

WORK IN PROGRESS — draft syllabus subject to revision

## Introduction to Data Science (CS 418)

UIC College of Engineering, 3 Undergraduate Hours, 4 graduate hours

### I. Instructor & Course Details

**Jack Bandy**

Email address: [jxb@uic.edu](mailto:jxb@uic.edu)

Drop-In Office Hours (in-person or virtual): TK

Drop-In Hours location (*office number; link to Zoom, Google Hangouts, etc.*): CTRLC 3454

**TK**

Email address: TK

Section designation(s): TK

Drop-In Office Hours (in-person or virtual): TK

Drop-In Hours location: TK

**Course Site:** [dodatascience.fun](http://dodatascience.fun)

The course site includes slides, the syllabus, work sheets, and the course schedule.

For technical questions about Canvas, email the Learning Technology Solutions team at [LTS@uic.edu](mailto:LTS@uic.edu).

**PrairieLearn:** TK

**Canvas:** TK

**Course Modality and Schedule**

Meeting time: \* Monday and Wednesday \* 03:30 PM - 04:45 PM

Location: \* Lecture Center Building C \* Room C001

CRN: 44033

Schedule Type: Lecture

Instructional Modality: Meet on campus

### II. Course Information

**Catalog Course Description and Prerequisite/corequisite Statement**

Provides an in-depth overview of data science in engineering. Topics include modeling, storage, manipulation, integration, classification, analysis, visualization, information extraction, and big data in the engineering domain.

**Prerequisite(s):** Grade of C or better in CS 251; and STAT 381 or IE 342 or ECE 341.

**Growth Mindset:**

Course materials and assignments can be complex and challenging, but they are crucial to your intellectual and personal growth and development. There are times you may need extra help.

## **Course Goals and Learning Outcomes**

- Learning outcome 1
- Learning outcome 2
- Learning outcome 3

## **Course Topics**

- Course introduction, statistics review, and the data science lifecycle
- Python foundations, dataframes, Polars, and obtaining data
- Data wrangling, filtering, and data formats
- Exploratory analysis and descriptive statistics
- Visualization basics, chart choice, visual encodings, visualization design, communication, and critique
- Hypothesis testing, estimation, sampling, and randomness
- Linear regression and classification
- Decision trees, support vector machines, and kernels
- Clustering, principal component analysis, and model evaluation
- Recommendation systems and A/B testing
- Network analysis, graphs, relationships, and network measures

## **III. Course Policies & Classroom Expectations**

### **Grading Policy and Point Breakdown**

Explain how you are going to measure student progress towards the achievement of your course goals and learning objectives. Be explicit in describing the way in which students will be evaluated, and be clear in describing how grades will be determined so that students always know where they stand at any time during the semester and do not feel that grading is done arbitrarily. Provide a breakdown of points or percentage of total points possible for each assignment.

Provide an outline of assignments and the associated number of points or percentage of total points possible for each assignment, along with the grading scale used for the course.

*Adapted from the [UIC CATE syllabus template](#).*

### **Policy for Missed or Late Work**

Clearly communicate the consequences of late or missing assignments, as well as the policy for missed exams.

*Adapted from the [UIC CATE syllabus template](#).*

### **Attendance / Participation Policy**

The activities we do during class are essential to your learning in this course, so you should make every effort to attend all class meetings and to arrive to class on time. I recognize, however, that illness, personal emergencies, university obligations, religious observances, and other circumstances may sometimes cause you to be late to class or prevent your attendance entirely.

Because active participation in the course is one of the most important ways to learn, you will

be assessed on your class engagement. Engagement looks a little different for everyone, but in general, an engaged student will come to class prepared, contribute regularly to class activities or discussions, listen attentively to peers and the instructor, stay on-task during class, complete their work in a timely manner, and reach out to the instructor if they have questions or start to fall behind. If you anticipate any barriers to your full engagement in the course, I encourage you to contact me so we can strategize about how you can best fulfill the course requirements.

*Adapted from the [UIC CATE syllabus template](#).*

## IV. Course Schedule

### Weekly Schedule

| Week | Class Day | Topic                                      | Before Class | In Class |
|------|-----------|--|--------------|----------|
| 1    | Monday    | Course introduction; statistics review     |              |          |
| 1    | Wednesday | Data science lifecycle                     |              |          |
| 2    | Monday    | Python foundations; dataframes and Polars  |              |          |
| 2    | Wednesday | Obtaining data                             |              |          |
| 3    | Monday    | Wrangling data; filtering data             |              |          |
| 3    | Wednesday | Data formats                               |              |          |
| 4    | Monday    | Exploratory analysis                       |              |          |
| 4    | Wednesday | Descriptive statistics                     |              |          |
| 5    | Monday    | Visualization                              |              |          |
| 5    | Wednesday | Visualization                              |              |          |
| 6    | Monday    | Visualization                              |              |          |
| 6    | Wednesday | Visualization                              |              |          |
| 7    | Monday    | Hypothesis testing                         |              |          |
| 7    | Wednesday | Estimation and sampling; randomness        |              |          |
| 8    | Monday    | Linear regression                          |              |          |
| 8    | Wednesday | Intro to classification                    |              |          |
| 9    | Monday    | Decision trees                             |              |          |
| 9    | Wednesday | Support vector machines; kernels           |              |          |
| 10   | Monday    | Clustering; principal component analysis   |              |          |
| 10   | Wednesday | Model evaluation                           |              |          |
| 11   | Monday    | Recommendation systems                     |              |          |
| 11   | Wednesday | A/B testing                                |              |          |
| 12   | Monday    | Network analysis                           |              |          |
| 12   | Wednesday | Graphs and relationships; network measures |              |          |
| 13   | Monday    | TBD  |              |          |

| Week | Class Day | Topic         | Before Class | In Class |
|------|-----------|---------------|--------------|----------|
| 13   | Wednesday | TBD           |              |          |
| 14   | Monday    | Presentations |              |          |
| 14   | Wednesday | Presentations |              |          |
| 15   | Monday    | Presentations |              |          |
| 15   | Wednesday | Presentations |              |          |

## V. Accommodations

### Disability Accommodation Procedures

UIC is committed to full inclusion and participation of people with disabilities in all aspects of university life. If you face or anticipate disability-related barriers while at UIC, you should connect with the Disability Resource Center (DRC) at [drc.uic.edu](http://drc.uic.edu), [drc@uic.edu](mailto:drc@uic.edu), or at (312) 413-2183 to create a plan for reasonable accommodations. In order to receive accommodations, you will need to disclose the disability to the DRC, complete an interactive registration process with the DRC, and provide me with a Letter of Accommodation (LOA). Letters of Accommodations can be presented at any point of the semester and, unless otherwise noted, do not expire once obtained. Upon receipt of an LOA, I will gladly work with you and the DRC to implement approved accommodations.

*Adapted from the [UIC CATE syllabus template](#).*

### Religious Accommodations

I will make every effort to avoid scheduling exams or requiring student projects be submitted on religious holidays. If you wish to observe your religious holidays, please notify me by the tenth day of the semester of the date when you will be absent unless the religious holiday is observed on or before the tenth day of the semester. In such cases, please notify me at least five days in advance of the date when you will be absent. I will make every reasonable effort to honor your request and not penalize you for missing the class. If an examination or project is due during your absence, you will be given an exam or assignment equivalent to the one completed by those students in attendance. Students may appeal through campus grievance procedures for religious accommodations.

*Adapted from the [UIC CATE syllabus template](#).*

## VI. Classroom Environment

### Inclusive Community

At UIC we expect all members of this class to contribute to a respectful, welcoming, and inclusive environment for every other member of our class. If there are aspects of the instruction or design of this course that result in barriers to your inclusion, engagement, accurate assessment or achievement, please notify me as soon as possible.

*Adapted from the [UIC CATE syllabus template](#).*