# 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/las/statistics-phd/)
- Agricultural & Biological Engineering, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Bioengineering, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Civil Engineering, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Computer Science, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Electrical & Computer Engineering, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Industrial Engineering, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Materials Science & Engineering, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Mechanical Engineering, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Nuclear, Plasma, & Radiological Engineering, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Physics, PhD (http://catalog.illinois.edu/graduate/las/statistics-phd/)
- Statistics, PhD (http://catalog.illinois.edu/graduate/las/statistics-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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**Admission**

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**Data Science & Engineering Concentration**
Director of Program: Luke Olson
Data Science & Engineering Concentration Program website
Data Science & Engineering Concentration Program Admissions (https://cse.illinois.edu/cse-educational-programs/graduate-concentration/)
Data Science & Engineering Concentration Program faculty

**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/)