

## Center for Computational Engineering

Computational engineering plays an increasingly important role in economic competitiveness, national security, environmental stewardship, and public safety. Indeed, computational engineering is central to all engineering endeavors, from the development of appropriate mathematical models to the prediction of mechanical, electrical, chemical, and biological phenomena and the design of complex natural and engineered systems. Computational engineering has now reached the stage in which further progress—to reach full potential as a pervasive enabling technology—requires the development of new interdisciplinary education and research models.

In fall 2008, the [Center for Computational Engineering](#) (CCE) was formed in the School of Engineering to support computational engineering research and education at MIT. Seventy-four faculty and researchers representing 13 academic programs from across the School of Engineering, the School of Science, and the MIT Sloan School of Management are currently affiliated with CCE. We focus on computational approaches to engineering problems: formulation and implementation of new approaches that are more efficient and capable and informed application of existing approaches to important engineering and scientific questions. Our emphasis is on the development of the “next generation” of innovators and innovations in computational engineering.

### Graduate Education

CCE offers two educational programs, the interdisciplinary [Master of Science Program in Computation for Design and Optimization](#) (CDO) and the [Doctoral Program in Computational Science and Engineering](#) (CSE). Nicolas Hadjiconstantinou and Youssef Marzouk serve as co-directors of the graduate programs.

### Computation for Design and Optimization

CDO enrollment at the start of AY2016 was 27 students, nine of whom were first-year students. Three CDO students were on the September 2015 degree list, five graduated in February 2016, and seven graduated in June 2016, increasing the total number of CDO alumni to 150 as of June 2016.

CDO conducted its 12th admissions cycle this past winter and spring. Serving on the admissions committee were Youssef Marzouk (chair), Nicolas Hadjiconstantinou, Saurabh Amin, and Ben Forget. Eighty-five applications were submitted in January 2016. Eleven applicants were offered admission, and four accepted and plan to begin pursuing their SM degree in September 2016; two students deferred admission to September 2017.

### Computational Science and Engineering

We began accepting applications for the Doctoral Program in Computational Science and Engineering in September 2013. CSE enrollment at the start of AY2016 was 29 students; 11 were first-year students. Two CSE students were on the September 2015 degree list, two graduated in February 2016, and one graduated in June 2016. There are now seven alumni of the CSE PhD program.

CSE conducted its third admissions cycle this past winter and spring, receiving 53 applications. As CCE reviewers, Youssef Marzouk and Nicolas Hadjiconstantinou read all applications and passed the names of the most qualified applicants along to the indicated home department for review. Of the 53 applicants, 10 were offered admission; one student accepted and enrolled in February 2016, seven students accepted and plan to begin their degree work in September 2016, and one student deferred admission to September 2017. A breakdown of September 2016 admissions is shown below.

Course	Applications Received	Admitted	Attending
Course 1	15	5	4
Course 2	11	3	3*
Course 5	9	1	1
Course 16	16	1	1
Course 22	2	0	0

\*One admitted student deferred enrollment to September 2017.

### Graduate Student Honors and Recognition

CDO student Abdulaziz Abdulrahman Alhassan was part of a team of researchers that won a best paper award from the International Council on Systems Engineering (INCOSE). The award, for the paper “Large Scale Engineering Systems—Insight on Desalination for Agriculture in Saudi Arabia,” will be formally announced during the INCOSE International Symposium in Edinburgh in July 2016.

CDO student Abdullah Almaatouq received an Academic Excellence Award from the Saudi Arabian Cultural Mission for achieving a grade point average above 4.7 out of 5.0. The award includes a cash prize of \$3,000.

CDO student Florian Feppon received the Wunsch Foundation Silent Hoist and Crane Award for Outstanding Graduate Research at the Department of Mechanical Engineering student awards luncheon on May 13, 2016.

CDO student Lutao Xie was part of a team of students and postdocs from MIT, Harvard, and Columbia that won a third-place award in the 2016 Columbia Case Competition.

CSE student Jiahong Ben Zhang received an honorable mention for his 2016 National Science Foundation Graduate Research Fellowship application, Efficient Nonlinear Bayesian Filtering of Rare Events.

CSE student Kai Pan was awarded the Shoji Prize for Innovation in IT in Civil Engineering for his accomplishments in the development and application of a smooth particle hydrodynamic code to the area of rogue wave impact on offshore structures.

CSE student Enrique Lizarraga-Garcia received the Sontheimer Travel Award in Mechanical Engineering at the 2016 International Conference on Multiphase Flow.

CSE student Deepak Subramani won the Best Theoretical/Computational Presentation Award at the second annual MIT Mechanical Engineering Research Exhibition on September 18, 2015. The event was organized by the Graduate Association for Mechanical Engineers and sponsored by the Department of Mechanical Engineering.

CSE students Derek Gaston, Geoff Gunow, and John Tramm were three of seven Nuclear Science and Engineering (NSE) graduate students to receive Outstanding Student Service Awards in recognition of their exceptional service to the department. The presentations were made at the 2016 annual awards dinner hosted by NSE and the student chapter of the American Nuclear Society on May 10.

CSE student Geoff Gunow was recognized by MIT as a 2016 Outstanding Graduate Research Advisor for his role as Delta Tau Delta's research advisor.

**Anthony T. Patera, Co-Director**  
**Ford Professor of Engineering**  
**Professor of Mechanical Engineering**

**Karen Willcox, Co-Director**  
**Professor of Aeronautics and Astronautics**