

ABE TBD (possibly 516X): Data Science and Analytics for Agricultural and Biosystem Engineers

Tuesday / Thursday 9 – 10:50 AM, Sukup

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“Our data analysis experts can’t read your minds. You’re going to reach your own decision regarding hiring us, even though it’s the same decision we knew in advance you’d make.”

Description: This course introduces students to research methods associated with data science concepts and their applications. Students will perform analyses and research related to agricultural and biosystems engineering and technology; methods to develop and maintain reproducible data analysis pipelines; best practices of data visualization and communication of data-driven results to broad audiences; concepts of data integrity and ethics

This course introduces graduate level researchers to core data science skills that are necessary for data-driven research. Students will be able to understand data science concepts and gain experience with applying these concepts to ABE-related case studies. They will be able to describe, build, and test reproducible data analysis pipelines, including applying programming for analysis, performing describing data wrangling and analysis; creating effective data visualizations to communicate data findings; and to describe methods to maintain data integrity and access.

Course outcomes/objective:

After completing this course, students should be able to:

1. Describe key ideas in data science and data analysis
2. Identify data challenges and potential solutions
3. Create a data science pipeline for research-relevant datasets
4. Design and implement a reproducible data analysis
5. Identify methods to evaluate data integrity and access

Proposed Syllabus

Class	Week	Theme
1	1	Introduction
2	1	Bootcamp Python
3	2	Bootcamp Github
4	2	Getting / Summarizing Data
5	3	CASE STUDY I
6	3	CASE STUDY I
7	4	CASE STUDY I
8	4	PROJECT 1
9	5	PROJECT 1
10	5	Text Scraping
11	5	Stat models
12	6	Visualization
13	6	Regression
14	7	Distribution and Probability
15	7	CASE STUDY II
16	8	CASE STUDY II
17	8	CASE STUDY II
18	9	PROJECT 2
19	9	PROJECT 2
20	10	Data Reduction
21	10	Classification
22	11	Machine Learning I
23	11	Machine Learning II
24	12	CASE STUDY III
25	12	CASE STUDY III
26	13	CASE STUDY III
27	13	PROJECT 3
28	14	PROJECT 3

1. Case Study 1 Example – Optimization of coverage, time, or fuel based on engine CAN bus datasets.
2. Case Study 2 Example – Reproducible reporting of water quality monitoring flow and nutrient datasets.
3. Case Study 3 Example – CART analysis predicting student success rates based on performance in freshman course.