Computational and Data Science and Engineering

The Designated Emphasis (DE) in Computational and Data Science and Engineering Program (CDSE) at the University of California, Berkeley trains students to use and manage scientific data, whether it is in analyzing complex physical systems or in using statistics and machine learning, along with data visualization to extract useful information from the massive amount of data that can be collected from sensors today. The CDSE program is committed to the development of new curricula and expanded programs aimed at development and propagation of the use of numerical and computational tools to further research across multiple disciplines. To that end, the CDSE program will actively support the training and multidisciplinary education of scientists, engineers, and technical specialists who are experts in relevant areas.

The CDSE program crosses numerous disciplines, and participating departments include computer science, mathematics, chemistry, mechanical engineering, astronomy, neuroscience and political science, among many others. Upon graduation, the student receives a "PhD in X with a Designated Emphasis in Computational Data Science and Engineering" on their transcript and diploma. This designation certifies that he or she has participated in, and successfully completed, a designated emphasis in addition to the departmental requirements for the PhD, and completion of the DE-CDSE will also be posted to the student's transcript.

Some of the CDSE activities include:

- Identifying existing and encouraging the development of new courses that best serve to educate computational science and engineering students.
- Encouraging involvement in CDSE research activities by undergraduate and graduate students and postdoctoral researchers, and, potentially, by experienced professionals seeking to develop new skills that can benefit their careers.
- Supporting formal short "boot-camp" education programs involving both live and web-based course offerings, with certificates if completed.
- Supporting summer schools, seminar series, and tutorials.
- Integration of these activities with LBNL.

Applicants must already be students within a PhD program at UC Berkeley.

Students must be accepted into the program and petition to add the DE-CDSE before taking their qualifying exam.

Applicants for the DE-CDSE program are required to submit an online application; for access to the application, please see the program's website (http://citris-uc.org/decse-application) . With this form, the student must specify their proposed area of CDSE study and list which three courses they will take to fulfill the requirements. They also will upload a completed and signed Graduate Petition for change of Major or Degree Goal; a recommendation letter from their adviser; transcripts; a CV; and a one-page statement about why they are applying to the program.

For further information regarding admission to graduate programs at UC Berkeley, please see the Graduate Division's Admissions website (http://grad.berkeley.edu/admissions) .

Coursework/Curriculum

The student must take one course from each of the categories below; all courses taken to fulfill the DE requirements must be taken for a letter grade.

Category 1: Mathematical Tools

Select one of the following:

MATH 221	Advanced Matrix Computations
MATH 228A	Numerical Solution of Differential Equations
MATH 228B	Numerical Solution of Differential Equations
STAT 204	Probability for Applications
STAT 210A	Theoretical Statistics
STAT 210B	Theoretical Statistics
STAT 215A	Statistical Models: Theory and Application
STAT 215B	Statistical Models: Theory and Application
STAT 232	Experimental Design
STAT C239A	The Statistics of Causal Inference in the Social Science
STAT 240	Nonparametric and Robust Methods
STAT C241A/ COMPSCI C28	Statistical Learning Theory
STAT C241B/ COMPSCI C281B	Advanced Topics in Learning and Decision Making
STAT 243	Introduction to Statistical Computing
STAT 244	Statistical Computing
STAT 248	Analysis of Time Series
A course not listed, by petition to the program director	

Category 2: High Performance Computing

Select one of the following:

COMPSCI C26	Applications of Parallel Computers
COMPSCI 294	Special Topics (Software Engineering for Scientific Computing)
A course not listed, by petition to the program director	

Category 3: Application area

Application area courses that utilize the above tools in a significant manner [1]

[1] The student proposes this course, including a detailed syllabus documenting the use of mathematics and computation in an application area.

Qualifying Exam

Students must have a DE-CDSE component in their qualifying exam, with a DE-CDSE faculty member on the exam committee.

Dissertation

At least one member of the DE-CDSE faculty be on the dissertation committee.