

## Information/Requirements for Graduate Students and Faculty Advisors

### UCI MAPS NSF Graduating Training Program

July 2020, <http://maps-nsf.uci.edu>

#### Description of the MAPS Program

This is a 5-year NSF-funded training program (2016-2021) to train and support graduate students working on interdisciplinary research at the interface of (1) machine learning/statistics, and (2) the physical sciences (particle physics, chemistry, earth sciences, astronomy). An important component of the program is an emphasis on team science. Advances over the past decade in sensor technology, storage capacity, computational power, and data analysis methodologies have ushered in a new era of data-driven science. To fully realize the benefits of massive scientific data sets requires training of graduate students in the data science skills needed to extract useful information from such data. This project anticipates funding at least 20 graduate students over the duration of the program, along with a comparable number of honorary participants. The program will involve a variety of activities for students, including monthly research meetings, opportunities to meet leading researchers, participation in an annual symposium, summer internship opportunities at leading research labs, and more. For more information see [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1633631](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1633631). The PI of the program is Padhraic Smyth (Computer Science) and the co-PIs are Pierre Baldi (Computer Science), Jim Randerson (Earth Systems Sciences), Maritza Salazar (Merage School of Business), and Daniel Whiteson (Physics and Astronomy).

#### Funded Fellows

- NSF-funded MAPS fellowships will support a student for 12 or 24 calendar months, ending by August 2021, and will include a student stipend of \$36,000 per year plus all fees and tuition.
- ***Important: funded students are expected to actively participate in MAPS program activities and to engage in in-depth collaborative research involving both their primary and secondary advisors.***

**Honorary Fellows** are PhD and MS students who participate in the MAPS program (see details below) but do not receive funding support.

**Decisions related to student admission** to the MAPS program, for both funded and honorary fellows, are made by the PI and co-PIs on the grant.

**Administrative questions** about the program should be directed to the program administrator, Janet Ko, at [janetmk@ics.uci.edu](mailto:janetmk@ics.uci.edu).

**Appendix A: MAPS Program Requirements related to Student Status, Research Topic, and Faculty Advisors**

<b>Requirement</b>	<b>Description</b>
Student Status	Enrolled full-time as a PhD student in ICS or Physical Sciences for funded fellows or as a PhD or MS student for honorary fellows
Residency	US citizen or permanent resident status required for funded fellows, no requirement for honorary fellows
Research Topic	Either: (a) Research on a physical sciences problem that involves a strong element of machine learning or statistics; or (b) Research on machine learning or statistics methodology involving an active application to a physical sciences problem.
Primary Advisor	In ICS or Physical Sciences
Secondary Advisor	From ICS for Physical Sciences students, from Physical Sciences for ICS students. <i>“Secondary advisor” means that the faculty member is on the student’s advancement and thesis committees, is actively involved in the student’s research, and meets on a regular basis with the student to discuss research progress.</i>

\* for ICS PhD students there is a possibility of funding fellowships for students that are not US citizens or permanent residents.

## Appendix B: UCI MAPS Program Requirements and Recommendations for Students

Activity	Description
Graduate elective course in a student's "other" school	<b>Recommended:</b> 1 or more courses from the approved list of courses (see Appendix). Courses can be taken either before becoming a fellow or while a fellow.
Monthly MAPS meetings during academic year	<b>Required:</b> Attend and participate in at least N-1 of N monthly MAPS meetings during the academic year
Team Science activities	<b>Required:</b> Roughly 2 hours of time per month during the AY
Research project meetings	<b>Required:</b> Arrange at least 3 research meetings per quarter where both primary and secondary faculty advisors participate
Annual MAPS student symposium (Spring quarter)	<b>Required:</b> Participation required
Seminar attendance	<b>Required:</b> Attend at least 1 research seminar per quarter in student's other school*
Annual written summary report of research progress	<b>Required:</b> annually at end of Spring quarter
Complete evaluation summary for external program evaluators	<b>Required:</b> up to twice a year. External evaluations will be conducted via the company SmartStart.

\* "other school" means ICS for Physical Sciences students and Physical Sciences for ICS students. Students are encouraged to get on department/school seminar mailing lists.

\*\*short courses are sponsored by the Data Science Initiative: subscribe to the Data Science mailing list, <https://maillists.uci.edu/mailman/listinfo/datascience-initiative/> to receive announcements about these short courses

### Additional Recommended Program Activities

The following activities are recommended for all students participating in the MAPS program but are not required. The MAPS program staff will assist students in providing contact information for summer internships, outreach opportunities, and so forth.

- Co-author a paper with both your primary and secondary advisor
- Participate in an outreach activity at a local community college or high-school, e.g., volunteer to give a 30 minute talk on data-driven science or on machine learning or statistics
- Take at least one Graduate Professional Success (GPS) Course, run by the UCI Graduate Division. These courses cover topics such as teaching, leadership, communications, entrepreneurship, and more. For more details see <http://www.grad.uci.edu/professional-success/index.html>

## Appendix C: Recommended List of Graduate Elective Courses

The following courses have been approved as satisfying the requirement for an elective course (for funded fellows). Students seeking exceptions to pursue other courses as exceptions should send a request by email to Janet Ko, [janetmk@ics.uci.edu](mailto:janetmk@ics.uci.edu), cc'ing the program director Padhraic Smyth ([smyth@ics.uci.edu](mailto:smyth@ics.uci.edu)), with a clear justification for the request. For example, due to lack of prerequisites, students have been granted permission in the past to take undergraduate versions of some of the graduate courses below.

Students who have already taken one of these courses prior to entering the program should email Janet Ko with the relevant information.

### For Physical Sciences Students:

- **Computer Science**
  - o CS 273A: Machine Learning (typically offered in Fall and Winter)
  - o CS 274A: Probabilistic Learning: Theory and Algorithms (typically offered in Winter)
  - o CS 274E: Deep Generative Models (typically offered in Spring)
  - o CS 276A: Neural Networks (typically offered in Winter)
  - o CS 277: Control and Reinforcement Learning
  - o CS 216: Image Understanding
  - o CS 242: Parallel Computing
  - o CS 260: Fundamentals of Algorithms
- **Statistics**
  - o Stats 225: Bayesian Statistical Analysis
  - o Stats 230: Statistical Computing Methods
  - o Stats 245: Time Series Analysis

### For Information and Computer Sciences Students:

- **Physics and Astronomy**
  - o PHY 136: Introduction to Particle Physics
  - o PHY 137: Introduction to Cosmology
  - o PHY 212A: Mathematical Physics
- **Chemistry**
  - o CHEM 201: Organic Reaction Mechanisms 1
  - o CHEM 202: Organic Reaction Mechanisms 2
  - o CHEM 204: Organic Synthesis I
- **Earth Science**
  - o ESS 212: Geoscience Modeling and Data Analysis
  - o ESS 222: Global Climate Change Impacts
  - o ESS 228: Geophysical Fluid Dynamics