



College of Engineering

Mechanical Engineering

Graduate Student Handbook

Academic Year 2023-2024

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Table of Contents

1. Introduction	4
2. The Mechanical and Bioengineering Programs	4
2.1 Graduate Program Options	4
2.2 Program Descriptions	4
2.2.1 Integrated B.S. and M.S. (4+1) Programs	4
2.2.2 Master of Science in Mechanical Engineering (MSME) and Bioengineering (MSBioE)	6
2.2.3 Master of Engineering	8
2.2.4 General requirement for Master's Degrees	9
2.2.6 The Joint Doctoral Program (JDP)	11
2.3 Key Contact Information	12
3. Faculty Advisers and their Research Areas	13
4. Major Research Areas in the Department	18
5. Graduate Admission	19
5.1 B.S. and M.S. in Mechanical Engineering (4+1 Program)	19
5.2 B.S. in Mechanical Engineering and M.S. in Bioengineering (4+1 Program)	19
5.3 Master of Science in Mechanical Engineering (MSME)	19
5.4 Master of Science in Bioengineering (MSBioE)	19
5.5 Master of Engineering (MEng)	19
5.6 Joint Doctoral Program (PhD)	19
6. Financial Support	20
6.1 Graduate Research Assistantships	20
6.2 Graduate Teaching Assistantships	20
6.3 Graders	20
6.4 Departmental Scholarships	20
6.5 University Scholarships	20
6.6 Graduate Equity Fellowship	21
6.7 CSU Chancellor's Doctoral Incentive Program (C-DIP)	21
6.8 Fee Assistance Program	22
6.9 Graduate Student Travel Fund	22
7. Registration Guidelines	23
7.1 Online Registration	23
7.2 Late Registration	23
8. International Students	23
8.1 International Graduate Admissions	23
8.2 Admission Requirements	24
8.3 Insurance Requirement	24
8.4 American Language Institute (ALI)	24
8.5 Housing and Scholarship	24
8.6 Current International Students	25

9. Forms and Policies	25
9.1 Advancement to Candidacy	25
9.2 Request to Change Degree/Major Objective between Departments	25
9.3 Change of Status	26
9.4 Enrolling in Thesis	26
9.5 Comprehensive Departmental Examination or Defense of Thesis	26
9.6 Request for Letter of Completion	26
9.7 Thesis Committee Form	27
10. Campus Resources	27
11. Frequently Asked Questions	28
What's the most important thing a graduate student can do to be successful?	28
What is a Red ID Number?	28
What is Classified Admission?	28
What if I have been admitted conditionally?	28
When the conditions of admission have been met, how do I request classified standing?	28
How do I register for classes?	28
What is a Program of Study (POS)?	29
How do I change my Program of Study (POS) once it has been approved?	29
How many units of transfer, extension, or foreign university credit may be used on a Program of Study (POS)?	29
What does it mean to be Advanced to Candidacy?	29
How soon should I think about my thesis?	29
12. List of Graduate Courses	30
12.1 Courses Acceptable on Master's Degree Program in Mechanical Engineering.	30
12.2 Upper Division Courses	30
12.3 Graduate Courses	32

1. Introduction

This handbook should be used in conjunction with the SDSU Requirements for Master's Degree which is available at <https://catalog.sdsu.edu/content.php?catoid=5&navoid=399>. It states the requirements for all Master's Programs at SDSU. Additional information is also available at the departmental website <https://mechanical.sdsu.edu/programs/graduate> and at the Graduate Affairs website <https://grad.sdsu.edu/>.

2. The Mechanical and Bioengineering Programs

The department offers graduate education in Mechanical Engineering and Bioengineering at the Master's and Doctoral levels, preparing students to work and conduct cutting-edge research in such emerging areas as advanced materials and materials processing, manufacturing, mechanics of nontraditional materials, design of medical devices, energy storage, micro- and nano-electromechanical systems, nanotechnology, neural engineering, multiphase flows, renewable (solar, wind, etc.) energy, robotics and control, smart health, combustion, wildfire, and tissue engineering. The doctoral program in the College of Engineering is offered jointly with the University of California, San Diego.

2.1 Graduate Program Options

- Integrated B.S. and M.S. in Mechanical Engineering (4+1 Program)
- Integrated B.S. in Mechanical Engineering and M.S. in Bioengineering (4+1 Program)
- Master of Engineering in Mechanical Engineering (MEng) (College level)
- Master of Science in Mechanical Engineering (MSME)
- Master of Science in Bioengineering (MSBE)
- Joint Doctoral Program (JDP) in Engineering Science (Aerospace and Mechanical, Bioengineering, Electrical and Computer, Structural) through the College of Engineering with UC San Diego (College level).

2.2 Program Descriptions

2.2.1 Integrated B.S. and M.S. (4+1) Programs

Two integrated five-year Bachelor's-Master's programs are available in the Department of Mechanical Engineering. These programs are designed to give students the opportunity to focus in a subfield of interest in either mechanical engineering, e.g. design and manufacturing, dynamics and control, energy and thermofluids, materials and mechanics, or bioengineering, e.g. biomaterials, biomechanics. Upon successful completion of the required coursework and thesis, the students will be simultaneously awarded the B.S. degree in Mechanical Engineering and either the M.S. degree in Mechanical Engineering, or the M.S. degree in Bioengineering.

A BSME student who applies to the program is required to have a Master Plan on file in the ME Office before applying. This plan must show the semester in which the student completes the requirements for the BSME degree. If the student matriculates into the (4+1) BSME/MSME or BSME/MSBioE program,

graduate tuition fees will be charged from the semester following the one in which the student has earned 120 units which count toward either BS or MS degrees.

To satisfy the requirements for the BS/MS (4 + 1) degree programs, students must achieve at least a 3.0 average in the 30 units of courses used to satisfy the graduate program of study. Of the 30 units, a maximum of nine units may be in 500-numbered courses. Up to three 500-level courses may be used to fulfill the undergraduate requirements for the (4+1) BS/MS degree program while at the same time meeting the requirements for graduate study. The minimum number of course units required for graduation in the (4+1) program is 141. Students in the BS/MS (4+1) degree programs must follow the thesis option (Plan A, see Section 2.2.2.1). Students applying to the blended program are required to have a Faculty Advisor who will supervise their thesis work. Students in the program should work with their Faculty Advisor to select the appropriate 500-level and 600-level courses that meet the objectives of their thesis work. While a maximum of 9 units of 500-level coursework may count towards the MS degree in the blended program, students are encouraged to work with their Faculty Advisor to select more challenging 600-level courses which can meet the objectives of the graduate degree in lieu of the 500-level courses. The Department will provide academic adjustments for these 600-level courses to count toward meeting the elective requirements of the undergraduate degree provided they are approved by the Faculty Advisor.

Transfer Students:

Students are not eligible for the 4+1 program until they enroll at SDSU and take courses at SDSU for at least a year or at least 30 units. To

2.2.1.1 Application for Integrated B.S. and M.S. Programs

- Students must apply and be admitted to the BS/MS (4+1) program. An updated Master Plan must be on file in the ME Office before the application is accepted. If the student matriculates into the (4+1) program, graduate tuition fees will be charged from the semester following the one in which the student has earned 120 units which count toward the BS or MS degrees. Once admitted into the program, the student must fulfill all requirements of the BS/MS (4+1) program **before being granted either the BS or the MS degree.** If a student leaves the program but decides to return to pursue their master's program in the future, they shall formally apply for graduate admission. With the approval of their academic department, students may count up to 12 units of graduate courses completed during their blended program towards their master's degree. Such courses cannot exceed seven years, unless approved for validation by both the academic program and designated University administrator.

The following are minimum requirements to apply to the program.

1. Students should have a minimum of 24 and maximum of 38 units remaining on the Master Plan to be completed for the BSME degree.
2. B grade or better in ME 304 (or CIVE 301), ME 350, and ME 360

3. 3.0 overall GPA
4. 3.0 ME Upper Division Major GPA
5. Submission of a Faculty (Thesis) Advisor Form signed by the Advisor and the Graduate Advisor..

Rare exceptions to the conditions may be considered if a statement of justification is provided by the Thesis Advisor and is then approved by the departmental Graduate Committee and the Graduate Division.

2.2.2 Master of Science in Mechanical Engineering (MSME) and Bioengineering (MSBioE)

2.2.2.1 MSME program

A total of 30 units constituting 21 units of coursework and 9 units of thesis work (designated as thesis option- Plan A) or 27 units of coursework and 3 units of project (designated as non-thesis option- Plan B) are required for graduation.

The student's program, prepared in conference with and approved by the Graduate Adviser. The courses listed below are recommended for the areas of emphasis.

1. Twenty-one units of coursework:
 - a. Twelve units in one area of emphasis (designated as Group A, B, C, or D, see below), with no more than six units of 500-level courses. Exceptions will be made if an appropriate number of courses are not offered.
 - b. Nine additional units of 500-, 600-, or 700-level courses (excluding ME 797, 798, 799A, 799B, 799C) selected in consultation with the Graduate Adviser.
 - c. At least 15 units of coursework (excluding ME 797, 798, 799A, 799B, 799C) from mechanical engineering. Please note the paragraph in *italics* below.
2. Nine additional units:
 - a. Thesis students: Six units of ME 797 and at least three units of 799A (thesis) or 799B (extension).
 - b. Non-thesis students: Three units of ME 797 and six units of 600- or 700-level courses from mechanical engineering.
3. The total number of units from 500-level courses should not exceed nine.
4. All 700-level courses must be from the Mechanical Engineering department. Exceptions may be approved by the Graduate Adviser.

Note: *Incoming students may transfer up to 9 units of course credit, including courses taken through San Diego State University College of Extended Studies, for the MSME program. Based on the number of units transferred, the requirement about units of courses to be taken in Mechanical Engineering will*

change. For example, if 9 units are, in fact, transferred, the number of additional units of coursework required from Mechanical Engineering will change to 12 for the thesis option and 18 for the non-thesis option. The decision whether a course can be transferred and what the course will be used towards, e.g. specialization, elective, has to be made by the Graduate Adviser and Graduate Affairs on a case by case basis.

Group A - Design and Manufacturing : ME 535, 540, ME 543, ME 555, ME 580, ME 585, ME 596, ME 610, ME 645, ME 683, ME 685, ME 696, AE 515, AE 535, AE 621, AE 641, AE 696

Group B - Dynamics and Control : ME 520, ME 530, ME 532, ME 596, ME 696, AE 515, AE 596, AE 611, AE 670, AE 696

Group C - Energy and Thermofluids : ME 552, ME 554, ME 555, ME 556, ME 596, ME 651, ME 653, ME 656, ME 657, ME 658, ME 661, ME 696, AE 515, AE 550, AE 601, AE 612, AE 644, AE 696

Group D - Materials and Mechanics: ME 520, ME 535, ME 540, ME 543, ME 580, ME 582, ME 596, ME 610, ME 645, ME 646, ME 681, ME 688, ME 696, AE 515, AE 535, AE 611, AE 621, AE 641, AE 696

NOTE: Courses numbered x96 are “experimental” courses taught for the first or second time, and can change every semester. Students must check with the Graduate Adviser to be certain a particular x96 satisfies the degree requirement for a particular specialization.

2.2.2.2 MSBioE program

A total of 30 units is required. Of these, 15 units of coursework (excluding 797, 798, 799 courses) must be from Engineering. At least 12 units of coursework must be at the 600-level or 700-level (excluding 797, 798, 799 courses). There are three areas of emphasis. Each area of emphasis has a recommended set of courses which are listed below, additional elective courses, and 9 units of thesis.

Biomaterials: BIOL 585, ME 540, ME 681, ME 685, ME 688

Biomechanics: BIOL 590, ME 580, ME 610, ME 681, ME 685, ME 688

Bioinstrumentation: BIOL 590, ME 503, ME 580, ME 685

The list of elective courses are: AE 601, AE 621, BIOL 585, BIOL 590, BIOL 597A, CHEM 711, CHEM 712, CHEM 751, EE 502, EE 503, EE 539, ENS 610, ENS 611, ENS 612, ENS 613, ENV E

554, ENV E 648, ME 540, ME 543, ME 580, ME 582, ME 585, ME 610, ME 640, ME 645, ME 656, ME 681, ME 683, PHYS 670A, PHYS 670 B

2.2.3 Master of Engineering

The Master of Engineering (M.Eng) degree is a practice-oriented, interdisciplinary degree designed to meet the needs of students who are interested in furthering a career in engineering with a business/management emphasis. This program is managed at the College level from the Office of the Associate Dean of Graduate Studies and Research. Based on the preference of individual students for concentrating in specific engineering disciplines, the student may consult with the program advisers of the respective departments on



course selection, subject to the guidelines below. In addition to the course requirements, the student is required to complete a design project and a final written report. This phase of the program introduces the student to the problems and solutions faced by practicing engineers. The program is designed for both the industrial professional who is seeking career enhancement and also to the new baccalaureate graduate who wants to continue to study in order to be able to enter the work force with an interdisciplinary background in engineering and with business/management skills.

The student must complete a graduate program of **36 units** to include:

- 18 units of graduate engineering courses
- 12 units of graduate business courses
- 6 units of the project registered under ENGR 798.
- 18 of the 36 units must be in 600- and 700-numbered courses.

The courses in engineering and business administration are selected in consultation with the Associate Dean in the College of Engineering and the Director of the Graduate Program in the Fowler College of Business. With the consent of the Associate Dean (CoE) and Director of the Graduate Program (Fowler), one unit of ENGR 798, with appropriate content, may be substituted for one unit in business administration. No more than a total of seven units of 798 will be accepted for credit towards the degree. The industry-oriented design project is to be selected in cooperation with the Associate Dean (CoE) and Director (Fowler) and the program advisers in the disciplines of interest. Typically, the students take this project at the end of the program of study as a culminating experience integrating engineering and business knowledge attained through coursework and experience. A formal written report of project findings will be submitted and approved by a committee of two engineering faculty members and one faculty member from business administration. The contacts for the Master of Engineering Program are:

College of Engineering: Dr. Temesgen Garoma, Associate Dean for Graduate Studies and Research, College of Engineering, 619-594-1324, tgaroma@sdsu.edu

Fowler College of Business: Dr. Nikhil Varaiya, Director of Graduate Programs, 619-594-7713, nvaraiya@sdsu.edu

2.2.4 General requirement for Master's Degrees

To receive the Master's Degree at San Diego State University, the candidate must complete the following general requirements as well as the more specific program requirements stated above.

2.2.4.1 Official Programs of Study

Official programs of study are to be submitted to the Division of Graduate Affairs for approval after the student has been granted classified graduate standing. The program must be submitted prior to or concurrent with the time the student wishes to be considered for advancement to candidacy and the student must be in good academic standing at the time of submission.

When course requirements listed on an official Master's degree program deviate from those prescribed in the Graduate Requirements of the 2021-2022 General Catalog, the student must submit to the graduate dean a petition for adjustment of academic requirements.

It is the student's responsibility to complete the specific courses listed on the official program of study with a grade of C or better. No changes will be permitted unless recommended by the graduate adviser and approved by the graduate dean. No course can be deleted from an official program of study after the course has been completed. This includes a course for which a student has registered and received an "Incomplete" or "Report in Progress" grade.

2.2.4.2 Advancement to Candidacy

A student who holds classified graduate standing and who meets the scholastic, professional, and personal standards of the university may be considered for advancement to candidacy for the Master's degree at the point of submission of the official program of study.

In addition to having classified graduate standing and the grade point averages specified above, the student must have maintained the required grade point averages with **no grade of less than 2.0 (C)** in a program of study course, completed all the undergraduate deficiencies, and the special requirements of the department or school concerned. The Division of Graduate Affairs will send the students written notification of advancement to candidacy.

A program of study must be on file at least one semester prior to graduation. A student may not enroll in 799A, or submit a Plan B Project Report, until advancement to candidacy.

2.2.4.3 Grade Point Averages

Grade point averages of at least 3.0 (B) must be maintained in:

1. All courses listed on the official degree program.
2. All courses, 300-level and above, taken at San Diego State University concurrently with or subsequently to the earliest course listed on the official degree program, including courses accepted for transfer credit.

A grade point average of at least 2.85 must be maintained in all courses on the graduate record. No transfer or extension credit may be used to improve the grade point average of units completed at San Diego State University whether computed to determine the average on the official degree program or the overall average.

2.2.4.4 Additional Restrictions on Earning Credits toward a Graduate Degree

Credit earned by correspondence or by examination is not acceptable on advanced degree programs. Courses applied toward one advanced degree may not be used to fulfill the requirements of another advanced degree. Courses designated undergraduate level cannot be used towards an advanced degree. Coursework completed prior to earning a baccalaureate degree is not applicable toward any future graduate degree except under policy for concurrent master's degree credit.

When directed by the Office of Financial Aid and Scholarships, some students may be required to obtain approval when additional coursework, not on the official Master's degree program, is required to prepare for a thesis or a project. The additional courses must be recommended by the Graduate Adviser and approved by the Division of Graduate Affairs for the student to receive financial aid.

2.2.4.5 Degree Time Limitations

All requirements for advanced certificates and Master's degrees coursework must be completed within **six consecutive calendar** years after initial registration. All requirements for Master's and joint Master's degrees entailing more than 36 units must be completed within seven consecutive calendar years after initial registration. Time spent on leave of absence is counted toward the degree time limit. Time spent in compulsory service by active duty military is not counted toward the degree time limit. Students who do not graduate by this deadline will be subject to administrative disqualification by the graduate dean. With the approval of the program or department graduate adviser, a student in the sixth academic year of graduate study may appeal to the graduate dean for a one-year time limit extension. Students who exceed the time limit and wish to continue their studies must formally apply for new admission. Programs readmitting students who have been disqualified for exceeding the time limit should consult with the student at the time of readmission to determine whether credits previously earned will meet current degree requirements. Disqualified and readmitted students will be held to current graduate requirements and will need approval from their program adviser to use expired courses.

2.2.4.6 Selecting an Adviser

Preferably within the first or second semesters, but no later than the end of the first summer after admittance, a graduate student needs to find a thesis (Plan A) or project (Plan B) adviser. Thesis and project topics can be collaborative and interdisciplinary, involving more than one faculty. Note that for part- or full-time working students, or those admitted conditionally, this timeline can be extended.

To help you find a thesis advisor, you can visit the faculty websites found at Mechanical Engineering department website to learn more about their research areas and/or consult the Graduate Adviser. Once you have found a thesis or project adviser, you need to complete a Thesis Adviser Form or Project Adviser Form and return it to the ME office. These forms are available on the ME website.

2.2.6 The Joint Doctoral Program (JDP)

The JDP program in Engineering Science with focus on four disciplines (Aerospace and Mechanical, Bioengineering, Electrical and Computer, and Structural) is offered jointly by San Diego State University and the University of California, San Diego. An applicant for admission must be admitted to regular graduate standing at SDSU and UCSD. Upon admission, the directors of the Engineering Joint Doctoral Program at SDSU and UCSD will appoint a three-member Advisory Committee consisting of at least one member from each institution. Note that some faculty in the College of Engineering also participate in the JDP program in Computational Science, offered through the College of Science, with Claremont College or UC Irvine (Ph.D. Degree). The details given below are specific to the JDP program in engineering disciplines offered jointly with UCSD.

2.2.6.1 Doctoral Qualifying Examination

The Doctoral Qualifying Examination is administered by the student's Advising Committee supplemented, if appropriate, by faculty appointed by the Directors of the Engineering JDP at SDSU and UCSD. It is the responsibility of this committee to develop in consultation with the student a course of study and plan of preparation for the Doctoral Qualifying Examination. On average, a student will take between 10 and 12 courses. An overall graduate GPA of 3.5 is required for continuation in the program. The qualifying examination should be taken as soon as possible after the two years of study at the two institutions. Students with advanced standing may be capable of taking the exam earlier.

The examination committee is designated by the UCSD department and consists of four members, three chosen in consultation with the primary co-advisers to represent the subject areas covered during the examination, and one appointed from a related academic department. At least one, but not more than two, of these members are from SDSU. The qualifying examination committee is chaired by the UCSD co-adviser of the student.

The examination will be oral, will cover at least four areas selected so as to ensure appropriate competence in the general areas of engineering science, and will be at the level and content of both SDSU and UCSD courses already completed.

2.2.6.2 The Joint Doctoral Committee

Upon successful completion of the Doctoral Qualifying Examination, a Joint Doctoral Committee shall be appointed by the Deans of the Graduate Divisions of SDSU and UCSD. The committee shall supervise the study and research program of the student. The Joint Doctoral Committee consist of at least five officers of instruction, with two members from SDSU, two members from UCSD, and one tenured UCSD member from outside the department of the candidate. At least two members should represent specialties different from the student's chosen field. The two co-advisers, one from each institution, serve as co-chairs of the Joint Doctoral Committee. The committee supervises the research work of the student, administers the Senate Candidacy Examination and the Dissertation Defense.

After admission, the student must spend at least one year in full-time residence on each of the two campuses. At SDSU, the year of full-time residence consists of registration in and completion of at least 9 semester units of graduate level courses or six semester units of research or dissertation courses each semester of the year of residence.

2.2.6.3 Senate Qualifying/Ph.D. Candidacy Exam

The student's Joint Doctoral Committee will administer the examination, which will consist of a presentation of the students' proposed research topic, initial dissertation results, and plans for future research. Upon successfully completing the Senate Qualifying Examination, the student may apply to both institutions for advancement to candidacy for the appropriate doctoral degree. The student must be a candidate at least two semesters (1 year) prior to the award of the degree.

2.2.6.5 Doctoral Dissertation Defense

The Joint Doctoral Committee will administer the final examination, which will consist of two parts: the student's submission of the written dissertation and the student's oral presentation of the dissertation results. The first part of the oral dissertation defense is open to the public while the second part of the dissertation defense involves specific evaluation and discussion with the student's Doctoral Committee.

2.2.6.6 Award of Degree/Diplomas

The degree is awarded jointly by the Trustees of the California State University and the Regents of the University of California, but the candidate will receive two separate diplomas, one from SDSU and the other from UCSD

2.3 Key Contact Information

Dr. John Abraham, Chair of Department, E-326B, 619-594-2450, jabraham@sdsu.edu

Dr. Parag Katira, Graduate Adviser of the MS programs. EIS 211, 619-594-2032, pkatira@sdsu.edu

Selena Jarin, Department Coordinator, E-326A, 619-594-6067, sjarin@sdsu.edu

Louisa Burrus, Administrative Support Assistant, E-326, 619-594-7050, lburrus@sdsu.edu

College-level programs (M.Eng and JDP): Dr. Temesgen Garoma, Associate Dean for Graduate Studies and Research, College of Engineering, 619-594-1324, tgaroma@sdsu.edu

Donovan Geiger, JDP and Master of Engineering Program Manager at SDSU, E-200A, 619-594-6079, dgeiger@sdsu.edu

Departmental website: <https://mechanical.sdsu.edu/>

Division of Graduate Studies website: <https://grad.sdsu.edu/>

3. Faculty Advisers and their Research Areas



JOHN ABRAHAM, Professor and Chair of Mechanical Engineering. Ph.D., Princeton University.

Research Interests

Dr. Abraham's research interests are in the areas of multiphase flows, sprays, combustion, internal combustion engines, fuel chemistry, computational fluid dynamics, and high-performance computing.



SARA ADIBI, Assistant Professor of Mechanical Engineering. Ph.D., National University of Singapore.

Research Interests

Dr. Adibi's research interests are in the areas of computational mechanics, multiscale modeling of materials, materials design, and high-performance computing.



ASFAN BEYENE, Professor of Mechanical Engineering, Director of Industrial Assessment Center. Ph.D., Warsaw University of Technology.

Research Interests

Dr. Beyene's research has been concerned with energy systems: renewables, efficient power sources with emphasis on combined heat and power applications, cycle and energy analyses, mathematical modeling, and high-performance computing.



AMNEET BHALLA, Assistant Professor of Mechanical Engineering. Ph.D., Northwestern University.

Research Interests

Dr. Bhalla's research interests include Fluid-Structure Interaction, Multiphase Flows, Aquatic Locomotion, Renewable Energy Device Modeling, Numerical Methods, High Performance Computing, and Scientific Software Design.



SUBRATA BHATTACHARJEE, Professor of Mechanical Engineering. Ph.D., Washington State University.

Research Interests

Dr. Bhattacharjee's research is on microgravity combustion and radiation heat transfer, flame dynamics in the space environment, fire detection, infra-red pyrometry, knowledge-based distributed intelligence, and development of the software **TEST**, The Expert System for Thermodynamics.



JOAQUIN CAMACHO, Assistant Professor of Mechanical Engineering. Ph.D University of Southern California

Research Interests

Dr. Camacho's research interests span from Multiphase flows, Sustainable Energy, Nanomaterial Theory and Fabrication, Combustion, Aerosol dynamics, and Carbon Materials.



MEYSAM HEYDARI GHARAHCHESHMEH, Assistant Professor of Mechanical Engineering. Ph.D., University of Houston.

Research Interests

Dr. Heydari's research interests are in advanced manufacturing, chemical vapor deposition methods, texture and nanostructural engineering, energy harvesting and storage materials, polymers and thin film deposition.



SUNGBUM (JOHN) KANG, Assistant Professor of Mechanical Engineering. Ph.D., Georgia Institute of Technology

Research Interests

Dr. Kang's research interests lie in the areas of smart optical metrology, mechatronics/robotics, industrial automation and smart factory.



SAMUEL K. KASSEGNE, Professor of Mechanical Engineering. Ph.D., Virginia Polytechnic Institute and State University, Director of Bioengineering Program

Research Interests

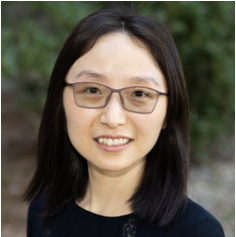
Dr. Kassegne's research interests are in the areas of MEMS, biotechnology, and computational sciences. He is particularly interested in developing novel applications of microfluidic and microarray technology (e.g. in molecular diagnostics), and a multi-scale hybrid algorithm for transport of charged species in micro-devices.



PARAG KATIRA, Associate Professor of Mechanical Engineering. Ph.D., University of Florida.

Research Interests

Dr. Katira's research interests lie in using mathematical modeling techniques to study the dynamics of active matter such as cells, tissues, bacterial biofilms and synthetic molecular-motor assemblies as well as the design of synthetic materials that can mimic the self-regulating and self-organizing properties of cells and tissues



LINGPING KONG, Assistant Professor of Mechanical Engineering. Ph.D., East China University of Science and Technology

Research Interests

Dr. Kong's research interests lie in electromechanical energy storage devices, solid-state batteries, solid-solid composite electrode microstructures, thin film deposition, and microelectronics fabrication.



XIANKE LIN, Assistant Professor of Mechanical Engineering. Ph.D., University of Michigan

Research Interests

Dr. Lin's research interests lie in energy storage systems, renewable energies, hybrid electric vehicle design and control, multiscale/multiphysics modeling and optimization, power electronics control and AC motor optimal control, and vehicle active safety/automated driving.



KAREN MAY-NEWMAN, Professor of Mechanical Engineering, Ph.D., University of California, San Diego.

Research Interests

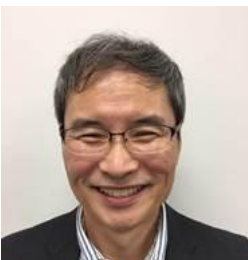
Dr. May-Newman's research is in the area of Cardiovascular Biomechanics with a focus on the mechanical interaction of the cardiovascular system with implanted medical devices, such as heart valves and left ventricular assist devices (LVADs).



FLETCHER J. MILLER, Professor of Mechanical Engineering. Ph.D., University of California Berkeley.

Research Interests

Dr. Miller's interests are in the field of thermal sciences in microgravity combustion and sustainable energy fields. He is especially interested in developing solar thermal applications in the southwest and California.



KEE S. MOON, Professor of Mechanical Engineering, Ph.D., University of Illinois, Chicago.

Research Interests

Dr. Moon's research interests are in the field of micro- and nano-fabrication technologies. In particular, he has recently developed various smart sensor/actuator systems including custom designed MEMS-gas and pressure sensors, nano-indentation systems, as well as precision instrumentation and testing devices.



KHALED MORSI, Professor of Mechanical Engineering, Director, Advanced Materials Processing Laboratory. Ph.D., University of Oxford, UK.

Research Interests

Dr. Morsi's research area is processing and properties of metals, intermetallics, ceramics *and* their composites. His current activities include synthesis of carbon nanotubes, nanotube reinforced aluminum composites, lightweight in-situ dual matrix composites, and processing- microstructure-properties relations.



PEIMAN NASERADINMOUSAVI, Associate Professor of Mechanical Engineering, Ph.D., Villanova University, PA.

Research Interests

His research interests include smart valves, nonlinear dynamics, control theory, optimization, magnetic bearings, and mathematical modeling. The results of his research can be used for achieving optimal and stable operation of electromechanical valve systems.



ZAHRA NILI AHMADABADI, Assistant Professor of Mechanical Engineering. Ph.D., University of Quebec (École de Technologie Supérieure).

Research Interests

Dr. Ahmadabadi's research interests include cooperative robotics, acoustic perception, robot learning, motion planning, nonlinear dynamical systems, dynamic systems and control, deep learning and sequence modeling, autonomy, and autonomous fault detection.



EUGENE OLEVSKY, Dean of College of Engineering, Distinguished Professor of Mechanical Engineering, Director of the Joint Doctoral Program. Ph.D., Ukraine National of Academy of Sciences.

Research Interests

Dr. Olevsky's research encompasses materials science and mechanics applied to processing of powders and porous materials, metals, ceramics, glass, and polymer composites, including nanomaterials. His current interests include materials for solid-oxide fuel cells, thermal management of electronic circuitry, hydrogen storage, and solar cells.



SUNG-YONG (SEAN) PARK, Assistant Professor of Mechanical Engineering, Ph.D., University of California, Los Angeles

Research Interests

Dr. Park's research interests lie in the general area of optofluidic energy and environmental systems with applications to biomedical sensors, optofluidic solar energy systems, triboelectric energy harvesting from waste water sources, lab on smartphone, smartphone based-environmental monitoring.



ELISA TORRESANI, Assistant Professor of Mechanical Engineering, Ph.D., University of Trento in Italy.

Research Interests

Dr. Torresani's research interests lie in the general area of materials science and engineering with a focus on advanced processing of powder materials, field assisted sintering, sintering-assisted additive manufacturing, numerical and experimental methods in materials science.



WENWU XU, Assistant Professor of Mechanical Engineering, Ph.D., Beijing University of Technology

Research Interests

Dr. Xu's research interests include computational Multiscale Modeling of Materials (continuum, microscopic, atomistic, and quantum mechanics) and characterization of material microstructure at multiple scales from 2D (electron microscopy) to 3D (synchrotron X-ray computed tomography), and 4D (time-resolved tomography).



YANG YANG, Assistant Professor of Mechanical Engineering, Ph.D., Wuhan University and University of California, Los Angeles

Research Interests

Dr. Yang's research interests include stereolithography-based additive manufacturing, microscale additive manufacturing, additive manufacturing of electronics, biomimetic design, 4D printing, high dielectric nanocomposites, wearable sensor, self-healing materials, superhydrophobic structure, and energy harvesting devices.



GEORGE YOUSSEF, Professor of Mechanical Engineering, Ph.D., University of California, Los Angeles

Research Interests

Dr. Youssef's research concerns the experimental mechanics of nontraditional materials, which include polymers, composites, and smart materials. He currently leads research on the application of composite materials in bioengineering, integration of smart materials in roughness control, and effect of environmental conditions on mechanical performance of protective polymeric coating.

4. Major Research Areas in the Department

Bioengineering

- *Biomaterials (Drs. Katira, May-Newman, Morsi, Youssef)*
- *Biomechanics (Drs. Katira, May-Newman, Youssef)*
- *Design of Medical Devices (Dr. May-Newman)*
- *Neural Engineering (Drs. Kassegne, May-Newman, Moon)*
- *Sensors, Smart Health (Drs. Kassegne, Moon, Park)*
- *Tissue Engineering (Dr. Katira)*
- *Computational Biomechanics/Biofluids (Drs. Adibi, Bhalla, Katira, May-Newman)*

Energy and Thermofluids

- *Combustion (Drs. Abraham, Bhattacharjee, Camacho, Miller)*
- *Computational Methods (Drs. Abraham, Bhalla, Bhattacharjee, Miller)*
- *Energy Systems (Drs. Beyene, Miller, Park)*
- *Renewable Energy (Drs. Abraham, Beyene, Bhalla, Miller, Park, Yang)*
- *Multiphase Flows (Drs. Abraham, Bhalla)*
- *Manufacturing of Energy Devices (Dr. Heydari)*

Materials & Manufacturing

- *Automation in Manufacturing (Dr. Kang)*
- *Computational Methods (Drs. Adibi, Bhalla, Xu)*
- *Manufacturing (Drs. Heydari, Kang, Torresani, Yang)*
- *Materials Processing (Drs. Camacho, Heydari, Morsi, Olevsky, Torresani)*
- *Mechanics of Sintering (Drs. Olevsky, Torresani)*
- *Multiscale Modeling of Materials (Drs. Adibi, Xu)*
- *Powder Metallurgy (Drs. Morsi, Olevsky, Torresani)*

Mechanics

- *Computational Mechanics (Drs. Adibi, Kassegne, Katira, Xu)*
- *Experimental Mechanics (Drs. Olevsky, Torresani, Youssef)*
- *Mechanical Polymers, Composites, Multiferroic Materials, Non-traditional Materials (Dr. Youssef)*

Microelectromechanical and Nanoelectromechanical Systems (MEMS/NEMS)

- *Bio-Nanoelectronics (Dr. Kassegne)*
- *Computational MEMS (Dr. Kassegne)*
- *Micro and Nano Fabrication (Drs. Kassegne, Park, Yang)*
- *Microfluids (Drs. Kassegne, Park)*
- *Nano Mechatronics (Dr. Moon)*
- *Polymer Solar Cells (Drs. Kassegne)*
- *Sensors (Drs. Kassegne, Moon, Park)*

Robotics, Dynamic Systems and Control, Mechatronics

- *Automation (Dr. Kang)*
- *Dynamic Systems and Control (Drs. Naseradinmousavi, Nili Ahmadabadi)*

- *Mechatronics (Dr. Moon)*
- *Robotics (Drs. Naseradinmousavi, Nili Ahmadabadi)*
- *Smart Valves (Dr. Naseradinmousavi)*

5. Graduate Admission

Detailed information about admission to each of the graduate programs is given on various websites. The links are given below:

5.1 B.S. and M.S. in Mechanical Engineering (4+1 Program)

Information: https://mechanical.sdsu.edu/undergraduate/bs_ms_4_1_program

The application form is posted on the website.

5.2 B.S. in Mechanical Engineering and M.S. in Bioengineering (4+1 Program)

Information: https://mechanical.sdsu.edu/undergraduate/bs_ms_4_1_program

The application form is posted on the website.

5.3 Master of Science in Mechanical Engineering (MSME)

Information: https://mechanical.sdsu.edu/graduate/msme_degree

Application: <http://arweb.sdsu.edu/es/admissions/grad/index.html>

5.4 Master of Science in Bioengineering (MSBioE)

Information: https://mechanical.sdsu.edu/graduate/msbe_degree

Application: <http://arweb.sdsu.edu/es/admissions/grad/index.html>

5.5 Master of Engineering (MEng)

Information: https://mechanical.sdsu.edu/graduate/meng_degree

Application: <http://arweb.sdsu.edu/es/admissions/grad/index.html>

5.6 Joint Doctoral Program (PhD)

Information: https://mechanical.sdsu.edu/graduate/phd_degree

Application: <http://arweb.sdsu.edu/es/admissions/grad/index.html>

6. Financial Support

6.1 Graduate Research Assistantships

The primary means of support for graduate students is through graduate research assistantships offered through grants that faculty members have from industry and federal agencies. You have to contact individual faculty members in the areas of your interest to check on availability of such funds.

6.2 Graduate Teaching Assistantships

There are only limited opportunities for teaching assistantships in the department. You have to contact the department Chair to check on availability.

6.3 Graders

Graders are hired by course Instructors to assist in grading. This is an opportunity for graduate students to get partial support to support their education. This should not, however, be considered as a primary means of support. The pay in Fall 2022 was \$16/hour and graduate students who were hired were usually hired for about 10 hours/week. An application to be a grader is on the ME website: <https://mechanical.sdsu.edu/graduate/forms>

6.4 Departmental Scholarships

The department has a few targeted scholarships that are available for outstanding students. These should be considered as supplemental funds. They pay \$1000 - \$5000 per year. <https://sacd.sdsu.edu/financial-aid/scholarships/sdsu-aztec-scholarships>

6.5 University Scholarships

San Diego State University awards scholarships to students to foster academic excellence, to develop talents, and to recognize leadership, community involvement, and outstanding achievement. Scholarships are also awarded to students who have overcome significant challenges to obtain an education and to provide financial support to students for academic related activities, such as conference attendance and study abroad.

For example, **the Shiley Scholarship in Bioengineering** will provide annual support to graduate students participating in research in the Donald P. Shiley BioScience Center in the area of chronic diseases.

All students, regardless of nationality, citizenship, residency status, area of study, or grade point average are encouraged to apply for as many scholarships as possible.

Navigate to the **SDSU Financial Aid Homepage** (http://go.sdsu.edu/student_affairs/financialaid/) for more information about scholarships, tuition, and payment and filing deadlines.

Office: SSW 3605

Phone: (619) 594-6323

Students should submit their Free Application for Federal Student Aid (FAFSA) as soon after January 1 as possible for the following fall semester. File your FAFSA online (<https://studentaid.gov/h/apply-for-aid/fafsa>).

The main SDSU scholarship application filing period is November through early February for awards paid in the following academic year. A second filing period extends from early March through April. Applications accepted August through October offer awards paid in the current academic year.

6.6 Graduate Equity Fellowship

The **Graduate Equity Fellowship** program provides support for economically disadvantaged graduate students, especially from groups who are underrepresented within their respective disciplines. Only legal residents of the State of California who can demonstrate significant financial need of \$1,000, as determined by the Free Application for Federal Student Aid form (FAFSA) are eligible. Recipients must be classified or conditionally classified graduate students, maintain a 3.00 GPA, and must be enrolled for a minimum of six units of graduate coursework each semester they hold the fellowship.

Fellowships range from \$500 to \$2,000 for an academic year depending on the demonstrated need. Students may receive awards for a maximum of two academic years, but they must apply each year. Applications for the Fellowship can be submitted after being admitted to the MS program but before completing the BS degree.

Interested students should complete an application, obtained in the Graduate Division office (SSE 1410), and a Free Application for Federal Student Aid (FAFSA) form, obtained in the Financial Aid office.

6.7 CSU Chancellor's Doctoral Incentive Program (C-DIP)

The **Engineering Joint Doctoral Program** endeavors to provide adequate support for all students so that full time can be devoted to research and graduate level study. All students are also expected to obtain teaching experience which will be carried out under the supervision of faculty members participating in the program.

The **CSU Chancellor's Doctoral Incentive Program (C-DIP)** provides student loans to doctoral students who show promise of teaching within the CSU system, as well as loan forgiveness to those who obtain a CSU instructional position.

The Chancellor's Doctoral Incentive loan is \$10,000 per year for three years and forgivable for those with full- or part-time teaching appointments at a CSU campus. Recipients must be CSU employees in

order to receive loan forgiveness. Being awarded the CDI loan is not a guarantee of employment at the CSU.

Established in 1987, the CSU CDIP is the largest program of its kind in the United States. As of June 2014, the program has loaned \$46 million to 2,006 doctoral students enrolled in universities throughout the nation, and 1,205 of these participants have successfully earned doctoral degrees. Among participants who have earned their doctoral degrees, 600 (50 percent) have subsequently obtained employment in CSU instructional faculty positions.

Who Can Apply for C-DIP:

- Anyone interested in doctoral study, including *lecturers without terminal degrees, current MA and MFA students, and undergraduate seniors* may apply for C-DIP.
- The program is open to applicants who will be new or continuing full-time students in doctoral programs at regionally accredited universities anywhere within the United States.
- Applicants are not required to have attended the CSU nor to have been accepted in a doctoral program at the time of their application.
- Each applicant is required to have a full-time tenure/tenure-track CSU faculty advisor who will provide professional mentoring and networking opportunities throughout the student's educational experience.

For more information, visit <http://www.calstate.edu/hr/cdip/>

6.8 Fee Assistance Program

For most students pursuing the Ph.D. degree, the University has some funds available to offset in whole or in part the cost of the state-mandated registration fees. Currently, these fees approximate \$600 each semester for students enrolled in six units or less and about \$900 for students enrolled in more than six units. Awardees must be participating in the graduate teaching program of the University. Information regarding this support is available from the director of the doctoral programs.



6.9 Graduate Student Travel Fund

The Graduate Student Travel Fund (GSTF) supports travel associated with scholarly research and creative activities. Funding for the GSTF has been generously provided by the Financial Affairs Committee of the Associated Students. For more information please refer to the SDSU Division of Research Affairs website (<https://newscenter.sdsu.edu/researchaffairs/gstf.aspx>).

7. Registration Guidelines

7.1 Online Registration

San Diego State University students register online at SDSU WebPortal [my.SDSU](http://my.sdsu.edu). On campus registration is not conducted. The Class Schedule is available at <http://www.sdsu.edu/schedule> and contains specific information on registration, the courses offered for the term, and a listing of the fees required for enrollment. Students will not be permitted to register until fees are paid. Payment of fees by itself does not constitute registration. **A student is considered registered when: 1) fees have been paid, and 2) at least one course has been added prior to the first day of classes.**

7.2 Late Registration

Late registration is allowed during the schedule adjustment period each semester. Students wishing to register late must pay registration fees plus a \$25.00 late fee by 3:30 p.m. on the 10th day from the first day of classes. The last day to add/drop classes is by 11:59 p.m. on the 10th day from the first day of classes

8. International Students

San Diego State University offers opportunities for graduate study to international students whose academic preparation meets the standards for admission. International applicants include those who hold U.S. temporary visas as students, exchange visitors, or in other non-immigrant classifications. SDSU uses separate requirements in the admission of international students. Verification of English proficiency, financial resources, and academic performance are important considerations for admission.

8.1 International Graduate Admissions

International students who plan to attend SDSU on an F-1 student visa and have coursework completed at schools outside the U.S. should complete the CSUMentor international application (<http://www.csumentor.edu/planning/international/>) to apply for admission.

To learn more about the application process, please visit the International Graduate Admissions website: <http://arweb.sdsu.edu/es/admissions/international/grad/index.html>

You may also contact International Admissions at:

International Admissions
San Diego State University
5500 Campanile Drive
San Diego, CA 92182-7455
(619) 594-6336
intladmission@sdsu.edu



8.2 Admission Requirements

Applicants for any type of graduate or post-baccalaureate study at San Diego State University must:

- (a) hold an acceptable baccalaureate degree from an accredited institution or one approved by a department and/or ministry of education in the host country; or have completed equivalent academic preparation as determined by the graduate dean
- (b) have attained a cumulative grade point average of at least 3.0
- (c) have been in good standing at all universities attended
- (d) have satisfactory scores on all sections of the GRE or GMAT and TOEFL/IELTS if required.

Applicants who do not qualify for admission under provisions (a) and (b) may be admitted by special action if the graduate dean determines that there is other academic or professional evidence sufficient to warrant such action.

8.3 Insurance Requirement

As a condition of receiving an I-20 or DS2019 form, all F-1 and J-1 visa applicants must agree to obtain and maintain health insurance as a condition of registration and continued enrollment. Such insurance must be in amounts as specified by the United States Information Agency (USIA) and National Association of Foreign Student Advisers (NAFSA). The campus president or designee shall determine which insurance policies meet these criteria. Further information may be obtained from the International Student Center or go to <http://www.sdsu.edu/international>.

8.4 American Language Institute (ALI)

If English instruction is needed prior to admission to SDSU, students may enroll in the American Language Institute (<http://ali.sdsu.edu>). The ALI offers academic preparation in English language reading, writing, and listening skills necessary for university success.

8.5 Housing and Scholarship

Arrangements for housing should be completed well in advance of the student's arrival to campus. Detailed information regarding housing may be obtained from the Office of Housing Administration website at <http://www.sdsu.edu/housing>. Scholarship aid for entering foreign students is limited. All admitted foreign students will be required to provide evidence of funding for a minimum of one academic year. Upon arrival at SDSU, the student should contact the International Student Center.

8.6 Current International Students

The International Student Center (ISC) currently serves enrolled international students. They can help you with advising, immigration questions, adjusting to life in the United States, and much more.

To learn more about the services the ISC offers please visit: [ISC Student Services](#).

You may also contact the ISC at:

International Student Center
San Diego State University
5500 Campanile Drive
San Diego, CA 92182-7455
(619) 594-1982
isc.reception@sdsu.edu

9. Forms and Policies

9.1 Advancement to Candidacy

The Graduate Division will generate the Advancement to Candidacy and send it to the Graduate Adviser for approval after the student's Official Program of Study has been processed and approved.

The Advancement to Candidacy must be signed by the Graduate Adviser and returned to the Graduate Division. If a student is not eligible for Advancement to Candidacy after the Official Program of Study is approved due to the lack of units, unsatisfactory GPA, an unfulfilled foreign language requirement, or unfulfilled deficiencies, the student's file will be reviewed for Advancement to Candidacy by the Graduate Division at the end of each semester.

For most majors, a student is eligible for Advancement to Candidacy after having completed at least 12 semester units of the Official Program with a GPA of 3.0 or better. In addition, the student must have completed all the undergraduate deficiencies and the special requirements of the department or school concerned; have passed the foreign language examination if required; been recommended for Advancement of Candidacy by the department; and approved for Advancement to Candidacy by the Graduate Council.

NOTE: A student may not receive an Appointment of Thesis/Project Committee Form, enroll in Thesis 799A, or take a final departmental examination (including a thesis defense) until s/he is Advanced to Candidacy.

9.2 Request to Change Degree/Major Objective between Departments

The Request to Change Degree/Major Objective between Departments Form https://registrar.sdsu.edu/students/academic_resources/change_declare_major is initiated by the student when declaring or changing a major for an advanced degree.

This form should be completed and submitted to the Graduate Division for verification of the student's records; completion of the GRE (or GMAT for the College of Business), transcripts from all colleges and an updated SDSU record, and a GPA of 2.85 or higher in the last 60 units. After a decision has been made, the form must be returned to the **Graduate Division** for processing.

9.3 Change of Status

If a student is admitted to a graduate program on a conditional basis, the student must meet the conditions by the deadline stated on the departmental recommendation s/he receives when s/he is admitted to SDSU. After the student has completed the conditions, s/he must contact the Graduate Adviser and request that a Change of Status is sent to the Graduate Division to become classified.

9.4 Enrolling in Thesis

Students who wish to enroll in Thesis 799A must first have an approved Thesis Committee Form on file with the Graduate Division. Once this form is processed and approved, students may request a schedule number and an add code from the Graduate Division in order to enroll in Thesis 799A.

Students requiring additional time to finish their theses must enroll in 799B Thesis Extension, either through main campus or through the College of Extended Studies.

9.5 Comprehensive Departmental Examination or Defense of Thesis

The department must notify the Graduate Division of the thesis defense or project submission by submitting the Report for Final Exam or Thesis Defense form by the appropriate deadline. Officially, a student may not sit for an exam without first being Advanced to Candidacy.

9.6 Request for Letter of Completion

A letter verifying completion of degree requirements may be requested ONLY if the following applies: The student has missed the application for graduation with an advanced degree deadline yet has completed all degree requirements. If the student has completed a thesis, the Montezuma Publishing division of Aztec Shops must have provided notification to the Graduate Division that the thesis was turned in and payment was made for binding before a letter of verification may be written. If the student has completed a final/comprehensive departmental examination, the student's department must provide notification to the Graduate Division.

Note: This is a standard letter, and no special exceptions of the wording may be requested.

9.7 Thesis Committee Form

Students are only able to obtain and officially file an Appointment of Thesis Committee/Project Form, listing the names of people who will serve on the thesis committee, after they have been Advanced to Candidacy. This is a **restricted form** and may be mailed upon request or picked up by students in the Graduate Division. This form must be approved by the Graduate Division before students will be allowed to enroll in Thesis 799A.

10. Campus Resources

SDSU Academic Calendar https://registrar.sdsu.edu/calendars/academic_calendars/spring-2023

SDSU Division of Graduate Studies <https://grad.sdsu.edu/>

SDSU Division of Research Affairs <https://go.sdsu.edu/researchaffairs/>

SDSU Graduate Admissions <http://arweb.sdsu.edu/es/admissions/grad/index.html>

SDSU Graduate Requirements <https://catalog.sdsu.edu/content.php?catoid=5&navoid=399>

SDSU Financial Aid & Scholarships Office http://go.sdsu.edu/student_affairs/financialaid/Default.aspx

SDSU International Graduate Admissions website:

<http://arweb.sdsu.edu/es/admissions/international/grad/index.html>

SDSU Dissertation & Thesis Review website <http://www.montezumapublishing.com/>



11. Frequently Asked Questions

What's the most important thing a graduate student can do to be successful?

READ! Read about being a graduate student. Please read through the Requirements for Master's Degree in the 2021-2022 General Catalog, available here: <https://catalog.sdsu.edu/content.php?catoid=5&navoid=399> Communicating with your Graduate Adviser will be important to your success as well.

What is a Red ID Number?

The Red ID Number (a 9-digit number, beginning with the number "8," shown on your admission letter) is the reference number used to identify you and your student record. If you do not have this number, or have misplaced it, contact the Registrar's Office at <http://arweb.sdsu.edu/es/registrar/> (619-594-6871). You will also need to pick up your ID card as well. Please see the Card Office website (<http://sdsucard.sdsu.edu>) for more information.

What is Classified Admission?

Students admitted with classified standing have met all university and department requirements for admission. Classified students are fully eligible to proceed with courses for their graduate program of study, and should not be required to take any prerequisites or meet any additional requirements beyond those listed in the 2021-2022 Graduate Requirements in the General Catalog for all students.

What if I have been admitted conditionally?

Students admitted conditionally have not met all university or department requirements for admission. Conditionally admitted students are typically required to take prerequisite courses or maintain a minimum GPA during their first several semesters of attendance. The specific conditions, and the allotted time period for completing them, are set by the student's department. If you have been admitted conditionally, please contact your Graduate Adviser for specific information regarding your conditions.

When the conditions of admission have been met, how do I request classified standing?

Adequate completion of a student's conditions is determined by the department. If you believe that you have satisfied your conditions, or would like to request more time to meet them, file a Change of Status form electronically here: <https://sdsuedu.sharepoint.com/sites/GRA/GA/SitePages/Forms.aspx>. Once this form has been signed by the Graduate Adviser, it will automatically be routed to Graduate Affairs for final evaluation.

How do I register for classes?

Registration for classes is completed online through my.SDSU. However, prior to registration, required fees must be paid. Payment may be made either (1) by check made payable to SDSU; (2) online

(<http://www.sdsu.edu/sfs>) using personal checking account information or with a credit card through CASHNET SmartPay (http://commerce.cashnet.com/sdsu_sp). Once fees are paid, you may access registration through your my.SDSU account.

What is a Program of Study (POS)?

The Program of Study (POS) is a contract between the student, the department, and the university. The POS consists of the complete list of courses a student will take in order to satisfy the requirements for the degree. It includes both required coursework and electives. The POS can only be submitted by students with classified graduate standing. The Graduate Adviser and student consult about the Program of Study. Once an agreement is reached, the adviser submits the POS to the Graduate Division electronically for review. If the POS meets all university requirements it is given final approval by the Graduate Dean and becomes binding.

How do I change my Program of Study (POS) once it has been approved?

If you wish to alter an approved POS, a Petition for Adjustment of Academic Requirements (<https://sdsuedu.sharepoint.com/sites/GRA/GA/SitePages/Forms.aspx>) must be supported by the Graduate Adviser and approved by the GRA. You must complete the Petition, obtain the signature of the Graduate Adviser, and submit the Petition to the GRA. When approved, a copy will be mailed to you.

How many units of transfer, extension, or foreign university credit may be used on a Program of Study (POS)?

In most graduate programs the maximum transfer credit allowed is 9 units. This includes coursework taken through the SDSU College of Extended Studies. All transfer credit must have been taken at an appropriately accredited university, and approved by the Graduate Adviser and the Graduate Dean.

What does it mean to be Advanced to Candidacy?

A student who has advanced to candidacy officially recognized by the university as a candidate for the degree. In order to be advanced to candidacy a student must have an approved Program of Study (POS) on file, completed a minimum number of POS units, and have a minimum GPA of 3.0. Students are typically nominated for advancement by their department, and reviewed for advancement by the GRA at the time the POS is submitted. If approved for advancement to candidacy, the student becomes eligible to file the Appointment of Thesis/Project Committee form in preparation for enrollment in thesis (Plan A), or to sit for the comprehensive examination (Plan B).

How soon should I think about my thesis?

It is never too early to start thinking about the thesis. Preparing a dissertation or thesis (from the proposal development stage to the final manuscript) requires advance planning. Please see Montezuma Publishing site (<https://www.montezumapublishing.com/sdsuthesisdissertation>) as soon as possible. As you progress through the Program of Study, a topic of interest will develop. Seek out the advice and

counsel of faculty members within your academic department and determine their willingness to chair your thesis committee. Two additional members (one within your department, one from outside your department) must also be secured in order to complete the thesis committee. If the research involves human or animal subjects, prior approval must be obtained from the appropriate university office, i.e., the Institutional Review Board or the Institutional Animal Care and Use Committee. Once a student has been advanced to candidacy, the Appointment of Thesis/Project Committee paperwork may be filed, and the final step in the culminating experience (writing and publication of the thesis) can officially begin.

12. List of Graduate Courses

12.1 Courses Acceptable on Master's Degree Program in Mechanical Engineering.

Refer to Courses and Curricula and Regulations of the Division of Graduate Affairs sections of this bulletin for explanation of the course numbering system, unit or credit hour, prerequisites, and related information.

12.2 Upper Division Courses

Note: Proof of Completion of prerequisites required for all Mechanical Engineering 300-, 400-, and 500-level courses: Copy of transcript.

M E 520: Introduction to Mechanical Vibrations (3)

Prerequisites: Mechanical Engineering 304 (or Civil Engineering 301) and Mechanical Engineering 330. Analysis of mechanical vibration; single- and multi-degree of freedom systems; free and forced vibrations; vibration isolation; vibration absorbers. Theory of vibration measuring instruments.

M E 530: Automatic Control Systems (3)

Prerequisite: Mechanical Engineering 330. Dynamic characteristics of control components and systems. Stability and response of closed loop systems. Design of control systems.

M E 532: Robot Modeling and Control (3)

Prerequisite: Mechanical Engineering 330. Analysis, computer programming, modeling, motion planning, and design of control systems for robots.

M E 535: Mechanics of Composite Structures (3) (Same course as Aerospace Engineering 535)

Prerequisites: Aerospace Engineering 280 and Aerospace Engineering 310 or Mechanical Engineering 314. Micro- and macro-mechanics of composite materials, classical lamination theory, initial failure prediction and progressive failure analysis of laminates, analysis of beam and plate structures, stiffness and strength-based design of composites.

M E 540: Nonmetallic Materials (3)

Prerequisites: Mechanical Engineering 314. Fundamentals of ceramics, polymers, and composite materials. Materials design and selection. Statistical methods of brittle materials design, appropriate for ceramic materials, and rheological modeling of polymeric materials. Stress and strain analysis using classical lamination theory of multi-ply composite laminates.

M E 543: Powder-Based Manufacturing (3)

Prerequisite: Mechanical Engineering 240. Manufacturing of micro and nano-structured engineering components and composites starting with metal and/or ceramic powders. Powder production methods, characterization, powder shaping and compaction, sintering, hot consolidation, design considerations, and finishing operations.

M E 552: Heating, Ventilating, and Air-Conditioning (3)

Prerequisites: Mechanical Engineering 351 and 452. Fundamentals of air conditioning processes, psychrometrics, and building cooling load calculations. Design and analysis of HVAC systems. Equipment selection. Design codes and standards. Computerized cooling load calculations.

ME 554: Automotive Power (3)

Prerequisites: Mechanical Engineering 351 and 452. Conventional and emerging energy conversion devices for automotive applications to include fuel-cell, hybrid, and internal combustion engines. Alternative fuels to include biofuels, cleaner fossil fuels, hydrogen, and natural gas. Well-to-wheel energy and cost analysis of prime mover designs/fuels.

M E 555: Energy and Thermal Systems Analysis and Design (3)

Prerequisites: Mechanical Engineering 351 and 452. Analysis, design, and optimization of thermal systems using microcomputers. Modeling of thermal systems and components. Thermal system component characteristics and their effect on overall system performance. Relationship among thermal sciences in design process. Introduction to thermoeconomic optimization.

M E 556: Solar Energy Conversion (3)

Prerequisites: Mechanical Engineering 351, 452, and Aerospace Engineering 340. Application of thermodynamics, fluid mechanics and heat transfer to the thermal design of solar energy conversion systems. Computer simulations utilized.

M E 580: Biomechanics (3)

Prerequisites: Mechanical Engineering 304 (or Civil Engineering 301) and Aerospace Engineering 340. Application of engineering methodologies for quantitative understanding of biological/physiological

phenomena. Continuum mechanics principles. Cardiovascular system and its components viewed from a mechanistic standpoint.

M E 585: Fundamentals of Micro-Electro-Mechanical Systems (MEMS) (3)

One lecture and four hours of laboratory.

Prerequisites: For aerospace engineering majors: Aerospace Engineering/Mechanical Engineering 220, Electrical Engineering 204, and Mechanical Engineering 240. For electrical engineering majors: Electrical Engineering 330 and Mechanical Engineering 240. For mechanical engineering majors: Mechanical Engineering 240 and Aerospace Engineering/Mechanical Engineering 220. Microfabrication techniques, microsensors and microactuators, and scaling laws. A design project of a micro-device including schematic creation, test of performance, layout generation, and layout versus schematic comparison.

M E 596: Advanced Mechanical Engineering Topics (1-3)

Prerequisite: Consent of instructor. Modern developments in mechanical engineering. May be repeated with new content. See Class Schedule for specific content. Maximum credit of nine units for any combination of Mechanical Engineering 496, 499 and 596 applicable to a bachelor's degree. Credit for 596 and 696 applicable to a master's degree with approval of the Graduate Adviser.

12.3 Graduate Courses

M E 610: Finite Element Methods in Mechanical Engineering (3)

Prerequisites: Aerospace Engineering 280 with a grade of C or better. Development of finite elements and an introduction to solution methods. Problems from various fields of study in mechanical engineering such as stress analysis, vibrations and heat transfer. Introduction to finite element programs such as NASTRAN.

M E 640: Nanomaterials (3)

Prerequisite: Mechanical Engineering 543. Nanomaterials compared with conventional materials. Nanomaterials synthesis, characterization, properties, and applications.

M E 645: Mechanical Behavior of Engineering Materials (3)

Prerequisites: Mechanical Engineering 314 and 350. Elastic and plastic deformation of monolithic engineering materials and composites. Dislocation theory and plasticity of crystalline solids. Linear elastic and elastic-plastic fracture mechanics. Failure analysis of engineering components. Design optimization based on materials and service environment variables.

M E 646: Mechanics of Sintering (3)

Prerequisite: Classified graduate standing. Practical aspects and conceptual models and mechanisms associated with sintering of ceramic and metal powders.

M E 651: Advanced Thermodynamics (3)

Prerequisites: Aerospace Engineering 280 with a grade of C or better and Mechanical Engineering 351. Advanced concepts of macroscopic thermodynamics are developed including entropy generation, irreversibility, effectiveness, exergy, and chemical exergy of fuels. Concepts applied to power and refrigeration cycles using computer software.

M E 653: Combustion (3)

Prerequisite: Mechanical Engineering 351. Thermodynamics of combustion, chemical equilibrium, chemical kinetics, combustion of gaseous, liquid and solid fuels, and their application. M E 656. Conduction Heat and Transfer (3) Prerequisites: Mechanical Engineering 452 and Aerospace Engineering 515. Conduction heat transfer analysis of multi-dimensional and transient processes using both classical analysis and numerical methods.

M E 656: Conduction Heat and Transfer (3)

Prerequisites: Mechanical Engineering 452 and Aerospace Engineering 515. Convection heat transfer processes under laminar and turbulent conditions. Mass transfer. Scaling arguments, analytical and numerical modeling.

M E 657: Convection Heat Transfer (3)

Prerequisites: Mechanical Engineering 452 and Aerospace Engineering 515. Convection heat transfer processes under laminar and turbulent conditions. Mass transfer. Scaling arguments, analytical and numerical modeling.

M E 658: Radiation Heat Transfer (3)

Prerequisites: Mechanical Engineering 452 and Aerospace Engineering 515. Radiation heat transfer processes. Radiative properties of surfaces and gasses. Absorption, emission, and scattering phenomena. Numerical modeling.

M E 661: Gas Dynamics (3)

Prerequisites: Mechanical Engineering 351 and Aerospace Engineering 515. Thermodynamics of high velocity compressible fluid flow. Adiabatic and diabatic flow; shock phenomena; imperfect gasses; multidimensional flow. Applications to the propulsive duct and turbomachinery.

M E 681: Biomaterials (3)

Prerequisites: Mechanical Engineering 240 and 580. Structure and properties of metallic, ceramic, and polymer biomaterials. Chemical interaction with the physiological environment. Thrombosis and

hemostasis on synthetic surfaces. Sterilization and packaging. Ethics and regulatory approval process. Applications discussed in cardiovascular, pulmonary, renal, orthopedic and dental medicine.

M E 683: Design of Medical Devices (3)

Prerequisites: Mechanical Engineering 314 and 580. Device design, including biomaterials, human factors engineering, reliability, and manufacturing. Topics relevant to industry reviewed include regulatory, documentation, quality, and legal.

M E 685: Micro-Electro-Mechanical Systems (MEMS) Design and Applications (3)

(Same course as Electrical Engineering 685) Prerequisite: Mechanical Engineering 585. Design and manufacturing technology for micro- and nano-scale devices. Topics include solid state transducers, microscale physics, biomedical microelectronics, microfluidics, biosensors, and hybrid integration of microfabrication technology. Emphasis on biomedical applications.

M E 696: Advanced Topics in Mechanical Engineering (2 or 3)

Intensive study in specific areas of mechanical engineering. May be repeated with new content. See Class Schedule for specific content. Credit for 596 and 696 applicable to a master's degree with approval of the Graduate Adviser.

M E 797: Research (1-3) Cr/NC/RP

Prerequisites: Consent of Graduate Adviser and advancement to candidacy. Research in engineering. Maximum credit six units applicable to a master's degree. M E 798. Special Study (1-3) Cr/NC/RP Prerequisite: Consent of Graduate Adviser; to be arranged with Department Chair and Instructor. Individual study or internship. Maximum credit three units applicable to a master's degree.

M E 799A: Thesis or Project (3) Cr/NC/RP

Prerequisites: An officially appointed thesis committee and advancement to candidacy. Preparation of a project or thesis for the master's degree.

M E 799B: Thesis or Project Extension (0) Cr/NC

Prerequisite: Prior registration in Thesis or Project 799A with an assigned grade symbol of RP. Registration required in any semester or term following assignment of RP in Course 799A in which the student expects to use the facilities and resources of the university; also students must be registered in the course when the completed thesis or project is granted final approval.

M E 799C: Comprehensive Examination Extension (0) Cr/NC

Prerequisite: Completion or concurrent enrollment in degree program courses. Registration required of students whose only requirement is completion of the comprehensive examination for the master's degree. Registration in 799C is limited to two semesters.

