Data Science, Undergraduate (DATA)

Courses

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DATA 88 Data Science Connector 2 - 4 Units
Terms offered: Spring 2020, Fall 2019
Designed to be taken in conjunction with the Foundations of Data Science (COMPSCI/INFO/STAT C8) course, each connector course will flesh out data science ideas in the context of one particular field. Blending inferential thinking and computational thinking, the course relies on the increasing availability of datasets across a wide range of human endeavor, and students' natural interest in such data, to teach students to work actively with data in a field of their interest and to interpret and critique their analyses of data. Topics vary by field, and several topics will be offered each term.

Objectives & Outcomes

Course Objectives:
- Discuss how to formulate and substantiate an argument with evidence
- Explain a variety of analytic and visualization techniques
- Explore approaches to effective communication
- Explore the challenges with working with primary and secondary data

Student Learning Outcomes:
- Apply data analysis to evaluate everyday problems
- Communicate effectively in written, spoken, and graphical form about specific issues
- Interpret statistical results
- Know how to locate and use primary data sources
- Obtain and/or collect relevant data using specific qualitative and/or quantitative research methods
- Understand how to use empirical evidence to evaluate an argument

Rules & Requirements

Prerequisites: Instructors may require students to enroll concurrently or have completed Data 8 (COMPSCI/INFO C8)
Repeat rules: Course may be repeated for credit without restriction. Students may enroll in multiple sections of this course within the same semester.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.

DATA 144 Data Mining and Analytics 3 Units
Terms offered: Fall 2019
Data Mining and Analytics introduces students to practical fundamentals of data mining and emerging paradigms of data mining and machine learning with enough theory to aid intuition building. The course is project-oriented, with a project beginning in class every week. The in-class portion of the project is meant to be collaborative and a time for the instructor and GSIs to work closely with project groups to understand the objectives, help work through software logistics, and connect project work to lecture. Lectures will introduce theories, concepts, practical contexts, and algorithms. Students should expect to leave the class with hands-on, contemporary data mining skills they can confidently apply in research and industry.

Objectives & Outcomes

Course Objectives:
- Conduct manual feature engineering (from domain knowledge) vs. machine induced featurization (representation learning)
- Develop intuition in various machine learning classification algorithms (e.g. decision trees, feed-forward neural networks, recurrent neural networks, skip-grams) and clustering techniques (e.g. k-means, spectral)
- Foster critical thinking about real-world actionability from analytics
- Provide an overview of issues in research and practice that will affect the practice of data science in a variety of domains

Student Learning Outcomes:
- Develop capabilities in a range of data mining techniques
- Gain the ability to solve problems in data mining research and practice
- Think critically about how to assess analytics
- Use data mining and analytics in a domain of application

Rules & Requirements

Prerequisites: Data 100 (COMPSCI/STAT C100) recommended
Credit Restrictions: Students will receive no credit for DATA 144 after completing INFO 154. A deficient grade in DATA 144 may be removed by taking INFO 154.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.
Instructor: Pardos

Data Mining and Analytics: Read Less [-]
DATA H195A Data Science Honors Thesis Seminar 2 Units

Terms offered: Not yet offered

The senior honors thesis seminar gives students an opportunity to experience firsthand what it means to do data science research. Over two semesters, students will learn to formulate a research problem, design a research strategy, collect evidence, and write up the findings and analysis. The first semester focuses primarily on the preparation and implementation of a research proposal, as well as data management strategies. During the second semester, we will emphasize analysis and writing. The final result will be a hybrid product with a 20-25 page research paper, with data visualizations and analysis tables, along with a documented data source, annotated code, well documented Github repository, and open science posting of the project.

Data Science Honors Thesis Seminar: Read More [+]

Objectives & Outcomes

Course Objectives:

- Assist students with project organization and management.
- Convey approaches to effective writing and visual communication.
- Discuss how to formulate and substantiate an argument with evidence.
- Explain approaches to designing a research question and project.
- Explore a variety of analytic and visualization techniques and discuss their appropriateness to different research questions.
- Identify the challenges in data acquisition and management.

Student Learning Outcomes:

- Communicate effectively in written, spoken, and graphical form.
- Develop an understanding of data availability, constraints, and ethics.
- Develop data management skills.
- Develop reproducible research and interpret results.
- Formulate a proposal for a research project.
- Learn how to develop a research question and project.
- Understand how to organize empirical work into a written document.
- Understand how to use empirical evidence to construct an argument.

Rules & Requirements

Prerequisites: There are no specific prerequisites. Students must be accepted into the data science honors program in order to take this course. Students must complete H195A in order to enroll in H195B

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Data Science Honors Thesis Seminar: Read Less [-]

DATA H195B Data Science Honors Thesis Seminar 2 Units

Terms offered: Spring 2020

The senior honors thesis seminar gives students an opportunity to experience firsthand what it means to do data science research. Over two semesters, students will learn to formulate a research problem, design a research strategy, collect evidence, and write up the findings and analysis. The first semester focuses primarily on the preparation and implementation of a research proposal, as well as data management strategies. During the second semester, we will emphasize analysis and writing. The final result will be a hybrid product with a 20-25 page research paper, with data visualizations and analysis tables, along with a documented data source, annotated code, well documented Github repository, and open science posting of the project.

Data Science Honors Thesis Seminar: Read More [+]

Objectives & Outcomes

Course Objectives:

- Assist students with project organization and management.
- Convey approaches to effective writing and visual communication.
- Discuss how to formulate and substantiate an argument with evidence.
- Explain approaches to designing a research question and project.
- Explore a variety of analytic and visualization techniques and discuss their appropriateness to different research questions.
- Identify the challenges in data acquisition and management.

Student Learning Outcomes:

- Communicate effectively in written, spoken, and graphical form.
- Develop an understanding of data availability, constraints, and ethics.
- Develop data management skills.
- Develop reproducible research and interpret results.
- Formulate a proposal for a research project.
- Learn how to develop a research question and project.
- Understand how to organize empirical work into a written document.
- Understand how to use empirical evidence to construct an argument.

Rules & Requirements

Prerequisites: There are no specific prerequisites. Students must be accepted into the data science honors program in order to take this course. Students must complete H195A in order to enroll in H195B

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Data Science Honors Thesis Seminar: Read Less [-]
DATA 197 Field Studies in Data Science 1 - 4 Units
Terms offered: Spring 2020, Fall 2019
Students take part in organized individual field sponsored programs with off-campus organizations or tutoring/mentoring relevant to specific aspects and applications of data science on or off campus. Note Summer CPT or OPT students: written report required. Course may not count toward major requirements but will be counted in the cumulative units toward graduation.

Field Studies in Data Science: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor (see department advisor). Upper-division standing
Repeat rules: Course may be repeated for credit with advisor consent.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of fieldwork per week
Summer:
6 weeks - 2.5-10 hours of fieldwork per week
8 weeks - 2-7.5 hours of fieldwork per week
10 weeks - 1.5-6 hours of fieldwork per week

Additional Details
Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.

Field Studies in Data Science: Read Less [-]

DATA 198 Directed Group Studies for Advanced Undergraduates 1 - 4 Units
Terms offered: Not yet offered
Written proposal must be approved by a faculty sponsor, who will serve as Instructor of Record. Seminars for the group study of selected topics, which will vary from semester to semester. Topics may be initiated by students.

Directed Group Studies for Advanced Undergraduates: Read More [+]

Rules & Requirements
Prerequisites: Instructors may require students to enroll concurrently or have completed Data 8 (COMPSCI/STAT/INFO C8). Upper-division standing and consent of instructor
Repeat rules: Course may be repeated for credit without restriction. Students may enroll in multiple sections of this course within the same semester.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details
Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Directed Group Studies for Advanced Undergraduates: Read Less [-]
DATA 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Not yet offered
Independent study and research by arrangement with faculty or staff.
This course allows students to obtain course credit for participation in undergraduate research. Students may opt either to participate in a semester-long series of workshops which provide a guided research experience with project milestone assignments and regular feedback, or they may opt to work independently with supervision from one faculty research mentor.
Supervised Independent Study and Research: Read More [+]

Objectives & Outcomes

Student Learning Outcomes: Develop and refine skills acquired in other courses in a hands-on, self-directed research project. Identify how to properly manage data and describe best practices in programming and analytics. Integrate feedback from an instructor into research on a regular basis. Learn how to structure and complete a research project working independently.

Rules & Requirements

Prerequisites: Instructors may require students to enroll concurrently or have completed Data 8 (COMPSCI/STAT/INFO C8). Upper-division standing and consent of instructor
Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3-12 hours of independent study per week
Summer:
6 weeks - 7.5-30 hours of independent study per week
8 weeks - 5.5-22.5 hours of independent study per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.
Supervised Independent Study and Research: Read Less [-]