

COLLABORATION AGREEMENT

**DEPARTMENT OF STRUCTURAL ENGINEERING
JACOBS SCHOOL OF ENGINEERING AT
THE UNIVERSITY OF CALIFORNIA SAN DIEGO, U.S.A.**

AND

**DEPARTMENT OF CIVIL ENGINEERING
THE COLLEGE OF ENGINEERING AT
THE NATIONAL CHENG KUNG UNIVERSITY, TAIWAN**

I. Parties to the Agreement

This Collaboration Agreement (“Agreement”) is entered into by and between The Regents of the University of California, on behalf of the Department of Structural Engineering (Structural Engineering), Jacobs School of Engineering, the University of California San Diego (UC San Diego), and the Department of Civil Engineering (Civil Engineering), the College of Engineering, the National Cheng Kung University (NCKU).

II. Purpose of the Agreement and Program

The purpose of this Agreement is to set forth the terms and conditions under which UC San Diego Structural Engineering and NCKU Civil Engineering will establish and administer a cooperative sequential bachelor/master’s degree program (“Program”) beginning in academic year 2020-2021. Students participating in the Program may earn a Bachelor of Science (BS) degree in Civil Engineering at NCKU and a Master of Science degree in Structural Engineering at UC San Diego by completing three years of coursework at NCKU’s Civil Engineering and up to two years of coursework at UC San Diego’s Structural Engineering.

III. Organization and Administration

Each institution shall designate an Institutional Representative who holds responsibility for all measures undertaken through this Agreement. At UC San Diego, the designated representative for this Agreement is Chair John S. McCartney. At NCKU, the designated representative for this Agreement is Chair Chen-Ming Kuo. Either party may change the designated representative by providing written notice to the other party. Each institution shall also designate a Faculty Program Director, responsible for academic components of the Program, listed below.

UC San Diego Faculty Program Director

Name: Kenneth Loh

Title: Professor

Department: Structural Engineering

Email: kenloh@ucsd.edu

Phone: +1 (858) 822-0431

NCKU Program Faculty Director

Name: Chen-Ming Kuo

Title: Professor

Department: Civil Engineering

Email: ckuo@mail.ncku.edu.tw

Phone: +886 (6) 275-7575 ext.63101

In addition to its academic component, Structural Engineering will designate a Departmental Coordinator to serve as the Program Liaison to assist NCKU Students while in residence at Structural Engineering. The Program Liaison will maintain regular contact with NCKU and consult on key issues concerning the Program and Student participation. Structural Engineering will also assign a faculty advisor to each student to provide assistance pertaining to academic support and advisement in the Program and its curriculum as outlined in Addendum B.

IV. Student Status

- a. Students selected for the Program will begin as non-matriculated students as candidates for a BS degree at NCKU, with UC San Diego undergraduate coursework units transferring to NCKU for BS degree conferral. Maximum number of credits transferred are twenty (20) at NCKU.
- b. Students selected for the Program will receive conditional admission to the MS program in Structural Engineering at UC San Diego.
- c. Pending successful completion of their BS degree at NCKU and satisfaction of UC San Diego Graduate Division and Structural Engineering admissions criteria, students will subsequently matriculate to the Structural Engineering Master's program as degree-seeking students.
- d. Students selected for the Program will have their GRE waived for admissions to the MS program in Structural Engineering.
- e. Students are subject to the policies and regulations of UC San Diego.

V. Selection and Approval

- a. Students may apply to the Program during the third (3) year of their BS program at NCKU Civil Engineering and must be in good academic standing at the time of application. It is understood that each institution reserves the right to reject candidates.
- b. NCKU will manage the application process and select Students to be nominated for the Program on an annual basis. Students nominated for the Program will be studying in the Department of Civil Engineering in the College of Engineering, at NCKU, working towards their undergraduate degree.
- c. Students are expected to meet the relevant graduate admissions criteria set by Structural Engineering and the campus Graduate Division. Students shall submit an application for admission to the Program to the UC San Diego Graduate Division no later than February 15. Application materials are to include:
 - A Program application;
 - An official NCKU transcript with a 3.0 or higher cumulative grade point average (GPA) on a 4.0 scale;
 - A statement of purpose essay;
 - Two (2) letters of recommendation from NCKU verifying good academic standing; and
 - A certificate of proficiency in English (acceptable certificates include TOEFL internet-based score of 85 or better, TOEFL paper-based score of 550 or better, or IELTS score of 7 or better).
- d. Structural Engineering will review student applications and conduct student interviews at the beginning of March for Program finalists.

- e. Structural Engineering shall notify NCKU and Students of admissions decisions for the Program by the week of March 15.
- f. Once selected, Students may need to apply for an F-1 or J-1 visa at a U.S. embassy or consulate prior to entering the USA and pursuing full-time-study in the Program. Students applying for an F-1 or J-1 visa will be required to submit copies of their passport biographical page and verification of financial support, such as a personal bank statement or financial award letter to cover all tuition, fees, and living expenses during the entire duration of the program, to the UC San Diego International Students & Programs Office.
- g. NCKU agrees to inform Structural Engineering of any specific issues related to individual Students, such as a documented disability, as early in the acceptance process as possible to allow for the appropriate advising and counseling of the student, and to facilitate making appropriate arrangements, when possible.

VI. Responsibilities of NCKU

- a. NCKU agrees to advertise and promote the Program among their students, and to encourage and facilitate applications to the program by outstanding students.
- b. NCKU agrees to award a Bachelor of Science degree to students participating in this program upon successful completion of their first two semesters of coursework at UC San Diego, provided that the students have satisfied all other academic requirements and financial obligations established by NCKU for completion of degree program.
- c. NCKU agrees that the senior students pay the insurance fees for maintaining their student status at NCKU and are exempt from tuition and miscellaneous fees at NCKU.

VII. Tuition, Fees and Expenses

- a. NCKU Students will be responsible for remuneration of all costs associated with the Program.
- b. Students participating in the Program will be registered as full-time Students each quarter and will be subject to standard non-resident tuition and fees as outlined in Addendum A.
- c. Students participating in the Program will be subject to the UC San Diego enrollment and registration calendar, requiring tuition and fee payment no later than one week prior to the start of the quarter.
- d. A Student's enrollment may be cancelled if all mandatory tuition and fees are not paid by the deadline. If a Student leaves the Program before the start of the next quarter, there will be no financial obligation for the next quarter. If a Student leaves during the academic quarter, the Student is subject to the UC San Diego Schedule of Refunds as it applies to degree-seeking students.

VIII. Health Insurance

- a. Student health insurance coverage is included in quarterly non-resident tuition and fee payment. Students participating under the terms of this Agreement are required to ensure their health insurance coverage meets essential health benefits mandated by the US Affordable Care Act and the US Department of State for themselves and their dependents during the entire duration of the Program.

- b. The Parties understand that any medical and out-of-pocket expenses that are not covered by such insurance policy are the personal responsibility of the participating Students.

IX. Course of Study

The curriculum, including pre-requisite courses, is outlined in Addendum B of this Agreement. If the course of study for a Student is to include conducting research as part of the Program, then section XVII will be amended for such Student's activity as mutually agreed upon by NCKU and UC San Diego to address dispensation of intellectual property created under the research activity.

X. Transcripts

Students will be provided with an official transcript from UC San Diego within a reasonable period of completing the Program.

XI. Regulations and Code of Conduct

- a. Students participating under the terms of this Agreement will be expected to abide by the laws of the United States, including visa and immigration requirements.
- b. While studying at UC San Diego, Students will be held accountable to the UC San Diego Student Code of Conduct, the Policy on Integrity of Scholarship, and all other applicable University policies and procedures. Potential issues which could result in a student being dismissed from the Program include, but are not limited to, those items generally outlined in Addendum C.
- c. Students who fail to abide by these terms may be subject to disciplinary action and may be required to leave UC San Diego. However, action will not be taken without prior consultation with the appropriate officials at both universities.

XII. Housing

- a. UC San Diego will make every reasonable effort to assist students participating in the Program in obtaining housing.
- b. The parties agree that, in the case of housing provided by UC San Diego, it will be at a cost per student no greater than that charged to other students attending the host institution.
- c. The cost of housing shall be paid by each student as an individual and neither institution shall be held liable for payment of such charges. It is understood that students are likewise responsible for meals and personal expenses.

XIII. Orientation and Student life

UC San Diego will provide a campus orientation to Students and will actively endeavor to integrate Students into local academic life.

XIV. Use of Name, Logos, and Other Identifying Marks

Neither party will use the name, logo, or other identifying marks of the other, either expressly or by implication, in any publicity, solicitation or advertisement without the prior written approval of the other Party to this Agreement. Use of UC San Diego's name and trademarks is governed by California Educational Code, Section 92000.

XV. Intellectual Property

All intellectual property and data generated under this Agreement will be administered in accordance with UC San Diego and NCKU policies and procedures when derived from any work carried out within its facilities. UC San Diego and NCKU will work together to discuss the management and disposition of joint inventions made under this Agreement, with the goal of achieving an outcome that includes benefits to both UC San Diego and NCKU.

XVI. Discrimination Prohibition

Each institution agrees not to discriminate in the selection or acceptance of any Students on the basis of race, color, national origin, religion, gender, sexual orientation, mental or physical disability, age, veteran's status, ancestry, marital status or citizenship.

XVII. Indemnification

UC San Diego shall indemnify, defend and hold harmless NCKU, its officers, agents and employees from and against any proportionate claims, damages, costs, expenses (including an amount equal to reasonable attorneys' fees), proceedings or liabilities arising out of or in any way connected with the performance of, or failure to perform, UC San Diego's obligations under this Agreement including, without limitation, claims, damages, expenses, or liabilities for loss or damage to any property, or for death or injury to any person or persons, but only in proportion to, and only to the extent that such claims, damages, expenses or liabilities arise from the negligence, willful acts or omissions of, or breaches of this Agreement by UC San Diego, its officers, agents, or employees.

NCKU shall indemnify, defend and hold harmless UC San Diego, its officers, agents and employees from and against any proportionate claims, damages, costs, expenses (including an amount equal to reasonable attorneys' fees), proceedings or liabilities arising out of or in any way connected with the performance of, or failure to perform, NCKU's obligations under this Agreement including, without limitation, claims, damages, expenses or liabilities for loss or damage to any property, or for death or injury to any person or persons, but only in proportion to, and only to the extent that such claims, damages, expenses or liabilities arise from the negligence, willful acts or omissions of, or breaches of this Agreement by NCKU, its officers, agents or employees.

XVIII. Governing Law and Dispute Resolution

The validity, interpretation, and performance of this Agreement shall be governed by and construed under the laws of the country of the non-filing party and venue shall lie exclusively in the country of the non-filing party.

If any part or any provision of this Agreement shall prove to be unenforceable in law, all other provisions of this Agreement shall remain valid and enforceable to the fullest extent permitted by law. The remainder of the Agreement shall continue in full force and effect and the Parties shall negotiate in good faith to replace any invalid or unenforceable provision with a valid, legal, and enforceable provision which has an effect as close as possible to the provision or terms being replaced.

XIX. Force Majeure

Neither party shall be responsible for any delays or failure to perform any obligation under this Agreement due to causes beyond reasonable control, including (but not limited to) health epidemics, terrorist acts, war, insurrection, embargoes, governmental restrictions or other acts of governmental authorities. Notwithstanding the foregoing, the parties agree to cooperate in good faith to mitigate the effect of any such delays or failures to perform, with the goal of achieving, to the extent possible, the objectives of this Agreement.

The parties agree to inform each other of any crisis or emergency related to their respective Students. Additionally, if a program needs to be cancelled, Students need to be evacuated, and/or different program arrangements need to be made, communications to that effect will be sent immediately to the other party.

XX. Translation / Language

This Agreement has been executed in English, which is the authentic text.

XXI. Privacy

UC San Diego will:

- a. Ensure the Personal Information of each Student is protected against loss and against unauthorized access, use, modification and disclosure and other misuse; and
- b. Only use or disclose the Personal Information for the purposes of this Agreement, for program assessment and improvement, reporting, and to meet the education and research missions of the University. In the event the Personal Information is used for other purposes, UC San Diego will seek consent or provide notice to relevant students.

XXII. Amendments

Any change to, or modifications of this Agreement must be in writing, and shall only be effective if signed by the duly authorized representatives of both institutions.


XXIII. Entire Agreement and Effective Date/Termination

This Agreement contains all of the terms and conditions agreed upon by the parties and supersedes any prior agreement, oral or written, and all other communications between the parties. This Agreement will be valid for five (5) years starting from the latter date of the signing indicated below by each party.

During the final year of the Agreement, the Institutional Representatives will jointly evaluate progress made toward achieving stated objectives and benefits to both institutions. The parties will then determine whether to renew the present Agreement in writing, modify it, or allow the Agreement to expire.

Either institution may withdraw from this Agreement, provided written notification of the withdrawal is given to the other institution at least 180 days prior to the withdrawal date. However, no termination shall adversely interrupt or impair active participation in a program already in progress. The following individuals, duly authorized, have signed the present Agreement on behalf of their respective institutions.

**University of California San Diego
United States of America**



Elizabeth H. Simmons
Executive Vice Chancellor

Signed on this day: Dec 10, 2019

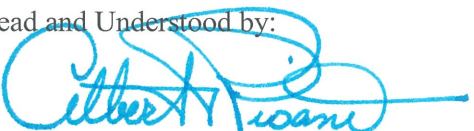
**National Cheng Kung University
Taiwan**



Dr. Jang-Yang Chang
Executive Vice President

Signed on this day: Dec. 15, 2019

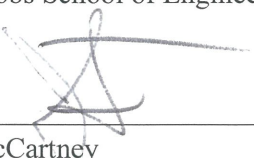
Read and Understood by:



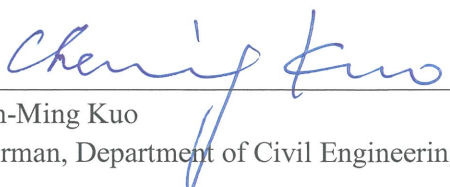
Albert P. Pisano
Dean, Jacobs School of Engineering



Woei-Shyan Lee
Dean, College of Engineering



John S. McCartney
Professor and Department Chair
Department of Structural Engineering



Chen-Ming Kuo
Chairman, Department of Civil Engineering

Addendum A
Projected Program Fees for 2020 - 2021
Prepared for National Cheng Kung University

UC San Diego Tuition and Fee Chart Year 1 (2020 – 2021)

Fee Description	9 Months
Tuition and Fees	\$43,953.00
Living Expenses (estimated)	\$ 17,706.00
Other: Books and Supplies (estimated)	\$ 1,100.00
TOTAL COSTS	\$62,759.00

UC San Diego Tuition and Fee Chart Year 2 (2021 - 2022)

Fee Description	9 Months
Tuition and Fees	\$32,309.00
Living Expenses (estimated)	\$18,177.00
Other: Books and Supplies (estimated)	\$ 1,371.00
TOTAL COSTS	\$51,857.00

Current Fees are posted at the following web site and are subject to change:

<https://ispo.ucsd.edu/prospective-students/costs-undergrad-students.html>

Health Insurance is required for all students. Structural Engineering or its partners will share information regarding health insurance providers prior to students' arrival to the U.S.

Notes: *Fees listed above are based on 2019 – 2020 budgets and costs and are subject to change.*

Information on this form is accurate as of November 26, 2019

Addendum B Curriculum

The College of Engineering at NCKU does not require any specific courses for students in their final year of undergraduate studies. Table 1 outlines a recommended course schedule for students to follow during their first year in the Program. All courses are 4 credits unless otherwise noted.

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
SE 264 – Sensors & Data Acquisition	SE 203 – Structural Dynamics	SE 214 – Masonry Structures

Courses in bold are graduate courses, and these credits will not be transferred to NCKU. These units will count towards the student’s UC San Diego M.S. degree requirements as 12 units of Credit Waived based upon the Student’s UCSD Undergraduate Record. Waived course work will not be included in calculating a student’s grade-point average. Courses counted towards the student’s NCKU B.S. degree requirements cannot be counted towards UC San Diego M.S. degree requirements.

The Department of Structural Engineering at UC San Diego, at the time of signing this agreement, offers three M.S. degree options:

- M.S. in Structural Engineering
- M.S. in Structural Health Monitoring & Nondestructive Evaluation
- M.S. in Geotechnical Engineering

Students pursuing an M.S. degree in Structural Engineering or Geotechnical Engineering are required to complete 48 units of courses for graduation. Students can elect either the “Coursework” or “Thesis” option. For the Coursework plan, all 48 units of credit must consist of regular courses (12 courses in total). For the Thesis plan, 36 units (9 courses) from regular courses are required, with the remaining 12 units being graduate research for the M.S. thesis. Graduate research culminates with the preparation of a written research thesis, and the thesis must be successfully defended in an oral and public presentation conducted by a committee of three faculty members.

Students pursuing an M.S. in Structural Health Monitoring & Nondestructive Evaluation are required to complete 36 units of courses for graduation, which is designed to be a one-year program. Students can elect either the “Coursework” or “Thesis” option. For the Coursework plan, all 32 units of credit must consist of regular courses (8 courses in total) and a mentored independent study (SE 296) capstone course. For the Thesis plan, 28 units (7 courses) from regular courses are required, with the remaining 8 units

being graduate research for the M.S. thesis. Graduate research culminates with the preparation of a written research thesis, and the thesis must be successfully defended in an oral and public presentation conducted by a committee of three faculty members.

Students who elect the Thesis plan can begin their thesis research as soon as they arrive UC San Diego.

Addendum C

Student Dismissal Guidelines

Participants are subject to the policies and regulations of UC San Diego. UC San Diego reserves the right to request the return of any student to that student's Home Institution at any time when the student's academic performance or conduct is considered unsatisfactory. UC San Diego will inform the Home Institution immediately if a participant withdraws from the student mobility program, fails to make satisfactory progress or is in danger of being dismissed from UC San Diego for performance or behavioral reasons. The standard for minimum progress at UC San Diego is a 2.0 cumulative GPA for undergraduate students and 3.0 for graduate students. Failure to maintain the standard may result in academic disqualification from the Program, including the barring of enrollment in future quarters. UC San Diego, in consultation with the Home University, may prohibit a student from further participation in Program.

For any student dismissed from the Program due to academic disqualification or student conduct, readmission will not be allowed.

Students in the Program will abide by the UC San Diego Student Code of Conduct (found here: https://students.ucsd.edu/student-life/_organizations/student-conduct/regulations/22.00.html) and the Policy on Integrity of Scholarship (found here: <https://academicintegrity.ucsd.edu/process/policy.html>).

UC San Diego Department of Structural Engineering 3+2 Program in Engineered Structures

UC San Diego
JACOBS SCHOOL OF ENGINEERING
Structural Engineering

LEARN : INNOVATE : INSPIRE

Program Information

The 3+2 Program in Engineered Structures invites all Taiwanese third-year students interested in Aerospace, Civil, and Mechanical Engineering to apply. Students will spend two years at UC San Diego, earning a B.S. degree from their home institution (Year 1) and followed by an M.S. degree in Structural Engineering from UC San Diego (Year 2). UC San Diego offers diverse focus sequences and degree specializations in **Civil Structures, Geotechnical Engineering, Structural Health Monitoring & Nondestructive Evaluation, Aerospace Structures, and Computational Mechanics.**

Eligibility & Requirements

- Apply in the 3rd year of undergrad
- Minimum of 3.5 GPA
- Statement of purpose essay
- Two letters of recommendation
- Certificate of proficiency in English:
TOEFL iBT > 85; TOEFL paper > 550;
or IELTS > 7
- Application Deadline: February 15**

Why Apply?

- Experience life as an undergrad in a top-ranked U.S. University
- Earn a B.S. degree when studying in the U.S.
- Access to world-class faculty and facilities
- Get a head start to your graduate program
- Network with Southern California companies
- Live in sunny San Diego
- Streamlined advanced degree with conditional enrollment in the M.S. program
- GRE waived
- Early access to funded Instructional Assistant and summer internship positions
- Jumpstart your M.S. research
- Seamless transition to a the Ph.D. program



Contact Information:
3+2 Program Director: Prof. Ken Loh
Department of Structural Engineering, UC San Diego
E-mail: kenloh@ucsd.edu

UC San Diego

JACOBS SCHOOL OF ENGINEERING
Structural Engineering

Department of Structural Engineering Master's Program

The Master's program in Structural Engineering at UC San Diego is intended to provide the student with additional fundamental knowledge as well as specialized advanced knowledge in selected structural engineering aspects over and above undergraduate degree course work. Two plans, the M.S. Thesis Plan and the M.S. Comprehensive Examination Exam are offered.

See the department's website (<http://structures.ucsd.edu>) for more information.

For more information on Structural Engineering Graduate Admissions: <http://structures.ucsd.edu/academics/graduate-program>

How to Apply:

Complete the Online Application at connect.grad.ucsd.edu/apply

**APPLICATION
DEADLINE:**
December 16, 2019

Materials Needed to Complete an Application:

1. Online Application
2. Application Fee
3. Transcripts
4. Statement of Purpose
5. Three Letters of Recommendation
6. Resume/CV
7. GRE
8. TOEFL/IELTS (international students)

Structural Engineering Graduate Admissions
9500 Gilman Drive, #0085 La Jolla, CA 92093

Phone: 858-534-4185
Email: se-sa@ucsd.edu
structures.ucsd.edu

Structural Engineering

Master of Science Degree

The M.S. Comprehensive Exam Plan

The M.S. Comprehensive Examination Plan involves coursework and requires the completion of a written comprehensive examination covering multiple courses that the student has taken. The exam will be comprehensive and covers two focus sequences and at least one additional technical elective that the student has taken. The examination must be completed no later than the end of the eighth week of the quarter the student intends to graduate.

The M.S. Thesis Plan

The M.S. Thesis Plan is designed for those with an interest in research prior to entering the structural engineering profession or a doctoral degree program. This plan involves course work leading to the completion and defense of a master's thesis. The thesis defense is the final examination and must be conducted after the completion of all course work. Upon completion of the research project, the student writes a thesis that must be successfully defended in an oral examination and public presentation conducted by a committee composed of three faculty members.

Coursework:

Master students must complete forty-eight units of coursework for graduation. For the M.S. Comprehensive Examination Plan, all forty-eight units must consist of regular courses. For the M.S. Thesis Plan, thirty-six units from regular courses are required, in addition to twelve units of graduate research for the master's thesis. For both M.S. plans, students are required to complete three courses in at least two different focus sequences. Students are also required to complete two out of the eight core course electives.

Focus Sequences

Structural Analysis	Geotechnical Engineering
Structural Design	Advanced Composites
Computational Mechanics	Solid Mechanics
Earthquake Engineering	Structural Health Monitoring

Core Course Electives:

SE 200	Applied Mathematics for Structural Engineering
SE 201A	Advanced Structural Analysis
SE 202	Structural Stability
SE 203	Structural Dynamics
SE 233	Computational Techniques in Finite Elements
SE 241	Advanced Soil Mechanics
SE 271	Solid Mechanics for Structural & Aerospace Engineering
SE 276A	Finite Elements in Solid Mechanics I

Faculty & Staff Contacts

Structural Engineering Department Chair

John S. McCartney
se-chair@ucsd.edu
(858) 534-9630

Structural Engineering Graduate Chair

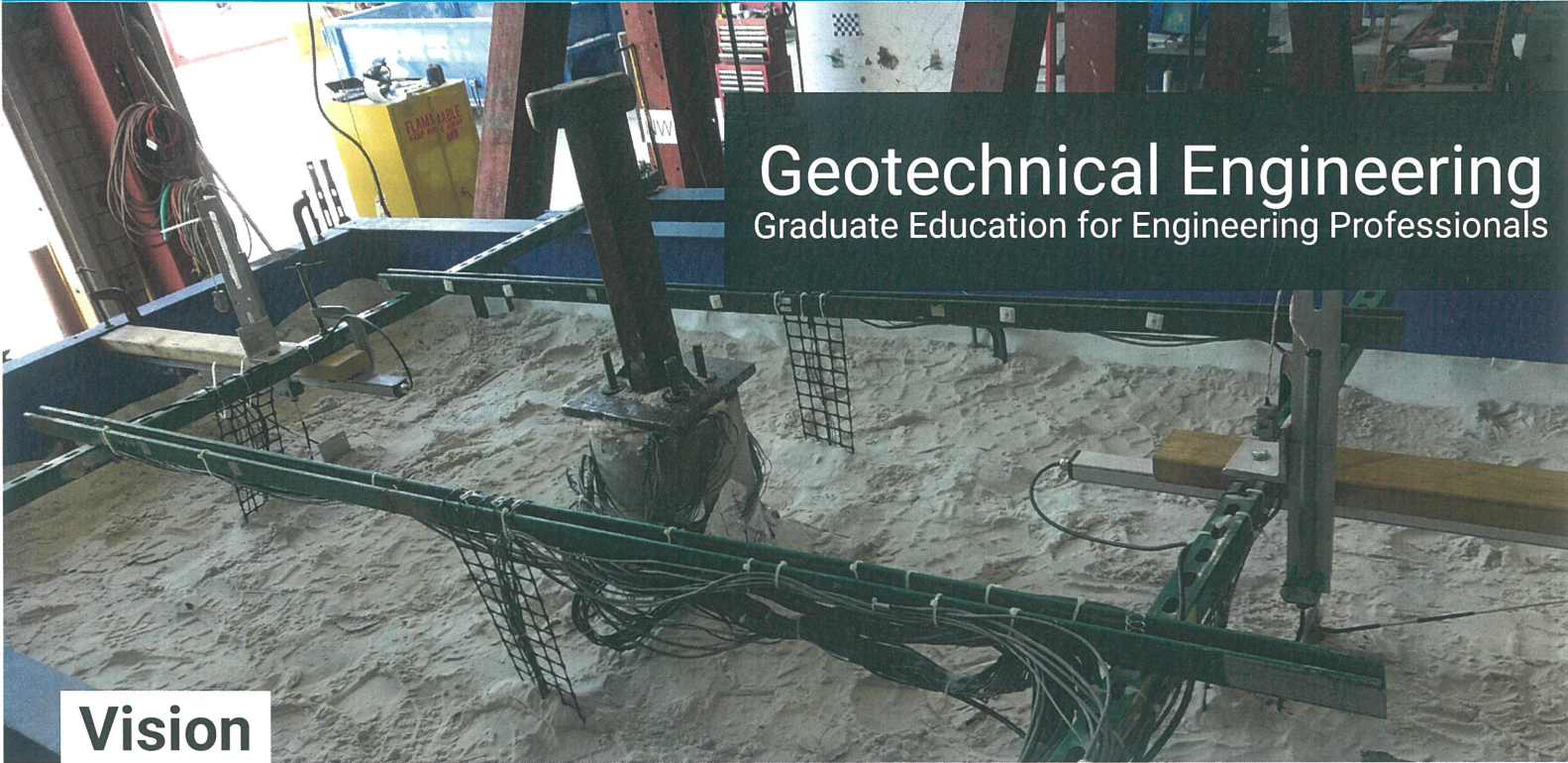
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Student Affairs Manager

Sandra de Sousa
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Graduate Advisor

Joana Halnez
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(858) 534-4185



Geotechnical Engineering

Graduate Education for Engineering Professionals

Vision

The M.S. program in Geotechnical Engineering at UC San Diego will build upon common themes in the Department of Structural Engineering to provide a unique specialization that sets it apart from other geotechnical programs around the country. This includes a focus on both geomechanics fundamentals and soil-structure interaction. Soil-structure interaction is critical to consider when addressing the response of built environment to earthquakes/natural hazards, thermal loading, stability and deformation of slopes and retaining walls, etc.

The focus on soil-structure interaction is facilitated by incorporating faculty research findings obtained using the unique experimental facilities at UC San Diego into the set of geotechnical courses provided, as well as allowing students to take structural electives available in the department.

There is a strong demand for geotechnical engineers in Southern California, and the coursework and mentoring opportunities in this M.S. program will help put students on the right career trajectory to succeed.

LEARN GEOMECHANICS AND SOIL- STRUCTURE INTERACTION FUNDAMENTALS NEEDED FOR ADVANCED GEOTECHNICAL ENGINEERING ANALYSES.

Gain the tools required for analyzing and designing geotechnical systems, including foundations, embankments, slopes, retaining walls, tunnels, dams, among others. Courses build upon a strong set of fundamental geomechanics principles to perform the advanced analyses required in challenging projects in geotechnical engineering practice. Earn a M.S. degree in 4 quarters along with a summer internship.

Geotechnical Engineering

Master of Science Degree

About the Master of Science:

The Master of Science is a unique degree program focused on geomechanics fundamentals and applied soil-structure interaction analyses crucial for future geotechnical engineering advancements. The goal of this M.S. program is to provide students planning to pursue a career in geotechnical engineering practice with the necessary training beyond that obtained in a B.S. degree to analyze, simulate, and design geotechnical-related infrastructure. The American Society of Civil Engineers (ASCE) is encouraging new engineers pursuing a career in civil engineering disciplines to have a minimum of a M.S. degree to practice. This is particularly relevant in geotechnical engineering due to the particularly complex behavior of soils, rocks, and soil-structure interaction. Similar to structural engineers, geotechnical engineers have their own licensure process to reflect their specialization.

Who Should Apply:

The M.S. in geotechnical engineering is meant to provide the necessary expertise required to practice. It is offered to both students who would like to directly continue their studies after their undergraduate degree in structural or civil engineering.

How to Apply

Visit <http://connect.grad.ucsd.edu/apply/> for the online application.

Applications for Fall 2020 will be open until December 16, 2019.

Faculty Directors

John McCartney

Program Director & Professor

Ahmed Elgamal

Professor

Tara Hutchinson

Professor

Ingrid Tomac

Assistant Professor

Coursework:

M.S. students in Geotechnical Engineering must complete 12 courses as part of their degree. Students are required to complete the 4 core courses, and must take at least 4 geotechnical electives. The remaining 4 courses can be geotechnical or structural engineering electives as well as geology courses offered by Scripps Institution. Opportunities to engage in research through a M.S. thesis will be available, and a M.S. thesis can be counted as two courses.

Core Courses:

SE 241 Advanced Soil Mechanics

SE 242 Advanced Foundation Engineering

SE 248 Engineering Properties of Soils

SE 250 Stability of Earth Slopes & Retaining Walls

Geotechnical Electives:

SE 222 Geotechnical Earthquake Engineering

SE 226 Groundwater Engineering

SE 243 Soil-Structure Interaction

SE 244 Numerical Methods in Geomechanics

SE 246 Unsaturated Soil Mechanics

SE 247 Ground Improvement

SE 207 Rock Mechanics

SE 207 Soil Dynamics



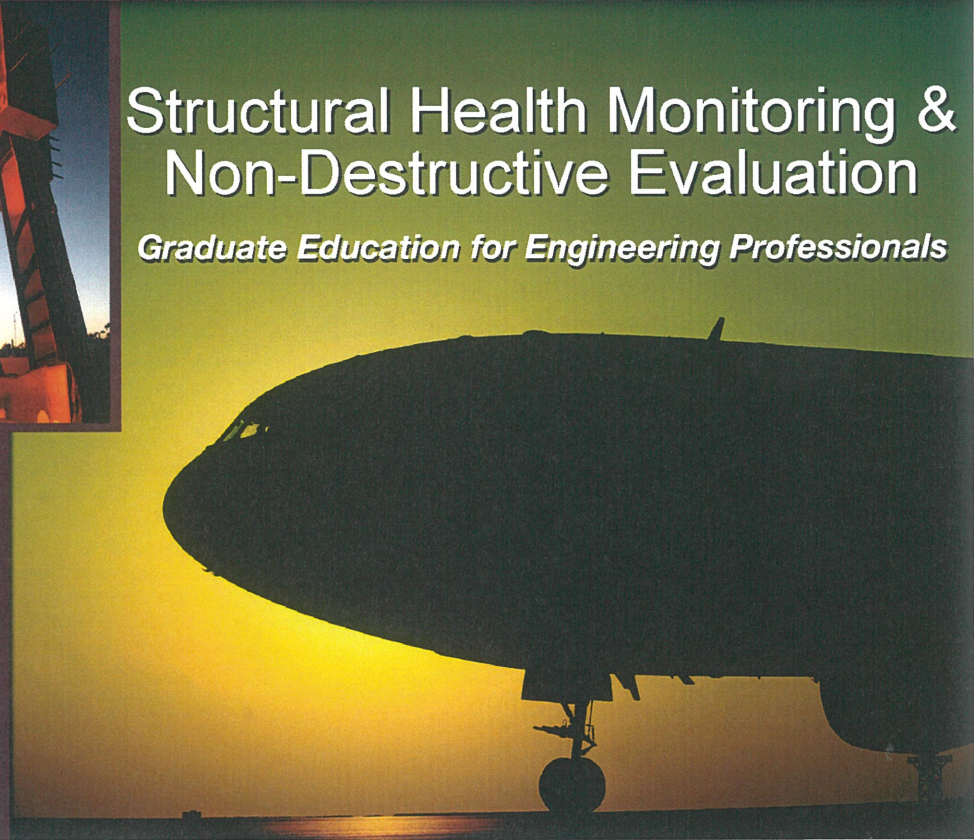
Contact

University of California, San Diego
9500 Gilman Drive La Jolla, CA
92093-0085

se-sa@ucsd.edu

Structural Health Monitoring & Non-Destructive Evaluation

Graduate Education for Engineering Professionals



Vision

Increasingly, military, corporate and government organizations are adopting a condition-based approach to assuring the operational readiness and safety of their most critical assets.

Rather than relying on human inspection and timed maintenance alone, the emerging field of Structural Health Monitoring and Non Destructive Evaluation (SHM&NDE) involves acquiring structural system response data coupled with validated simulation models of failure mode behavior and expected service states so that a prediction about the remaining useful life of the structure may be developed. Such SHM&NDE systems can reduce operations and maintenance costs in a way that supports intelligent asset life cycle management.

The UC San Diego Master of Science program in SHM&NDE is the first of its kind for engineering professionals, providing a multidisciplinary, integrated education in the theory and tools of SHM&NDE. Such SHM&NDE systems can reduce operations and maintenance costs in a way that supports intelligent asset life cycle management.

APPLY INTERDISCIPLINARY TOOLSETS FOR INTELLIGENT STRUCTURAL/SYSTEM MONITORING AND LIFE CYCLE MANAGEMENT.

Gain the tools required for implementing condition-based structural health monitoring systems, including structural dynamic behavior modeling, sensing and signal processing, data mining, and statistical analysis.

Apply new skills and knowledge to complete the design of a structural health monitoring system.

Earn a master's degree in one year.

COURSES TAUGHT BY UC SAN DIEGO AND LOS ALAMOS NATIONAL LABORATORY EXPERT FACULTY, MANY OF WHOM HAVE EXPERIENCE CREATING STRUCTURAL HEALTH MONITORING AND NONDESTRUCTIVE EVALUATION SYSTEMS FOR CRITICAL DEFENSE AND CIVIL ASSETS.

Structural Health Monitoring and Non Destructive Evaluation

Master of Science Degree

About the Master of Science

The Master of Science is a unique multidisciplinary degree program focused on technology areas crucial for future engineering advancements. Courses will be taught by faculty in the Department of Structural Engineering and the Department of Electrical and Computer Engineering at the UC San Diego Jacobs School of Engineering; as well as by adjunct faculty from the Los Alamos National Laboratory.

This high quality degree program is offered to working engineering professionals. Courses will be delivered on a convenient schedule for working engineers, with instructional materials available online.

Who Should Apply

The Master of Science program in SHM&NDE is designed for engineering professionals in civil and defense industries, who are responsible for maintaining the safety and reliability of key structural systems and assets. The program is targeted for early and mid-career engineers who are on a technical leadership track within their organizations.

How to Apply

Visit <https://connect.grad.ucsd.edu/apply/> for the online application

Applications for Fall 2020 will be open until December 16, 2019.

Key Faculty Members

Michael Todd
Professor
Structural Engineering

Ken Loh
Professor
Structural Engineering

Francesco Lanza di Scalea
Professor
Structural Engineering

Falko Kuester
Professor
Structural Engineering

Charles Farrar
Adjunct Professor
Structural Engineering Engineering Institute Leader, Los Alamos National Laboratory

Coursework

The MS in Structural Health Monitoring offers two degree options: MS Thesis Option and MS Comprehensive Option. Students in both plans must complete thirty-six units of credit for graduation. For both options, students must complete two core courses, SE 263 "Nondestructive Evaluation" and SE 265 "Structural Health Monitoring Principles" (8 total units). Additionally, the MS SHM&NDE Thesis Plan involves regular course work (20 units) and graduate research (8 units) leading to the completion and defense of a master's thesis. Correspondingly, the MS Comprehensive Examination Plan involves regular course work (24 units) and a mentored independent study (SE 296) capstone course.

Fall Quarter

SE 264 Sensors and Data Acquisition for Structural Engineering

Discusses theory, design and applications of sensor technologies in the context of structural engineering and structural health monitoring. Topics include: sensors and sensing mechanisms; measurement uncertainty; signal conditioning and interface circuits; data acquisition; analog/digital circuits; and emerging sensors.

Winter Quarter

SE 203 Structural Dynamics

Response of the linear systems to harmonic, periodic and transient excitations. Duhamel's integral. Response spectra. Principles of dynamics, Hamilton's principle and Lagrange's equations. Linearization of the equations of motion. Free and forced vibrations. Matrix iteration, Jacobi, normal mode and frequency response method.

SE 267A Signal Processing and Spectral Analysis for Structural Engineering

Signal processing is widely used in engineering and physical sciences. This course discusses techniques to analyze signals (or data), particularly related to structural dynamic response focusing on time/frequency domain data analyses (Fourier transform, digital filtering, and feature extraction).

ECE 251A Digital Signal Processing I

Discrete random signals; correlation and power spectral density functions. Conventional (FFT based) spectral estimation; coherence and transfer function estimation. Statistical analysis of time series; tests for stationarity and normality. Minimum mean-square error (MMSE) and least-squares (LS) estimation. Linear prediction; Levinson-Durbin algorithm; lattice filters. High resolution spectral estimation; model-based approaches; AR/ARMA modeling; minimum variance spectral estimation. Adaptive filtering; eigenvalue/eigenvector decompositions; LMS algorithm; noise cancelling.

SE 266 Smart/Multifunctional Material

This course examines the properties, physics, mechanisms, and design of smart and multifunctional materials; data acquisition and operating principles of sensor technologies; smart materials (piezoresistive, piezoelectric, magnetorheological, and shape memory materials); nanotechnology-enabled multifunctional materials; and applications for structural health monitoring. Use of computer resources.

Spring Quarter

SE 265 Structural Health Monitoring

A modern paradigm of structural health monitoring as it applies to structural and mechanical systems is presented. Concepts in data acquisition, data interrogation, and predictive modeling will be introduced in an integrated context. MATLAB and laboratory exercises and demonstrations.

SE 263 Non-Destructive Evaluation

Introduction to NDE; liquid penetrant; elastic wave propagation; ultrasonic testing; impact-echo; acoustic emission; active and passive thermography; X-ray radiography

Summer Quarter

SE 296 Capstone Project: Integrated Structural Health Monitoring

A modern paradigm of structural health monitoring as it applies to structural and mechanical systems is presented. Concepts in data acquisition, feature extraction, data normalization, and statistical modeling will be introduced in an integrated context. MATLAB-based exercises.

Contact

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Updates available at:
<http://shm.ucsd.edu>