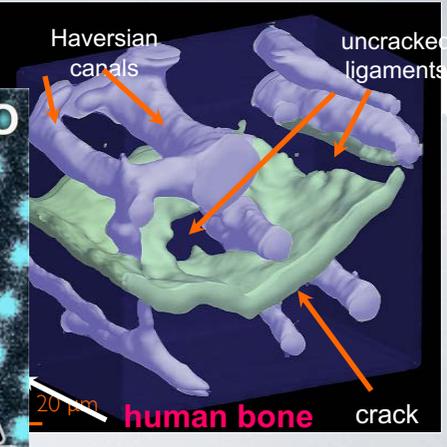
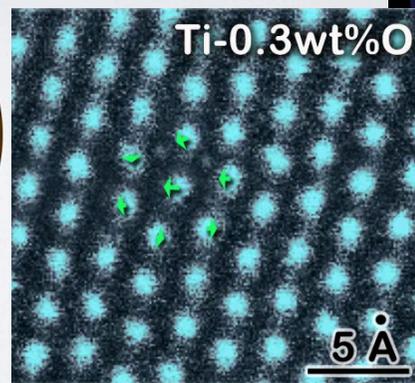
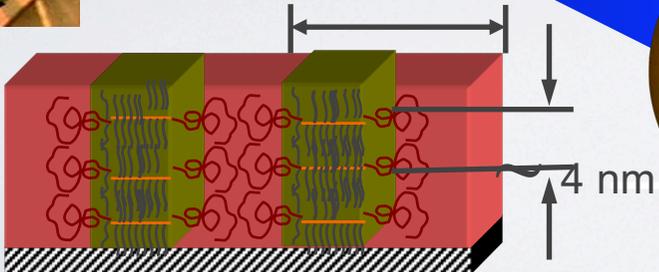
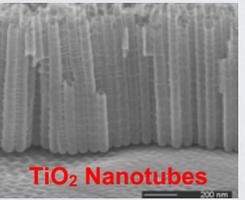
In situ mechanical behavior



functional nanostructures



synchrotron x-ray and atomic-scale characterization



# PhD Research Advisor

*PhD students need to select a PhD research advisor and we suggest you do this immediately (if not sooner).*

- 1) If your research advisor is a Core or Joint member of MSE faculty they can serve as the sole chair of your dissertation committee.
- 1) If your research advisor is outside of MSE or an Adjunct Professor, you will need to find a co-advisor who is a Core or Joint MSE faculty member to serve as co-chair of your dissertation committee.

# Qualifying Examination

The qualifying examination consists of two parts, namely, a written proposal, and the oral examination:

- 1) **Written Proposal:** The proposal describes intended Ph.D. research. At least two weeks before the examination date the student must submit a written research proposal to his/her committee. The proposal must include a one page abstract and be roughly five to ten pages long. It must contain a concise statement of the research problem and its significance, a discussion of the technical background, the technical approach (experimental and/or theoretical), the anticipated results, and a bibliography. This written proposal is to be prepared by the student without direct collaboration or assistance from the faculty.
- 2) **The Examination.:** The student should prepare a 30-minute oral presentation of the research proposal(s). The committee will question the student on the material presented orally, the material contained in the written proposal, and on the general technical background to the research area. The student should be familiar with the relevant literature. The student must also defend the significance of the research problem and the viability of the technical approach. The second part of the examination consists of questions in the major and minor fields. (See "Preparing for the Exam" above.)

# The Qualifying Exam Committee

A committee of four members (at least two members from the major department excluding your PhD advisor, and at least one member from outside of the major field) gives the qualifying exam orally.

The student's research supervisor may not be a member of the qualifying examination committee. The examination lasts for up to 3 hours.

# The Last Hurdle

## Your Dissertation

Thesis committee typically consists of your thesis advisor, one other member of department and one outside the department

Note that there is no thesis defense at Berkeley.

Write your thesis, get signatures from your committee and then ....

