



**SAN DIEGO STATE
UNIVERSITY**

UCI University of
California, Irvine

PH.D. PROGRAM IN COMPUTATIONAL SCIENCE

2018-2019 Program Handbook

Joint Program Offered

by

San Diego State University

and

University of California, Irvine

Revised: February 04, 2019

Computational Science Ph.D. Program

Participating Units

- Donald Bren School of Information and Computer Science, UC Irvine
- Samueli School of Engineering, UC Irvine
- College of Engineering, SDSU
- College of Science, SDSU

Program Supervision and Administration

Overall program supervision will be the joint responsibility of a graduate faculty group at UCI and SDSU. A Program Director will be appointed at each campus. The two Program Directors will oversee the operation of the program, advise students, appoint preliminary advisors and recommend appointments to Doctoral Committees. At SDSU, the Office of Graduate and Research Affairs (GRA) processes forms for advancement to candidacy, checks program requirements, and sends notices to students. At UC Irvine, the Graduate Division processes official graduate student forms, reviews student records to ensure that degree requirements have been met, and sends official communications to graduate students enrolled at UC Irvine. Diplomas will be issued jointly.

SDSU Program Director: Dr. Jose Castillo - jcastillo@sdsu.edu

UCI Program Director: Dr. Wayne Hayes - whayes@uci.edu

SDSU Staff Contact: Parisa Plant- parisa.plant@sdsu.edu

UCI Staff Contact: Kris Bolcer - kris@ics.uci.edu

Admission Requirements

Students must be admitted to both institutions jointly. However, students must apply to SDSU first. Admission will be granted to a *limited number* of qualified students, and therefore application should be made as early as possible. Applications are encouraged from both men and women, and particularly from members of underrepresented groups. Completed applications are due by **December 15th** for the Fall term, although later applications may be allowed at the discretion of the Admissions Committee. The Admissions Committee has the sole responsibility of deciding admissions, consistent with both campus regulations. The admissions review process may include personal interviews of applicants.

To be admitted to the Joint Ph.D. Program, an applicant must have received a baccalaureate degree in one of the Science, Technology, Engineering, and Mathematics (STEM) fields, with background in Linear Algebra, Differential Equations, Statistics, and Programming in a language such as C or Fortran. Applicants will be evaluated on the basis of their prior academic record and their potential for creative research and teaching, as demonstrated in submitted application materials. These materials will include official university transcripts, letters of recommendation, GRE scores, Resume and Statement of Purpose from an accredited institution. The applicant must have an undergraduate Grade Point Average of at least 3.0, and of at least 3.50 in any prior graduate course work. The applicant must, in addition, have attained such a scholastic record and present such confidential recommendations as to indicate that he or she is well qualified to pursue, with distinction, advanced study and research.

The GRE General is a requirement for admission. Scores on this exam must be less than five years old. Applicants whose primary language is **not** English are required to demonstrate proficiency in English for admission consideration. A minimum score of 80 on the Test of English as a Foreign Language (TOEFL) is required. Oral communication in English is an important factor for admission into our program so we require, 26 or above in TOEFL iBT spoken component; 8 or above in spoken component of IELTS.

For more information, please visit <https://www.grad.uci.edu/admissions/applying-to-uci/english-proficiency.php>.

Please note that all international students, including those with Permanent Resident status, who wish to or will be expected to serve as a Teaching Assistant or Teaching Associate must pass an English proficiency exam approved by UCI. Please visit <https://www.grad.uci.edu/funding/employment/english-proficiency-teaching.php> for more information.

Advising

Upon admission to the program, each student will be assigned two Faculty Mentors, one from SDSU, and one from UCI, as appointed by the Program Directors.

By the end of their second year, the student will select a primary Doctoral Advisor (from either UCI or SDSU), a Co-Chair from the campus where the primary advisor is not a faculty member and 3 other faculty members affiliated with the program, 2 from the campus where the primary advisor is a faculty member and 1 from the other campus. A sixth member from UCI but not affiliated with the program will be appointed, to serve on a Six-person Doctoral Committee. The selection of the Doctoral Advisor and the Doctoral Committee **must be approved in writing** by the two Program Directors and be consistent with regulations outlining committee composition at both campuses. The Doctoral Committee will then function as the student's official advising unit. The members of this committee administer advancement to candidacy exam, monitor research progress, dissertation proposal exam, and administer the student's final exam (Doctoral Dissertation Defense).

Faculty members affiliated with the Joint Ph.D. in Computational Science shall be listed with the program in the UC Irvine catalogue and the SDSU Graduate Bulletin.

Notes on Committee Composition

Committee for Advancement to Doctoral Candidacy

At advancement to doctoral candidacy, all students must include a sixth UCI faculty member on their committee. This faculty member **must not be** affiliated with the Joint Ph.D. Program in Computational Science, and will serve as the Outside Member. The Outside Member will serve as an unbiased and

independent judge of both the quality and fairness of the exam. It is desirable that this individual be familiar with the student's research field.

If the Chair, Research/Thesis Advisor, or other member of the committee has a financial interest in an outside entity that carries a possibility of a conflict of interest potentially harmful to the graduate student, and oversight member must be appointed in addition to the general members of the committee. In cases where a possible conflict of interest exists, the Dean of the Graduate Division at UCI shall select the Oversight Member from a list of three nominees agreed upon by the student, the faculty research advisor, and the program directors. The Oversight Member must be a UCI faculty member.

At advancement to doctoral candidacy, students with a primary faculty advisor from SDSU must identify a co-chair from UCI to be listed on the Ph.D. Form I – Advancement to Candidacy – Ph.D. Degree form.

Doctoral Committee

The Doctoral Committee must include at least three voting members of the University of California Academic Senate. The Doctoral Committee Chair must be affiliated with the Joint Ph.D. Program in Computational Science. As noted above, if a student's Doctoral Committee Chair is an SDSU faculty member, the student must identify a UCI faculty member as Co-Chair.

Program of Study

- A) Unit requirements: A total minimum of 66 units of course work, independent study, and research (including transfer credit) must be completed. These must be distributed as follows:
- Minimum 18 units of graduate level coursework at SDSU
 - Minimum 24 units of graduate level coursework at UCI
 - Minimum 24 units of Research, Practicum, Dissertation and Graduate Seminar at either institution.
- B) Course requirements:
- Required: attendance at Summer Research Survey, to become familiar with faculty research programs
 - Required: A faculty advisor.

Detailed Program of Study must include the following:

Residency at SDSU (totaling 18 units):

Core Courses at SDSU (9 units):

- MATH 636: Mathematical Modeling
- COMP 605: Scientific Computing
- COMP 670: Problems in Computational Science

The student will select additional courses from the following list (or appropriate substitutions) with approval of the program director and their research mentor (9 units).

- Comp 607: Computational Database Fundamentals (3)

- Comp 589: Computational Imaging (3)
- Math 693A: Advanced Numerical Analysis I (3)
- Math 693B: Advanced Numerical Analysis II (3)
- COMP 526: Computational Methods for Scientists (3)
- STATS 700: Data Analysis (3)
- STATS 701: Monte Carlo Methods (3)
- STATS 702: Data Mining (3)
- CS 609: Computational Genomics (3)
- CS 653: Data Mining and Knowledge Discovery (3)
- CS 660: Combinatorial Algorithms (3)
- CS696: Programming Problems in Bioinformatics (3)
- CS 696: Applied Computer Vision (3)
- CS 696: Big Data Tools Methods
- STATS 676: Bayesian Statistics (3)
- AE 601: Computational Fluid Mechanics (3)
- AE 621: Theory of Elasticity (3)
- AE 641: Structural Optimization (3)
- AE 670: Optimal Control (3)
- EE 658: ADV DGTL Signal Processing (3)
- EE740: Advanced Topics in Physical Electronics, Antenna Design (3)

Residency at UCI (totaling 24 units):

Core Courses at UCI (12 Units):

- ENGRMAE 207: Methods of Computer Modeling in Engineering and the Sciences (4)
- COMPSCI 206: Principles of Scientific Computing (4)
- STATS 201: Statistical Methods for Data Analysis (4)
- ENGRMAE200A: ENGR Analysis I (4)

The student will select additional courses from the following list (or appropriate substitutions) with approval of the program director and their research mentor (8 Units).

- COMPSCI 284C: Computational Systems Biology (4)
- COMPSCI 284B: Probabilistic Modeling of Biological Data (4)
- COMPSCI 274A: Probabilistic Learning: Theory and Algorithms (4)
- COMPSCI 211A: Visual Computing (4)
- COMPSCI 284A: Representation & Algorithms for Molecular Biology (4)
- ENGRCEE 290: Merging Models and Data (4)
- MATH 225A,B,C: Introduction to Numerical Analysis and Scientific Computing (4)
- MATH 226A,B,C: Computational Differential Equations (4)
- COMPSCI 296: Elements of Scientific Writing (4)
- CHEM 137 Computational Chemistry (4)
- CHEM 138 Introduction to Computational Organic Chemistry (4).
- CHEM 229A-B Computational Methods (4-4).
- PHYSICS 223 Numerical Methods (4)
- PHYSICS 229A-B Computational Methods (4-4)
- PHYSICS 231: Special Topics in Computational Physics (4)
- EARTHSS 118 Advanced Data Analysis and Modeling (4)
- EARTHSS 212 Geoscience Modeling and Data Analysis (4)

Research units at SDSU

- COMP 897 Doctoral Research (18-36 Units)
- COMP 898 Practicum (3-18 Units)
- COMP 899 Dissertation (3 Units)

Research units at UCI:

- COMPSCI 298, ENGR 297: Dissertation Research (variable units)
- COMPSCI 299, ENGR 299: Independent Research (variable units)

Summer Research Survey

An annual seminar/workshop will feature the participating faculty members presenting their current research and possible projects. Attendance is mandatory for all incoming students.

Advancement to Doctoral Candidacy

The student is expected to pass the Advancement to Candidacy Exam **within 3 years of admittance**. This examination shall consist of a term research project supervised by a faculty mentor. The student will be required to prepare a written report of research work performed and its results, and offer an oral presentation before the members of the Doctoral Committee. The student must submit a journal paper manuscript based on their exam report before giving the oral presentation to the Doctoral Committee. The student will use the form entitled “Nomination of the Doctoral Committee for The Degree of Doctor of Philosophy” (JDP 2) from San Diego State University to nominate Examination committee. Should a student fail the exam, one retake will be allowed at the discretion of the doctoral committee.

After successful completion of the Advancement to Candidacy Examination the student is to complete the “Report of the Advancement to Candidacy for the Degree of Doctoral of Philosophy” form (JDP3) from SDSU to record the successful completion of the exam. The original form will be kept on file at UCI with a copy being kept on file at SDSU.

If a master’s degree will be awarded en route to the Ph.D., students must advance to master’s candidacy at least one quarter prior to conferral of the master’s degree. The requirements for the MS in Computational Science are the first and second year coursework and the advancement to candidacy exam report.

In order to formally advance to master’s candidacy, the student must submit the UCI Advancement to Candidacy/Final Degree Report – Master’s Degree Comprehensive Exam Form with appropriate signatures. This form is available at <https://www.grad.uci.edu/forms/index.php>. This form must be re-submitted with appropriate signatures by the program following the student’s successful advancement at least one quarter prior to master’s degree conferral.

In order to formally advance to candidacy for the Ph.D., students must submit the “Report of the Advancement to Candidacy for the Degree of Doctoral of Philosophy” (JDP3) form with appropriate signatures at SDSU and the “Ph.D. Form I – Advancement to Candidacy –Ph.D. Degree” form with appropriate signatures at UCI. Original forms will be kept on file at UCI with copies kept on file at SDSU. Advancement to candidacy for the Ph.D. degree must occur at least one term prior to dissertation defense. UCI forms can be found at <https://www.grad.uci.edu/forms/index.php>.

Please see the Notes on Committee Composition section for information on requirements for advancement committees.

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Practicum and Doctoral Research

Dissertation research will be carried out at either UCI or SDSU, or at an industry or national laboratory under the supervision of the Doctoral Advisor. While conducting dissertation research, students must enroll in the appropriate research units at the campus of the Doctoral Advisor. If research is done outside of UCI or SDSU, students should register in-absentia if appropriate.

Dissertation Proposal

Students must submit a Dissertation Proposal to the Doctoral Committee **by the end of their third year in the program**. This proposal should take the form of a scientific grant proposal to a major funding agency. It should describe the research project that the student intends to carry out and upon which their Doctoral Dissertation will be based. The student must also offer an oral presentation of the Proposal before the Computational Science faculty. Upon successful completion of this presentation, the student will be recommended for proceeding for the Doctoral Degree.

After successful completion of the Dissertation Proposal, students must submit the “Report of the Dissertation Proposal for the Degree of Doctoral of Philosophy” (JDP4) form with appropriate signatures at SDSU. Original forms will be kept on file at UCI with copies kept on file at SDSU. Advancement to candidacy for the Ph.D. degree must occur at least one term prior to dissertation defense. UCI forms can be found at <https://www.grad.uci.edu/forms/index.php>.

Please see the Notes on Committee Composition section for information on requirements for advancement committees.

Dissertation and Final Oral Examination

On completion of the research, the student will prepare the Dissertation in accordance with UCI regulations, outlined at <https://www.grad.uci.edu/academics/degree-completion/index.php>. A final draft of the Dissertation will be presented to each member of the Doctoral Committee at least three weeks prior to the final oral examination. For information on UCI’s filing deadlines, please visit <https://www.grad.uci.edu/academics/filing-deadlines.php>. The oral defense will be held on the campus of the primary faculty advisor. Following the Final Examination, the student must file the “Report of the Final Examination and Filing of the Dissertation for the Degree of Doctor of Philosophy” (JDP 5) at SDSU and the “Ph.D. Form II – Signature Page/Report on Final Examination for the Ph.D.” with appropriate signatures at UCI. UCI forms can be found at <https://www.grad.uci.edu/forms/index.php>. Originals of these forms will be kept on file at UCI with copies kept on file at SDSU.

Please see the Notes on Committee Composition section for information on requirements for doctoral committees.

Normative Time and Enrollment Requirements

Normative time to degree for the Ph.D. is five years. Maximum time to degree for the Ph.D. is seven years. During this time, a minimum of 66 units of combined coursework, independent study, and research, must be completed.

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Throughout their entire program of study, students must be registered at either UCI or SDSU. Students who have completed coursework requirements must enroll in the appropriate research units at the home campus of their primary faculty advisor. International students should consult with International Centers at both SDSU and UCI to ensure that appropriate paperwork is on file with both offices. Full-time registration is required to maintain immigration status.

Requests for leaves of absence or in-absentia registration must be reviewed and approved by both campuses. An approved leave of absence cannot be longer than one year, three quarters, or two semesters.

Health Insurance

Doctoral students enrolled at UCI are required to have health insurance. While enrolled at UCI, students visit <https://shc.uci.edu/insurance/uc-ship-benefits-and-information/gship>.

At SDSU, International students are required to purchase health insurance through JCB Insurance Solutions or provide documentation of comparable coverage. For more information, please visit http://go.sdsu.edu/student_affairs/internationalstudents/ishealthinsurancef1.aspx. SDSU will provide Domestic doctoral students enrolled at SDSU with health coverage via reimbursement of an approved plan. Students enrolled at SDSU are not eligible for UCI GSHIP.

Library Access

Students enrolled at UCI will have access to UCI Library resources. If students need access to UCI Library resources while enrolled at SDSU, they may purchase a discounted library card (\$24 for 6 months, \$48 for 12 months). For more information, please visit <https://www.lib.uci.edu/get-library-card>.

Housing

UCI provides a guaranteed offer of on-campus housing for Ph.D. students for normative time to degree minus one year. For this program, the housing guarantee will begin in year 2, and will only continue for years 3 and 4 for those students who secure a UCI faculty advisor. Students will be required to maintain continuous enrollment at UCI and remain in good academic standing to remain eligible for the UCI housing guarantee. Only those students who submit a housing application with UCI prior to the May 1 deadline will receive a guaranteed offer of on-campus housing. For additional information, please visit <https://housing.uci.edu/apply/Guarantees.html>.

SDSU does not provide guaranteed on-campus housing for graduate students. However, a limited number of units may be available. For more information, please visit http://housing.sdsu.edu/communities/soph_transf_upper_housing.aspx.

Satisfactory Academic Progress

Graduate students must meet all of the following criteria to maintain satisfactory progress:

- Maintain at least a 3.0 cumulative GPA.
- Advance to candidacy and complete the degree within limitations established by UCI's Graduate Council.
- Receive grades of B or better.
- Enroll in at least 8 graduate or upper-division units of credit each quarter at UCI, or at least 9 units of graduate courses, or 6 units of research, per semester at SDSU, including credit for

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supervised teaching and research, unless part-time status or an academic leave of absence has been approved in advance. In cases of approved part-time status, enrollment in eight 8 or fewer units of credit toward the degree is expected each quarter.

- Satisfactory progress towards the degree as determined by the student's faculty advisor, committee, or academic unit.

Note: The professional judgment of the faculty, upon review of all graduate work undertaken by the student, is paramount, and the faculty of a particular academic unit may establish more restrictive criteria for satisfactory academic progress. Graduate students must maintain satisfactory academic progress to be eligible for any academic appointment/employment, fellowship support, or other awards.

Policies and Procedures

Students will be subject to the UCI Graduate Policies and Procedures outlined at <https://www.grad.uci.edu/academics/academic-policies.php>.

Students admitted provisionally must provide the materials needed to complete their files before the end of their first term of enrollment.

Standards of Scholarship and Conduct

Students in the Joint Ph.D. Program in Computational Science will be expected to abide by the high standards of scholarship, research, and professional and collegial conduct outlined in San Diego State and UC Irvine policies, including but not limited to the following:

SDSU Honor Code

1. I will respect the intellectual property of others, giving credit for ideas or information where credit is due. When appropriate, I will compensate others for the use of their ideas or intellectual property.
2. I will respect copyright laws and software licenses; particularly, when completing course assignments or department requirements.
3. While I am encouraged to work with other students currently in our program, I am expected to turn in my own work. I am not allowed to consult with students who have taken previous offerings of the courses I am taking for assistance with homework assignments. I need to consult with both instructors if I want to use part of a project for more than one course. The submission of work originating from previous terms is considered to be a serious honor code violation.
4. In preparing assignments and responses to examinations, I will follow the policies provided by the program and its professors. When I do not understand the policies governing an assignment or exam, I will seek clarification.
5. Unless there are clear policies to the contrary, I will not seek information about the content of course exams, will not disclose such information to others, and will not seek or provide assistance to others

in the completion of exams or questions.

6. When communicating with department personnel about my status as a student, my program of study, or my coursework, I will honestly represent my understanding of relevant circumstances, for example, whether I have (or have not) completed course prerequisites or filed specific paperwork.
7. I will stay informed of SDSU and UCI policies regarding plagiarism, cheating, and software use. In particular, I will read and abide by SDSU's Statement of Student Rights and Responsibilities (http://go.sdsu.edu/student_affairs/srr/conduct.aspx).

(Adapted from SDSU's EDTEC Honor Code)

UCI Academic Senate Policy on Academic Integrity

The University of California, Irvine is an institution of learning, research, and scholarship that is strengthened by the existence of an environment of integrity. As members of the academic community, instructors, students, and administrators are responsible for maintaining this environment. It is essential that all members of the University practice academic integrity and accept individual responsibility for their work and actions. Violating the Academic Integrity Policy is unacceptable, devaluing the teaching and learning experience for the entire community. While at UCI, members of the academic community should become better educated about the ethical framework underpinning academic integrity and improve their moral standards supporting it. The UCI Academic Senate Policy on Academic Integrity states the general rules and procedures associated with student academic integrity. This Academic Integrity Policy applies to undergraduate and graduate students enrolled in a UCI course. A separate policy governs the integrity of research.

All students are expected to complete a course in compliance with the Instructor's standards. No student shall engage in any activity involving any Academic Integrity Policy Violations. No student shall engage in any activity that involves attempting to receive a grade by means other than honest effort, and shall not aid another student who is attempting to do so. All students are encouraged to notify instructors, but may also notify the Academic Integrity Administrative Office, about observed incidents of Academic Integrity Policy Violations. Instructors should take reasonable steps to preserve the confidentiality of students making such reports. All students have the responsibility to become familiar with and abide by the Academic Integrity Policy.

To read UCI's full Academic Senate Policy on Academic Integrity, please visit <https://aisc.uci.edu/policies/academic-integrity/AcademicIntegrityPolicyApproved-04.23.15.pdf>.

UCI Code of Conduct

Students are expected to behave professionally, with integrity, and with respect for others. The full UCI Code of Conduct is available at https://aisc.uci.edu/policies/pacaos/uc_uci_policies.pdf.