

DATA SCIENCE & ENGINEERING CONCENTRATION

for the Graduate Concentration in Data Science & Engineering

The Data Science & Engineering (DSE) Transcriptable Graduate Concentration is designed primarily for graduate students at the Ph.D. levels with an interest in data intensive computing. Data science plays a major role in many areas of computational science and engineering (CSE) – the DSE Concentration is open to domain scientists working in this area. This concentration requires students to complete 16 graduate credit hours spanning data science, from topics in mathematical foundations (MF), computational thinking (CT), statistical thinking (ST), as well as data management, description, and modeling (DX). Courses taken toward this concentration will count towards the student's graduate degree if permitted by the curriculum of their major, and the concentration will be listed on their transcript upon graduation.

To fulfill the requirements of the graduate concentration, students will take courses selected from an established list of core courses, along with a courses from a selection of elective courses that span a range of domain areas. Students may select any course in the list of electives, regardless of their enrolled degree program.

Additionally, understanding the ethical and societal implications of the application of data science is paramount, and CSE will integrate the latest topics to help educate future data scientists on appropriately developing and applying data science algorithms that impact society. To ensure that students in the Data Science & Engineering Graduate Concentration are exposed to current topics in this area and to highlight the how data science decisions can have real-world significance, CSE will (1) require that all DSE-seeking students attend at least one seminar on data science and social justice and (2) complete the self-paced Practical Data Ethics course developed by the UCSF Center for Applied Data Ethics. Students must affirm that they completed the course and will be required to report on their experience in order to receive the DSE Concentration. CSE will annually evaluate this requirement as additional on- and off-campus resources become available.

This graduate concentration is only available for students enrolled in these participating graduate degree programs:

- Aerospace Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/aerospace-engineering-phd/>)
- Agricultural & Biological Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/agricultural-biological-engineering-phd/>)
- Astronomy, PhD (<http://catalog.illinois.edu/graduate/las/astronomy-phd/>)
- Bioengineering, PhD (<http://catalog.illinois.edu/graduate/engineering/bioengineering-phd/>)
- Civil Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/civil-engineering-phd/>)
- Computer Science, PhD (<http://catalog.illinois.edu/graduate/engineering/computer-science-phd/>)
- Electrical & Computer Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/electrical-computer-engineering-phd/>)
- Environmental Engineering in Civil Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/environmental-engineering-civil-engineering-phd/>)
- Industrial Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/industrial-engineering-phd/>)
- Materials Science & Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/materials-science-engineering-phd/>)
- Mechanical Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/mechanical-engineering-phd/>)
- Nuclear, Plasma, & Radiological Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/nuclear-plasma-radiological-engineering-phd/>)
- Physics, PhD (<http://catalog.illinois.edu/graduate/engineering/physics-phd/>)
- Statistics, PhD (<http://catalog.illinois.edu/graduate/las/statistics-phd/>)
- Systems & Entrepreneurial Engineering, PhD (<http://catalog.illinois.edu/graduate/engineering/systems-entrepreneurial-engineering-phd/>)
- Theoretical & Applied Mechanics, PhD (<http://catalog.illinois.edu/graduate/engineering/theoretical-applied-mechanics-phd/>)

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For more information regarding the Data Science & Engineering (DSE) Graduate Concentration, visit the Computational Science and Engineering website (<http://cse.illinois.edu/>), or contact the CSE Office at 217-333-3247 or by email (cse@cse.illinois.edu).

Code	Title	Hours
Core Coursework		8
Select at least one course from two of the three groups below.		
Mathematical Foundations (MF) & Statistical Thinking (ST)		
STAT 425	Statistical Modeling I	
STAT 432	Basics of Statistical Learning	
CSE 448	Advanced Data Analysis	
CS 441	Applied Machine Learning	
CS 446	Machine Learning	
Mathematical Foundations (MF) & Computational Thinking (CT)		
CS 450	Numerical Analysis	
CS 484	Parallel Programming	
CSE 428	Statistical Computing	
Data Description and Curation (DX) & Data Modeling (DX)		
STAT 480	Big Data Analytics	
CS 412	Introduction to Data Mining	
Elective Coursework		8
Complete two additional courses in consultation with the CSE Education Coordinator or CSE Director.		
Total Hours (Core + Elective):		16

Other Requirements

Requirement

At least 4 hours of coursework for the DSE concentration should be advanced (500-level courses)

For students enrolled in both the DSE concentration and the CSE concentration, at least 12 hours of coursework earned for the DSE concentration must be distinct from credit earned for the CSE concentration.

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The learning objectives of the concentration include satisfactory completion of the core coursework along with completion of the electives component. These are selected in consultation with the unit and based on the Strategic Plan Task Force report on Data Science Education at the University of Illinois Urbana-Champaign, which highlights key areas of data science in the curriculum, namely mathematical foundations, computational thinking, statistical thinking, data management, data description and curation, and data modeling.

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Admission

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Data Science & Engineering Concentration

Director of Program: Luke Olson

Data Science & Engineering Concentration Program website (<https://cse.illinois.edu/cse-educational-programs/dse-graduate-concentration/>)

Data Science & Engineering Concentration Program Admissions (<https://cse.illinois.edu/cse-educational-programs/dse-graduate-concentration/>)

Data Science & Engineering Concentration Program faculty (<https://cse.illinois.edu/cse-educational-programs/dse-graduate-concentration/>)

Computational Science & Engineering

Computational Science & Engineering website (<https://cse.illinois.edu>)

1205 W Clark St, Suite 2102, Urbana, IL 61801

(217) 300-5696

Contact: Bryan Wang

CSE email: cse@cse.illinois.edu

Grainger College of Engineering

Grainger College of Engineering website (<https://grainger.illinois.edu/>)

Graduate Admissions

Graduate College Admissions & Requirements (<https://grad.illinois.edu/admissions/apply/>)