



# 3+2 Engineered Structures + Systems: A Taiwan-UC San Diego Partnership

UNIVERSITY OF CALIFORNIA, SAN DIEGO

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Professor and Vice Chair  
Department of Structural Engineering  
Materials Science & Engineering Program  
Active, Responsive, Multifunctional, and Ordered-materials Research (ARMOR) Lab



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## A Vibrant Campus

UC San Diego  
Structural Engineering  
JACOBS SCHOOL OF ENGINEERING



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# Jacobs School of Engineering

Dean Al Pisano



## Achievements and Accolades in 2019 (U.S. News & World Report):

### Quality:

- #11 Best Engineering School in U.S.
- #10 Best Global Universities for Engineering
- #6 Best Public Engineering School in U.S.
- #1 (2018) and #3 (2019) Research Productivity per Faculty

### Quantity:

- 266 Professors
- 9,225 engineering students (6,027 undergrad and 3,198 grad)
- \$188M in research funding (2017–2018) – #1 in research expenditures at the time

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# Jacobs School of Engineering



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Civil



Geotechnical



Automotive

## Structure?

Materials + Geometry + Function

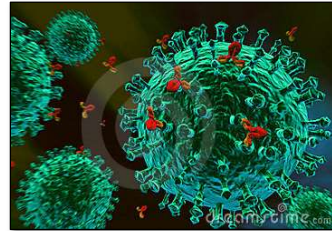
Aerospace



Marine



Biological



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- We aspire to be leaders in analyzing, designing, simulating, visualizing, optimizing, and monitoring and assessing the behavior and environmental interactions of structures and structural materials from a holistic perspective.



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## Department Statistics



- Faculty + Lecturers: 25 + 1 (open)
- Sponsored Research: \$10.4M / year
- Undergraduate students: 444
- M.S. students: ~ 110
- Ph.D. students: ~ 80

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## Department Faculty

### Computational Mechanics:

- Robert Asaro
- Jiun-Shyan Chen
- Peter Krysl
- Shabnam Semnani
- Qiang Zhu

### Civil Structures:

- Joel Conte
- Machel Morrison
- Gilberto Mosqueda
- Jose Restrepo
- Benson Shing
- Chia-Ming Uang
- Lelli van den Einde (LSOE)

### Structural Health Monitoring:

- Francesco Lanza di Scalea
- Falko Kuester
- Ken Loh
- Michael Todd

### Aerospace & Composites:

- Veronica Eliasson
- H. Alicia Kim
- Hyonny Kim
- John Kosmatka
- Yu Qiao

### Geomechanics:

- Ahmed Elgamal
- Tara Hutchinson
- John McCartney
- Shabnam Semnani
- Ingrid Tomac



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# Home of Structural Engineering

UC San Diego  
Structural Engineering  
JACOBS SCHOOL OF ENGINEERING



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# Home of Structural Engineering

UC San Diego  
Structural Engineering  
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Prof. Veronica Eliasson, *Structural Engineering*

# I. Master's Degree Programs

Traditional Degree Program Information



# M.S. in Structural Engineering

Requirement	Thesis option	Comprehensive option
<b>Core courses:</b>	Two core courses (8)	Two core courses (8)
<b>Thesis research:</b>	SE 299 – Graduate Research (12)	No requirement
<b>Sequence #1:</b>	Three courses (12)	Three courses (12)
<b>Sequence #2:</b>	Three courses (12)	Three courses (12)
<b>Technical electives:</b>	Three courses (12)	Three courses (12)
<b>Total units:</b>	<b>48</b>	<b>48</b>
<b>Other requirements:</b>	Complete and defend M.S. thesis	Complete comprehensive exam by Week #8 of quarter of graduation
<b>Graduate seminar:</b>	Three quarters of SE 290 (3)	Three quarters of SE 290 (3)

- **Graduate Handbook (available online):**

- ❖ List of pre-approved courses for each Sequence
  - ❖ Non-SE technical electives or undergraduate courses require faculty advisor and GAC approval

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# M.S. in Structural Engineering

- **Designed to equip students with fundamental training as well as specialized advanced knowledge in selected structural engineering aspects**

- **Requirements:**

- ❖ Complete a minimum of 2 sequences (3 courses) from the following focus areas:
    - ❖ Structural Analysis
    - ❖ Structural Design
    - ❖ Computational Mechanics
    - ❖ Earthquake Engineering
    - ❖ Geotechnical Engineering
    - ❖ Advanced Composites
    - ❖ Solid Mechanics
    - ❖ Structural Health Monitoring
  - ❖ Complete 2 out of 7 core course electives
    - ❖ SE 200, 201A, 202, 203, 241, 271, 233, and 276A
    - ❖ Can be counted towards a focus sequence or technical elective

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# Geotechnical Engineering Specialization

- Learn geomechanics and soil–structure interaction fundamentals needed for advanced geotechnical engineering analyses
- Geotechnical electives:
  - ❖ SE 222 – Geo. Earthquake Eng.
  - ❖ SE 226 – Groundwater Eng.
  - ❖ SE 243 – Soil–Structure Interaction
  - ❖ SE 244 – Numerical Methods in Geo.
  - ❖ SE 247 – Ground Improvement
  - ❖ SE 248 – Eng. Properties of Soil
  - ❖ SE 207 – Rock Mechanics
  - ❖ SE 207 – Soil Dynamics
  - ❖ SE 246 – Unsaturated Soil Mechanics

Requirement	Thesis option	Comprehensive option
<b>Core courses:</b>	SE 271 – Solid Mechanics (4) SE 241 – Adv. Soil Mechanics (4) SE 242 – Adv. Foundation Eng. (4) SE 250 – Stability (4)	SE 271 – Solid Mechanics (4) SE 241 – Adv. Soil Mechanics (4) SE 242 – Adv. Foundation Eng. (4) SE 250 – Stability (4)
<b>Thesis research:</b>	SE 299 – Graduate Research (8)	No requirement
<b>Geotechnical electives:</b>	Four courses (16)	Four courses (16)
<b>Structural engineering electives:</b>	Two courses (8)	Four courses (16)
<b>Total Units:</b>	<b>48</b>	<b>48</b>
<b>Graduate seminar:</b>	Three quarters of SE 290 (3)	Three quarters of SE 290 (3)

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# SHM & NDE Specialization

- Specialization in SHM/NDE equips you with interdisciplinary knowledge in sensing technologies, data interrogation, and modeling and analysis
  - ❖ Encompasses structural, civil, mechanical, aerospace, and marine engineering
  - ❖ Supports “design–to–retirement” life cycle management of systems
- One–year M.S. program (36 units):

Requirement	Thesis option	Comprehensive option
<b>Core courses:</b>	SE 263 – NDE (4) SE 265 – SHM Principles (4)	SE 263 – NDE (4) SE 265 – SHM Principles (4)
<b>Capstone experience:</b>	No requirement	SE 296 – Independent Study (4)
<b>Thesis research:</b>	SE 299 – Graduate Research (8)	No requirement
<b>Sensing Technology focus area</b>	One course (4)	One course (4)
<b>Data Interrogation focus area</b>	Two courses (8)	Two courses (8)
<b>Modeling &amp; Analysis focus area</b>	Two courses (8)	Two courses (8)
<b>Technical elective:</b>	No requirement	One course (4)
<b>Total Units:</b>	<b>36</b>	<b>36</b>
<b>Graduate seminar:</b>	Three quarters of SE 290 (3)	Three quarters of SE 290 (3)

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## II. 3+2 Program

### Degree Program Information

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## 3+2 Briefly Explained



- **Current undergraduate students in Taiwan**
  - ❖ UCSD Structural Eng. with Civil, Mechanical, Aero.
  - ❖ Apply in your third-year
  
- **Spend 2 years at UC San Diego**
  - ❖ Year 1 – majority of courses for satisfying B.S. degree from **home institution**
    - ❖ Not a dual-degree program
    - ❖ May begin taking M.S. courses
  - ❖ Summer: research or internships
  - ❖ Year 2 – complete M.S. degree in Structural Engineering (no GRE required)
    - ❖ Coursework or thesis option
  - ❖ Year 3+
    - ❖ Job opportunities in the U.S.
    - ❖ Continue as Ph.D. student (direct and no GRE)
    - ❖ Apply to other institutions for Ph.D.

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## Why Choose this 3+2?

### How can Structural Engineering at UC San Diego advance your career goals?

- ❖ Assigned faculty advisor and graduate advisors work directly with you to plan your curriculum and to ensure you meet your goals
- ❖ Topnotch graduate program in both breadth and depth
- ❖ Tailored degree programs based on your personal and career interests
- ❖ Access to world-class facilities, labs, and faculty (letter writers)
- ❖ Engage in meaningful extracurricular activities
- ❖ Connect with local industry and potential employers
  - ❖ Aerospace: General Atomics; Collins Aerospace; ATA Engineering; Raytheon; Leidos; Honeywell; Northrop Grumman; Lockheed Martin; Boeing; Action Drone; GKN Aerospace; Kratos Defense; NAVAIR
  - ❖ Civil: Jacobs Engineering; Tobolski Watkins Engineering; S. K. Ghosh Associates; Englekirk Structural Engineers; Miyamoto International; Wiss, Janney, Elstner Associates; SYSTRA; KPFF Consulting Engineers; ARUP
- ❖ Secure job and internship opportunities
- ❖ Possibility of Departmental funding opportunities for both M.S. and Ph.D. students
- ❖ Streamlined transition to the Ph.D. program
- ❖ Become a proud UC San Diego alumni
- ❖ Live, learn, and work in one of the best places in the country

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## Sample Course Schedule

### Civil Engineering:

**Table 1: Sample Course Schedule for Students in the First Year of the Program**

Fall Quarter	Winter Quarter	Spring Quarter
SE 180 – Earthquake Engineering	SE 103 – Conceptual Structural Design	SE 184 – Ground Improvement
SE 121A – Intro to Computing for Engineers	SE 121B – Computing Projects in Structural Eng.	SE 131 – Finite Element Analysis
SE 199 – Independent Study	SE 199 – Independent Study	SE 199 – Independent Study
<b>SE 264 – Sensors &amp; Data Acquisition</b>	<b>SE 203 – Structural Dynamics</b>	<b>SE 214 – Masonry Structures</b>

### Mechanical and Aerospace Engineering:

**Table 1: Sample Course Schedule for Students in the First Year of the Program**

Fall Quarter	Winter Quarter	Spring Quarter
SE 142 – Design of Composite Structures	SE 160A – Aerospace Structural Mechanics I	SE 160B – Aerospace Structural Mechanics II
SE 121A – Intro to Computing for Engineers	SE 121B – Computing Projects in Structural Eng.	SE 131 – Finite Element Analysis
SE 199 – Independent Study	SE 199 – Independent Study	SE 199 – Independent Study
<b>SE 264 – Sensors &amp; Data Acquisition</b>	<b>SE 203 – Structural Dynamics</b>	<b>SE 251B – Mechanical Behavior of Composites/Polymers</b>

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## 3+2 Program Costs for 2019–2020 AY

- **Year 1:**
  - ❖ Non-Resident Tuition: \$43,953
- **Year 2:**
  - ❖ Non-Resident Tuition: \$32,309
  - ❖ \*Students eligible for funding
- **Other expenses:**
  - ❖ On- or off-campus housing
  - ❖ Course and/or lab fees
  - ❖ Books and supplies
  - ❖ Transportation
  - ❖ Meals and personal expenses
  - ❖ Note: fees are estimated based on previous years

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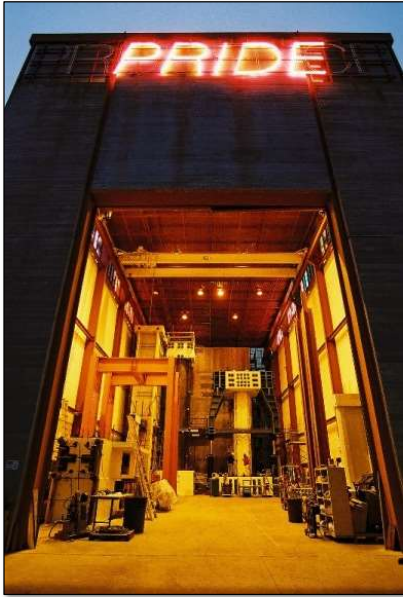
## III. Research Facilities

World-class facilities and shared resources

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# Research and Learning Facilities



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# Research and Learning Facilities



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# Research and Learning Facilities



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# Not Just Civil Structures



Prof. Hyonny Kim, SE



Prof. Hyonny Kim, SE  
Prof. John Kosmatka, SE

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## IV. Beyond Studying

Living, networking, socializing, and having fun

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## Life in La Jolla and San Diego



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## Socializing and Partying – ARMOR Lab



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## Department Social Activities

- Graduate Lounge
  - ✦ SME 408
- Monthly coffee break and social hour+ in the Graduate Lounge:
  - ✦ Hosted by local companies
  - ✦ Meet and greet with industry representatives
- SE Graduate Student Organization (GSO) holiday activities
  - ✦ Events will be announced throughout the year
- UC San Diego Science and Tech Career Fair: October 2, 2019
- Society of Civil and Structural Engineers (SCSE) Career Fair: January 24, 2020
- Triton Winter and Spring Career Fairs: January and April 2020

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### □ EERI Student Chapter

- ❖ Brings in earthquake engineers for seminars



**Earthquake Engineering  
Research Institute**

### □ CalGeo Student Chapter

- ❖ Brings in local geotechnical engineers for seminars



### □ Geoinstitute Graduate Student Organization

- ❖ Facilitates engagement of graduate students in geotechnical conferences



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### □ Eligibility:

- ❖ Current third-year undergraduate student
  - ❖ Or any undergraduate student who has at least one more year of undergraduate studies
- ❖ Cumulative GPA of >3.5
- ❖ Statement of purpose essay
- ❖ Two letters of recommendation
- ❖ TOELF iBT >85 or IELTS >7 (preferably >7.5)

### □ How to apply:

- ❖ Deadline: February 15 of each year
- ❖ Student selection: mid-March
- ❖ Serious applicants should contact your Department and Prof. Ken Loh:  
[kenloh@ucsd.edu](mailto:kenloh@ucsd.edu)

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# Questions?

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