



# ETHICS OF DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

DATA 120 (Section 3) Spring 2026

The University of North Carolina at Chapel Hill



## COURSE INFORMATION

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**Credit Hours:** 3

**Course Sessions:** Tuesdays and Thursdays 3:30 PM - 4:45 PM

**Classroom:** 116 Murphey Hall



## INSTRUCTIONAL TEAM INFORMATION

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### Instructor of Record

**Name:** Dan Kessler, Assistant Professor of Statistics & Operations Research and of Data Science & Society

**Office Hours:** Tue/Thu 1:30–3:00 PM, Hanes 352 or Zoom. Book at <https://scheduler.zoom.us/dankessler/data-120-oh>.

**Email Address:** [kesslerd@unc.edu](mailto:kesslerd@unc.edu). **Please include [DATA120] in your subject line.**

### Teaching Assistants

- Akshata Rai: [akshrai@unc.edu](mailto:akshrai@unc.edu)
- Ruthvika Kosuri: [rkosuri@cs.unc.edu](mailto:rkosuri@cs.unc.edu)
- Levi Harris: [levlevi@email.unc.edu](mailto:levlevi@email.unc.edu)



## COURSE CONTENT

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### Course Description

This course explores the ethical, social, and technical dimensions of Artificial Intelligence (AI) and data science. You will engage with critical readings on ethical theories and frameworks, conceptual analyses of data science and AI's impact on society, and practical exercises to apply these frameworks. In the final few sessions, the focus shifts toward a group project in which you will design an ethics audit, drawing from the concepts and tools you will have learned about throughout the semester.

### Course Texts & Materials

- A substantial number of readings will come from Martens, David (2022), *Data Science Ethics: Concepts, Techniques, and Cautionary Tales*. Oxford University Press.
- We will also draw from a variety of other sources and media, including videos and podcasts.

You are expected to complete assignments *before* each class session, as detailed in the course schedule below. These will be available (and engagement will be graded) through Perusall (accessed via Canvas).



## Class Expectations

This course consists of six modules, designed to expose you to tools and practice related to the ethics of AI and Data Science. These are exciting and difficult topics, and I expect you to engage with the materials thoughtfully and respectfully. When discussing these issues with peers and members of the instructional team, think less of trying to convince your interlocutor, and more of clearly conveying a position; the goal is not to change minds, but to explore. Curiosity is the name of the game here.

In the first few modules, we will divide sessions into more standard lectures and “Studio” sessions, when you will have a chance to put some of the concepts and tools we learn about into practice in small groups. As we progress in the semester, we will focus on content and have fewer, denser studio sessions. The course will end with a proposed ethical audit plan in a domain of your choice.

## Course Goals & Student Learning Goals (SLOs)

- Learn about philosophical, legal, and statistical frameworks for tackling ethical issues in machine learning, AI, and Data Science more generally.
- Understand foundational concepts and metrics in statistical decision theory, and understand trade-offs in the adoption of fairness criteria.
- Learn how to address, in practical terms, ethical issues as they arise throughout the typical data science pipeline
- Gain exposure to ethical issues in data science as they appear in various applied domains
- Learn to design a fairness audit that incorporates the frameworks and tools discussed in the course

## IDEAs in Action General Education Curriculum

### *Ethical And Civic Values*

#### Learning Outcomes:

1. Explain the contexts in which questions of justification arise.
2. Assess ethical values in terms of reasons offered
3. Recognize different ethical perspectives and the distinctive approaches these perspectives bring to questions of value, evaluating ethical justifications for different ways of organizing civic and political communities.
4. Analyze the differences between personal ethical decisions and those bearing on the public and civic spheres.

#### Questions for Students:

1. How can people think fruitfully (individually and together) about how they should live their lives?
2. What is required to judge a standard or value as worthy of support?
3. How should we distinguish between prejudices and reasonable grounds for value judgments?
4. What considerations — stories, reasons, testimony, documents, data, etc. — can justify our values and commitments, whether personal or social?



## Acknowledgments

This course builds upon materials generously shared by previous instructors, particularly Dr. Santiago Olivella and Dr. Justin Sola.



## COURSE ASSIGNMENTS & ASSESSMENTS

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### Assignment Descriptions

- Attendance & In-Class Reading Quizzes: 25% (15 total; 2 lowest grades dropped)
- Reading Engagement: 10% (Engagement-based; evaluated automatically by Perusall)
- Application Studio: 30% (8 total; lowest grade dropped. Completion, accuracy, and attendance based; typically due the Monday following the Studio session.)



- Group Audit Plan: 35% (divided into a short write-up of your proposed plan due on May 3, a 1-slide presentation to be given on the day of the final exam scheduled for May 5, and a peer review of your teammates.)

## Grading Scale & Schema

### Grading Scale

Numeric Grade (%)	Letter Grade
93.5 and above	A
89.5 – 93.4	A-
86.5 – 89.4	B+
82.5 – 86.4	B
79.5 – 82.4	B-
76.5 – 79.4	C+
72.5 – 76.4	C
69.5 – 72.4	C-
66.5 – 69.4	D+
59.5 – 66.4	D
59.4 and below	F



## COURSE SCHEDULE

### Module 1: Foundations: Formal frameworks, Legal Frameworks, and Metrics

Class (Date)	Topic(s)	Readings & Assignments Due
Jan 08 (Th)	<ul style="list-style-type: none"><li>• Introduction to course and objectives</li><li>• Introduction to data science ethics</li></ul>	<ul style="list-style-type: none"><li>• Syllabus</li><li>• Optional: PBS NOVA (2024). A.I. revolution: Explore the promise and perils of new A.I. technologies</li></ul>
Jan 13 (Tu)	<ul style="list-style-type: none"><li>• Overview of Ethics in AI and Data Science</li><li>• Studio 1</li></ul>	<ul style="list-style-type: none"><li>• Boddington (2023), Sections 2.1-2.5</li><li>• Studio 1 due on following Monday</li></ul>
Jan 15 (Th)	<ul style="list-style-type: none"><li>• Basic ethical frameworks</li></ul>	<ul style="list-style-type: none"><li>• Kühler et al.</li><li>• Quiz 1 (in-class)</li></ul>
Jan 20 (Tu)	<ul style="list-style-type: none"><li>• Studio 2</li></ul>	<ul style="list-style-type: none"><li>• Studio 2 due on following Monday</li></ul>
Jan 22 (Th)	<ul style="list-style-type: none"><li>• Regulatory Frameworks</li></ul>	<ul style="list-style-type: none"><li>• Martens (2022), Section 2.2</li><li>• Gracias (2024)</li><li>• Quiz 2 (in-class)</li></ul>
Jan 27 (Tu)	<ul style="list-style-type: none"><li>• Studio 3</li></ul>	<ul style="list-style-type: none"><li>• Studio 3 due on following Monday</li></ul>
Jan 29 (Th)	<ul style="list-style-type: none"><li>• Metrics</li></ul>	<ul style="list-style-type: none"><li>• Barocas et al. (2023), pp. 44–50</li><li>• Quiz 3 (in-class)</li></ul>
Feb 03 (Tu)	<ul style="list-style-type: none"><li>• Studio 4</li></ul>	<ul style="list-style-type: none"><li>• Studio 4 due on Friday 2/7</li></ul>
Feb 05 (Th)	<ul style="list-style-type: none"><li>• Statistical fairness definitions</li><li>• Impossibility trade-offs</li></ul>	<ul style="list-style-type: none"><li>• Martens (2022), Section 4.2.1</li><li>• Martens (2022), Section 4.3</li><li>• Chawla (2022)</li><li>• Quiz 4 (in-class)</li><li>• Optional deep dive: Barocas (2023), pp. 54–71 (online)</li></ul>



Class (Date)	Topic(s)	Readings & Assignments Due
Feb 10 (Tu)	<ul style="list-style-type: none"><li>• Studio 5</li></ul>	<ul style="list-style-type: none"><li>• Studio 5 due following Monday</li></ul>

## Module 2: Dimensions of Fairness: Bias, Privacy, Transparency

Class (Date)	Topic(s)	Readings & Assignments Due
Feb 12 (Th)	<ul style="list-style-type: none"><li>• Formal privacy models</li></ul>	<ul style="list-style-type: none"><li>• Martens (2022), Sections 3.1-3.2</li><li>• Quiz 5 (in-class)</li></ul>
Feb 17 (Tu)	<ul style="list-style-type: none"><li>• Studio 6</li></ul>	<ul style="list-style-type: none"><li>• Studio 6 due following Monday</li></ul>
Feb 19 (Th)	<ul style="list-style-type: none"><li>• Algorithmic bias</li></ul>	<ul style="list-style-type: none"><li>• Barocas et al. (2023), Ch. 4</li><li>• Martens (2022), Sections 3.5-3.6</li><li>• Quiz 6 (in-class)</li></ul>
Feb 24 (Tu)	<ul style="list-style-type: none"><li>• Interpretability</li><li>• Explainability</li></ul>	<ul style="list-style-type: none"><li>• Martens (2022), Sections 4.4.1-4.4.3</li><li>• Quiz 7 (in-class)</li></ul>
Feb 26 (Th)	<ul style="list-style-type: none"><li>• Studio 7</li></ul>	<ul style="list-style-type: none"><li>• Studio 7 due following Monday</li></ul>

## Module 3: The Ethical Data Science Pipeline: Data, Models, and Audits

Class (Date)	Topic(s)	Readings & Assignments Due
Mar 03 (Tu)	<ul style="list-style-type: none"><li>• Ethical data collection and consent</li></ul>	<ul style="list-style-type: none"><li>• Martens (2022), Sections 2.7-2.8</li><li>• Williams et al.</li><li>• Quiz 8 (in-class)</li></ul>
Mar 05 (Th)	<ul style="list-style-type: none"><li>• Privacy preservation</li></ul>	<ul style="list-style-type: none"><li>• Martens (2022), Section 4.1</li><li>• Quiz 9 (in-class)</li></ul>
Mar 10 (Tu)	<ul style="list-style-type: none"><li>• Fairness in training and model documentation</li></ul>	<ul style="list-style-type: none"><li>• Martens (2022), Section 4.2.2</li><li>• Quiz 10 (in-class)</li></ul>
Mar 12 (Th)	<ul style="list-style-type: none"><li>• Practical model interpretability</li></ul>	<ul style="list-style-type: none"><li>• Martens (2022), Sections 4.4.4-4.5</li><li>• Quiz 11 (in-class)</li></ul>
Mar 17 (Tu)	No Class (Spring Break)	
Mar 19 (Th)	No Class (Spring Break)	

## Module 4: Ethical Data Science in the Wild: applications and Case Studies

Class (Date)	Topic(s)	Readings & Assignments Due
Mar 24 (Tu)	<ul style="list-style-type: none"><li>• AI and sustainability</li></ul>	<ul style="list-style-type: none"><li>• Crawford (2021), Ch. 1</li><li>• Quiz 12 (in-class)</li></ul>
Mar 26 (Th)	<ul style="list-style-type: none"><li>• Studio 8</li></ul>	<ul style="list-style-type: none"><li>• Studio 8 due following Monday</li></ul>
Mar 31 (Tu)	<ul style="list-style-type: none"><li>• AI, Democracy, and Human Rights</li></ul>	<ul style="list-style-type: none"><li>• Crawford (2021), Ch. 6</li><li>• Quiz 13 (in-class)</li></ul>
Apr 02 (Th)	No Class (Well-Being Day)	
Apr 07 (Tu)	<ul style="list-style-type: none"><li>• Introduction to Evaluation and Audits</li></ul>	<ul style="list-style-type: none"><li>• Raji et al. (2024)</li><li>• Buolamwini and Gebru (2017)</li><li>• Quiz 14 (in-class)</li></ul>

## Module 5: Frontiers: Causal Fairness & Alignment

Class (Date)	Topic(s)	Readings & Assignments Due
Apr 09 (Th)	<ul style="list-style-type: none"><li>• Causal Fairness</li></ul>	<ul style="list-style-type: none"><li>• Barocas et al. (2023), Ch. 5</li></ul>
Apr 14 (Tu)	<ul style="list-style-type: none"><li>• Alignment and Design for Human Values</li></ul>	<ul style="list-style-type: none"><li>• Boddington (2023), Section 10.4</li><li>• Quiz 15 (in-class)</li></ul>



## Module 6: Final Project Development: Creating an Audit Plan

Class (Date)	Topic(s)	Readings & Assignments Due
Apr 16 (Th)	<ul style="list-style-type: none"><li>Fairness risk &amp; stakeholder map</li></ul>	
Apr 21 (Tu)	<ul style="list-style-type: none"><li>Metrics and trade-offs</li><li>Audit logistics</li></ul>	
Apr 23 (Th)	<ul style="list-style-type: none"><li>Group audit plan workshop</li><li>Course wrap-up</li><li>Audit plan Q&amp;A</li></ul>	<ul style="list-style-type: none"><li>Audit plan (3 pages) due on May 03</li><li>1-slide executive summary due on May 05</li></ul>



## POLICY STATEMENTS

### Academic Policies

#### *University Class Attendance Policy*

University Policy: As stated in the University's Class Attendance Policy, no right or privilege exists that permits a student to be absent from any class meetings, except for these University Approved Absences:

- Authorized University activities: University Approved Absence Office (UAAO) Website provides information FAQs for students and FAQs for faculty related to University Approved Absences
- Disability/religious observance/pregnancy, as required by law and approved by Accessibility Resources and Service and/or the Equal Opportunity and Compliance Office (EOC)
- Significant health condition and/or personal/family emergency as approved by the Office of the Dean of Students, Gender Violence Service Coordinators, and/or the Equal Opportunity and Compliance Office (EOC).

Instructors may work with students to meet attendance needs that do not fall within University approved absences. For situations when an absence is not University approved (e.g., a job interview, illness/ flu or club activity), instructors are encouraged to work directly with students to determine the best approach to missed classes and make-up assessment and assignments.

#### *Late Work*

No late work or participation will be accepted unless there is an excused and documented absence, as defined above.

#### *Honor Code Statement*

All students are expected to adhere to University policy and follow the guidelines of the UNC Student Code of Conduct. Additional information can be found at <https://studentconduct.unc.edu/>.

#### *Artificial Intelligence (AI) Use Policy*

Carolina students are expected to follow these AI guidelines: 1. AI should help you think, not think for you. You may be able to use these tools to brainstorm ideas, research topics, and analyze problems, but you must decide what's appropriate and accurate. 2. Engage responsibly with AI. You must evaluate AI-generated outputs for potential biases, limitations, inaccuracies, false output, and ethical implications. Do not put personal or confidential data into these tools. 3. The use of AI must be open and documented. You should declare, explain, and cite any use of AI in the creation of your work using applicable standards (e.g., APA, MLA, course guidelines). Understand that you are ultimately 100% responsible for your final product. 4. Follow specific AI guidelines in this syllabus. If you are unsure, check with me. Guidance offered in this syllabus would be referenced should an issue be referred to Student Conduct for alleged academic misconduct. For this particular class, and according to our general consensus, the following uses of generative AI tools are permitted: - Spell-checking and grammar checking - Obtain further clarification on complex topics - Brainstorm topic angles/perspectives - Summarize long external readings (although not in lieu of the original



assignment) - Draft emails to peers and members of the instructional team, provided that you review and edit the output before sending. - Copy-editing an initial, non-AI generated draft for clarity and conciseness

### *Syllabus Changes*

The instructor reserves the right to make changes to the syllabus including project due dates and test dates. These changes will be announced as early as possible.

### *Acceptable Use Policy*

By attending the University of North Carolina at Chapel Hill, you agree to abide by the University of North Carolina at Chapel Hill policies related to the acceptable use of IT systems and services. The Acceptable Use Policy (AUP) sets the expectation that you will use the University's technology resources responsibly, consistent with the University's mission. In the context of a class, it's quite likely you will participate in online activities that could include personal information about you or your peers, and the AUP addresses your obligations to protect the privacy of class participants. In addition, the AUP addresses matters of others' intellectual property, including copyright. These are only a couple of typical examples, so you should consult the full Information Technology Acceptable Use Policy, which covers topics related to using digital resources, such as privacy, confidentiality and intellectual property. Additionally, consult the Safe Computing at UNC website for information about data security policies, updates, and tips on keeping your identity, information, and devices safe.

### *Data Security & Privacy*

UNC-Chapel Hill is committed to fulfilling its responsibilities of transparency as a state-sponsored institution of higher learning, protecting certain types of information, and using information that Carolina collects only for appropriate purposes. Consult the UNC-Chapel Hill Privacy Statement for additional information.

### *Grade Appeal Process*

If you have any concerns with grading and/or feel you have been awarded an incorrect grade, please discuss it with me as soon as possible. If we cannot resolve the issue, you may talk to our director of undergraduate studies or assistant dean for academic affairs.

## **Services & Student Support Policies**

### *University Compliance Office - Accommodations*

University Compliance Office (UCO) Accommodations Team (Accommodations – UNC Equal Opportunity and Compliance) receives requests for accommodations for disability, pregnancy and related conditions, and sincerely held religious beliefs and practices through the University's Policy on Accommodations. UCO Accommodations team determines eligibility and reasonable accommodations consistent with state and federal laws.

### *Counseling & Psychological Services (CAPS)*

UNC-Chapel Hill is strongly committed to addressing the mental health needs of a diverse student body. The Heels Care Network website is a place to access the many mental health resources at Carolina. CAPS is the primary mental health provider for students, offering timely access to consultation and connection to clinically appropriate services. Go to their website <https://caps.unc.edu/> or visit their facilities on the third floor of the Campus Health building for an initial evaluation to learn more. Students can also call CAPS 24/7 at 919-966-3658 for immediate assistance.

### *Title IX Resources*

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made online to the EOC at <https://eoc.unc.edu/report-an-incident/> or by contacting the University's Title IX Coordinator (Elizabeth Hall, [titleixcoordinator@unc.edu](mailto:titleixcoordinator@unc.edu)) or the Report and Response Coordinators in the Equal Opportunity and Compliance Office ([reportandresponse@unc.edu](mailto:reportandresponse@unc.edu)). Confidential resources include Counseling and Psychological Services and the Gender Violence Services Coordinators ([gvsc@unc.edu](mailto:gvsc@unc.edu)). Additional resources are available at [safe.unc.edu](https://safe.unc.edu).



### *Policy on Non-Discrimination*

The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered, and that equitable and consistent standards of conduct and performance are applied. If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (email) or the Equal Opportunity and Compliance Office.

### *Learning Center*

Want to get the most out of this course or others this semester? Visit UNC's Learning Center at <http://learningcenter.unc.edu> to make an appointment or register for an event. Their free, popular programs will help you optimize your academic performance. Try academic coaching, peer tutoring, STEM support, ADHD/LD services, workshops and study camps, or review tips and tools available on the website.

