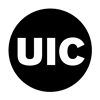
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PA 470: AI & ML for the Public Sector

CRN: 45542/3 | Spring 2023

Department of Public Administration

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| Instructor | Eric Langowski, Adjunct Lecturer |
| Course Location | Lincoln Hall, Room 312 |
| Meeting Times | TH 6:30pm – 9:15pm |
| Email | erhlango@uic.edu |
| Office Location | Online |
| Office Hours | By appointment via email |
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| **I. Course Information**  **Catalog Description:**  Public sector applications of artificial intelligence and machine learning. Philosophical foundations of artificial intelligence and major frameworks for learning. |

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| **Textbooks and Readings:**   * We have two assigned textbooks, both of which are available online:   + Tidy Modeling with R (<https://www.tmwr.org/index.html>)   + Data Science for Public Policy, Jeffrey Chen (can be downloaded as a pdf after login [here](https://link.springer.com/book/10.1007/978-3-030-71352-2)) * Readings are linked through the syllabus on the following pages. Please have read the assigned readings before attending class for the week, we will discuss all readings every class. |
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**II. Assessment Plan**

**Plan for Evaluating Student Achievement:**

a) Reading Responses (3@10%)

b) Guided Code Assignment (30%)

c) Final Project (30%)

d) Participation (10%)

Rubrics for each of these assignments will be posted to Blackboard or will be included within the assignment. This course is designed to balance assessment across the semester, while encouraging you to remain engaged in its discussion and readings. Below is an explanation of each graded item:

**Reading Responses** – You will create three reading responses: on a case study of ML/AI in the public sector, on the relationship between citizens, their data, government, and ML/AI, and on what you think an ideal application of AI/ML might be. These responses are primarily for you to gather your thoughts before class, and you should spend about an hour on each after completing that week’s readings. The form should be whatever you find most useful (diagrams, blog post, two-page case study, thought piece, your own idea). Use primary sources or lived experiences when appropriate, including but not limited to course readings. 2 responses must be shared with the class, all should be submitted on Blackboard.

**Guided Code Assignment** – Instead of having traditional problem sets, this course will have a single guided code assignment where you will submit your progress each week via GitHub and receive feedback. The assignment will be to create a new assessment model of properties in Detroit, Michigan. After the completion of the assignment, you will wrap your model into a report which analyzes the effectiveness of your model based on the ethical and other frameworks from class and make a brief presentation to the class.

**Final Project and Presentation** – Code or paper plus presentation. It is extremely difficult to create your own ML model especially in public sector applications. There are two options for the final project. Both options will be graded considering the ambition of the project idea. Please discuss your project idea with me early and often!

1. Find or simulate public sector data (e.g. open data or census plus generated data); formulate a problem for which ML is applicable; build a model; analyze the model including applicability, accuracy
2. Synthesize at least two different public sector applications of ML/AI and at least three readings from the class; construct a theoretical case study of a ML/AI application including data, modeling choices, ethical issues

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| **III. Course Policies**  **Assignment Submittal Guidelines:** Assignments should be completed by 11:59 p.m. on the due date. Submissions must be submitted via designated method on each assignment which is either GitHub or the Blackboardsystem. Late work will be docked 1 letter grade per day. |

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**Grading:**

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|  | Scale: | A | 90-100% D 60-69.99% |
|  |  | B | 80-89.99% F Below 60 |
|  |  | C | 70-79.99% |
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**Course Modifications:** The instructor reserves the right to make modifications to the syllabus and course schedule throughout the course, thus*the syllabus is not a contract and may be modified at his discretion*. Any changes will be announced in class, on Blackboard and/or email; it is the responsibility of the student to adhere to these changes. Unusual circumstances will be handled in accordance with DPA & CUPPA policies, or in consultation with the chair of the Department of Public Administration.

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| **Working with External Agencies:** In DPA courses, you may be required to interface with attorneys, executives, managers, directors, and/or staff in the public and/or nonprofit sectors as part of your course assignments. You are responsible for demonstrating the highest levels of professionalism, organization and tact as you schedule appointments, prepare for, conduct, and follow-up on meetings with your community counterparts. |

**IV. University Policies**

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| **Instructor Evaluation**: Students will have an opportunity to complete a university-approved course evaluation form late in the course. Additionally, the instructor will distribute a evaluation to assess student needs. Comments and information from the forms will help in developing this course in the future. Please refrain from disclosing any personally identifying information, and keep your tone objective and general.  **Academic Integrity:** The University of Illinois at Chicago is a student-centered research university that forges a responsive and ethical academic community. Its undergraduate, graduate, and professional programs are built upon intellectual inquiry, investigation, discovery, an open exchange of ideas, and ethical behavior. Members of the UIC community respect diversity, value the cultural differences of those around them, and engender a sense of social obligation. Because of these values, all individuals are expected to conduct themselves in a professional and civil manner. This includes exemplifying academic honesty, integrity, fairness, trustworthiness, personal responsibility, respect for others, and ethical conduct. These attributes are exhibited in the University as well as in the community. Responsibility for fulfilling the obligations of the code of honor is shared by the students, faculty, and every other member of the University community. |
| **You are responsible** for making yourself aware of and understanding the policies and procedures in the Graduate Catalog that pertain to academic integrity. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity, and computer misuse. If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of the Dean of Students. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with us if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test. Collaboration on homework assignments is unacceptable except when permission is explicitly granted by the instructor to submit a collaborative or combined-student piece of work. **All submitted works will be checked for plagiarism with the SafeAssign system.**  If a student is uncertain about an issue of academic honesty, he/she should consult the faculty member to resolve questions in any situation **prior** to the submission of the academic exercise.  Violations of academic honesty include but are not limited to cheating, fabrication, falsification, forgery, multiple submission, plagiarism, complicity, and computer misuse. The [Student Disciplinary Policy is available here](http://go.uic.edu/disciplinarypolicy).  Students who take this class are expected to submit their own work. If you use language, data, or ideas from other sources, published or unpublished, you must take care to acknowledge and properly cite those sources. Failure to do so constitutes plagiarism. Papers may be run through plagiarism checking software. All work submitted for this course must be original. Material that has been submitted for another course cannot be used in this course.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Disability Services**: To assure compliance with the Americans with Disabilities Act, faculty members at need to know how a disability will impact student participation and work in courses. Any student registered with Disability Resource Center who would like to discuss accommodations for this class should contact the instructor of record in a timely manner. Students with documented disabilities who are not registered with DSS should call the office at (312) 413‐2183 or visit <https://drc.uic.edu>. Students cannot request academic accommodations without first scheduling an appointment and meeting with a DRC staff member. If a student does not register with DRC, his/her academic accommodations/modifications cannot be accommodated.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Preferred Name Policy**: I allow students to indicate a preferred first name if different from their legal name. If a preferred first name is indicated on the roster, I will address students by the preferred first name unless the student requests otherwise.

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| The most updated schedule can be found at **<https://pa470spring2023.netlify.app/calendar/>** |

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| V. Course Schedule and Readings  The readings listed for each date should be completed ***prior to arriving in class***. Please view the course website for the schedule. |

## Week 1, 1/12

Introductions, Course Technology Stack, and Review

* [Can a Machine Learn Morality?](https://www.nytimes.com/2021/11/19/technology/can-a-machine-learn-morality.html)
* [Ask Delphi](https://delphi.allenai.org/?a1=Women+are+better+than+men.)
* [Crime Prediction Software Promised to Be Free of Biases. New Data Shows It Perpetuates Them](https://themarkup.org/prediction-bias/2021/12/02/crime-prediction-software-promised-to-be-free-of-biases-new-data-shows-it-perpetuates-them)
* [Crime Prediction Keeps Society Stuck in the Past](https://www.wired.com/story/crime-prediction-racist-history/)
* Chapter 6, Data Science for Public Policy (DSPP)

**Assignment:** [**Coding Warmup 0**](https://pa470spring2023.netlify.app/coding-warmup-0)

## Week 2, 1/19 (online)

Review, Conceptual Foundations, and Geospatial

* [tidymodels, Chapters 1-2](https://www.tmwr.org/index.html)
* Chapter 12, DSPP
* [sf](https://r-spatial.github.io/sf/)
* [tidycensus](https://walker-data.com/tidycensus/)
* [Urban Institute Guide](https://urbaninstitute.github.io/r-at-urban/mapping.html#Introduction)
* [Racism In, Racism Out](https://www.citizen.org/article/algorithmic-racism/)

**Assignment:** [**Coding Warmup 1**](https://pa470spring2023.netlify.app/coding-warmup-1)

## Week 3, 1/26 (online)

Coding 1

* [tidymodels, Chapters 3-4](https://www.tmwr.org/index.html)
* Chapter 7 & Sections 8.1/8.2, DSPP

**Assignment:** [**Coding Warmup 2**](https://pa470spring2023.netlify.app/coding-warmup-2)

## Week 4, 2/2 (online)

* Chapter 8, DSPP (continued)
* [tidymodels, Chapters 5-6 Fitting/Linear](https://www.tmwr.org/index.html)

Public Sector Case Studies

* [A Catalog of Civic Data Use Cases](https://datasmart.ash.harvard.edu/news/article/how-can-data-and-analytics-be-used-to-enhance-city-operations-723)
* [New York City Artifical Intelligence Strategy](https://www1.nyc.gov/assets/cto/downloads/ai-strategy/nyc_ai_strategy.pdf)
* [Secretary Antony J. Blinken at the National Security Commission on Artificial Intelligence’s (NSCAI) Global Emerging Technology Summit](https://www.state.gov/secretary-antony-j-blinken-at-the-national-security-commission-on-artificial-intelligences-nscai-global-emerging-technology-summit/)
* [Cook County Assessor Residential Valuation Model](https://gitlab.com/ccao-data-science---modeling/models/ccao_res_avm/-/tree/2021-assessment-year)
* [Summary of Agency Compliance Reporting, NYC Algorithms](https://www.nyc.gov/assets/oti/downloads/pdf/reports/ampo-agency-compliance-cy-2020.pdf)
* [Preparing for the Future of Artifical Intelligence](https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf)
* [Data Driven Information and the brave new world of smart firefighting](https://www.nfpa.org/-/media/Files/News-and-Research/Resources/Research-Foundation/Current-projects/Smart-FF/SmartFFNFPAJournalDataDriven.ashx)

**Assignment:** [**Reading Response 1, Case Study**](https://pa470spring2023.netlify.app/reading-response-1)

**Assignment:** [**Coding Warmup 3**](https://pa470spring2023.netlify.app/coding-warmup-3)

## Week 5, 2/9 (online)

Coding 2

* [Predictive Tools for Public Safety](https://datasmart.ash.harvard.edu/news/article/predictive-tools-for-public-safety-506)
* [tidymodels, Chapter 7-8 Workflow & Recipies](https://www.tmwr.org/index.html)

**Assignment:** [**Detroit Part 1, Due 2/13**](https://pa470spring2023.netlify.app/detroit-part-1)

## Week 6, 2/16 (online)

* Chapter 9, DSPP
* [tidymodels, Chapter 9 Effectiveness](https://www.tmwr.org/index.html)

Ethics: Government’s Black Box

* [A City Is a City — Against the metaphorization of data](https://everestpipkin.medium.com/a-city-is-a-city-against-the-metaphorization-of-data-2139be087a71)
* [ai.gov](https://www.ai.gov/)
* [Crafting an AI strategy for government leaders](https://www2.deloitte.com/us/en/insights/industry/public-sector/ai-strategy-for-government-leaders.html)
* [Using AI and machine learning to reduce government fraud](https://www.brookings.edu/research/using-ai-and-machine-learning-to-reduce-government-fraud/)
* [Fragile Algorithms and Fallible DecisionMakers: Lessons from the Justice System](https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.35.4.71)
* [REPORT: How to make AI work in government and for people, Case Studies](https://www.centreforpublicimpact.org/insights/how-to-make-ai-work-in-government-and-for-people)

**Assignment:** [**Response 2, Relationships**](https://pa470spring2023.netlify.app/reading-response-2)

**Assignment:** [**Coding Warmup 4**](https://pa470spring2023.netlify.app/coding-warmup-4)

## Week 7, 2/23

Coding 3

* [Model Evaluation, Model Selection, and Algorithm Selection in Machine Learning](https://arxiv.org/pdf/1811.12808.pdf)
* Sections 10.0-10.4, DSPP
* [Cross Validation Reduce, Reuse, Resample](https://mlu-explain.github.io/cross-validation/)

## Week 8, 3/2

Coding 4

* Sections 10.5-10.6, DSPP
* [tidymodels, Chapter 10-11 Resampling](https://www.tmwr.org/index.html)

**Assignment:** [**Detroit Part 2**](https://pa470spring2023.netlify.app/detroit-part-2)

## Week 9, 3/9

Ethical Critiques

* Chapter 14, DSPP

### Read 4

* [It’s COMPASlicated: The Messy Relationship between RAI Datasets and Algorithmic Fairness Benchmarks](https://arxiv.org/abs/2106.05498)
* [Excavating AI](https://excavating.ai/)
* [Assembling Accountability](https://datasociety.net/wp-content/uploads/2021/06/Assembling-Accountability.pdf)
* [To Live in Their Utopia: Why Algorithmic Systems Create Absurd Outcomes](https://ali-alkhatib.com/papers/chi/utopia/utopia.pdf)
* [Decolonial AI: Decolonial Theory as Sociotechnical Foresight in Artificial Intelligence](https://arxiv.org/pdf/2007.04068.pdf)
* [Algorithmic Risk Assessments Can Alter Human Decision-Making Processes in High-Stakes Government Contexts](https://www.benzevgreen.com/wp-content/uploads/2021/08/21-cscw.pdf)

Introduce Assignment: [*Final Project Proposal*](https://pa470spring2023.netlify.app/final-project), Due 4/4

**Assignment:** [**Reading Response 3, Ideals**](https://pa470spring2023.netlify.app/reading-response-3)

## Week 10, 3/16

Coding 4

* [Against Predictive Optimization: On the Legitimacy of Decision-Making Algorithms that Optimize Predictive Accuracy](https://predictive-optimization.cs.princeton.edu/)
* [tidymodels, Tuning Chapter 12-15](https://www.tmwr.org/index.html)

**Assignment:** [**Detroit Part 3**](https://pa470spring2023.netlify.app/detroit-part-3)

## Week 11, 3/23

Spring Vacation No Class

**Note: recording of solutions to Detroit Part 3 will be posted this week**

## Week 12, 3/30

Guest Speaker, public sector careers

* [In the Age of AI, Frontline](https://www.youtube.com/watch?v=5dZ_lvDgevk)
* [tidymodels, Chapter 18 Understanding Models](https://www.tmwr.org/index.html)

## Week 13, 4/6

Detroit Presentations

* Chapter 11, DSPP
* [Street–Level Algorithms: A Theory at the Gaps Between Policy and Decisions](https://dl.acm.org/doi/pdf/10.1145/3290605.3300760)

**Assignment:** [**Final Project Proposal**](https://pa470spring2023.netlify.app/final-project)**, Due 4/4**

**Assignment:** [**Detroit Final Submission & Presentation**](https://pa470spring2023.netlify.app/detroit-part-4)

## Week 14, 4/13

Coding 6

* Chapter 13, DSPP
* [tidymodels, Chapter 16, 19, 20](https://www.tmwr.org/index.html)

## Week 15, 4/20

Guest Speaker

Public Sector Implementation

* [A New Executive Order Ties Equity in AI to a Broader Civil Rights Agenda](https://points.datasociety.net/a-new-executive-order-ties-equity-in-ai-to-a-broader-civil-rights-agenda-ee448fda077b)
* [Implementation Challenges to Three Pillars of America’s AI Strategy](https://hai.stanford.edu/white-paper-implementation-challenges-three-pillars-americas-ai-strategy)
* [From Algorithmic Audits to Actual Accountability: Overcoming Practical Roadblocks on the Path to Meaningful Audit Interventions for AI Governance](https://dl.acm.org/doi/abs/10.1145/3514094.3539566)
* Ch 5 Weapons of Math Destruction, on Blackboard
* Chapter 15, DSPP

## Week 16, 4/27

Final Presentations

**Assignment:** [**Final Project**](https://pa470spring2023.netlify.app/final-project)**, Due 4/28**