# Taylor Olson

Assistant Professor of Computer Science, University of Iowa
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| **Research Interests** | Constructing moral and epistemological theories, deontic logics, and machine learning formalisms in hopes to better understand our moral nature and progress the moral competence of AI systems. |

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| **Education** | **Northwestern University, Evanston, IL** |
| | PhD Computer Science, 2025 |
| |     Thesis Title: *A Formal Theory of Norms* |
| |     Advisor: Professor Ken Forbus |
| |     Honors: IBM PhD Fellowship, 2023-24; Northwestern Cognitive Science Fellowship, 2018-19 |
| | Cognitive Science Certificate, 2023 |
| | **University of Northern Iowa, Cedar Falls, IA** |
| | B.S., Computer Science, 2018 |
| | B.A., Mathematics, 2018 |
| | Minor in Philosophy |
| | **Kirkwood Community College, Cedar Rapids, IA** |
| | Mechanical Engineering Transfer Program, 2014 |

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| **Research Experience** | **Thesis Research**, Computer Science, Northwestern University, Evanston, IL, 2018-Present |
| | Advisor: Professor Ken Forbus |
| | Project: *A Formal Theory of Norms* |

- Investigating the theoretical possibility of creating moral AI systems
- Developing predicate calculus knowledge representation and reasoning schemes for norms
- Developing machine learning models of norm learning and grounding them in reasoning
- Exploring defeasible logics for resolving normative conflicts

**Research Assistant (with Prof. Ken Forbus)**, Computer Science, Qualitative Reasoning Group, Northwestern University, Evanston, IL, 2018-Present
Project: *Social Reasoning for AI Systems*

- Implementing and testing normative reasoning in the Companions cognitive architecture
- Improving semantic parsing for learning norms via natural language

**Undergraduate Research Intern,** School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, Summer 2017
Advisors: Professor Dustin Tingley, Dr. Margot Levine
Project: *Clustering and Recommending Course Offerings from Syllabi*

- Built and tested an academic course recommender model trained on syllabi
- Developed a pipeline and interface for rapid development of ensemble machine learning models including LSA, LDA, K-nearest neighbors, and Doc2Vec/Word2Vec

**Research Assistant,** Computer Science, University of Northern Iowa, Cedar Falls, IA, 2016-17
Advisor: Professor Aleksandar Poleksić
Project: *Predicting Adverse Drug Reactions via Unified Medical Language System (UMLS)*

- Automated the translation of compound IDs to their standard IDs
- Analyzed coverage of compound IDs and their adverse reactions for prediction

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| **Publications** | Olson, T., Salas-Damian R., & Forbus, K.D. (2025). Reasoning and Planning with Dynamic Social Norms. (Extended Abstract) AAMAS-25. Detroit, Michigan. |
| | Olson, T., & Forbus, K. D. (2024). Normative Testimony and Belief Functions: A Formal Theory of Norm Learning. In *Proceedings of the 33rd International Joint Conference on Artificial Intelligence.* Jeju, South Korea. |
| | Olson, T., Salas-Damian R., & Forbus, K.D. (2024). A Defeasible Deontic Calculus for Resolving Norm Conflicts. Proceedings of the 11th Annual Conference on Advances in Cognitive Systems 2021. Palermo, Sicily, Italy. |
| | Olson, T. (2024). Towards Unifying the Descriptive and Prescriptive for Machine Ethics. In P. Wu , M. Salpukas, H. Wu, S. Ellsworth (Eds.), *Trolley Crash: Approaching Key Metrics for Ethical AI Practitioners, Researchers, and Policy Makers,* (Chapter 5)*.* Cambridge: Academic Press. |
| | Olson, T., & Forbus, K. D. (2023). Mitigating Adversarial Norm Training with Moral Axioms. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 37, No. 10, pp. 11882-11889). |
| | Olson, T. (2022). Towards Unifying the Descriptive and Prescriptive for Machine Ethics. In *Proceedings of the AAAI 2022 Spring Symposium on "Approaches to Ethical Computing Metrics for Measuring AI's Proficiency and Competency for Ethical Reasoning".* |
| | Olson, T. & Forbus, K. (2021). Learning Norms via Natural Language Teachings. In *Proceedings of the 9th Annual Conference on Advances in Cognitive Systems 2021.* |

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| **Invited Talks** | *A Formal Theory of Norms: Towards Artificial Moral Agents.* Rising Stars, University of Iowa, 2025. |
| | *Normative Testimony and Belief Functions: A Formal Theory of Norm Learning*, IJCAI-24, Jeju, South Korea, 2024. |
| | *A Defeasible Deontic Calculus for Resolving Norm Conflicts*, the 11th Annual Conference on Advances in Cognitive Systems 2024, Palermo, Sicily, Italy, 2024. |
| | *Mitigating Adversarial Norm Training with Moral Axioms*, Second International Workshop on Computational Machine Ethics, 20th International Conference on Principles of Knowledge Representation and Reasoning (KR2023), 2023. (Virtual). |
| | *Mitigating Adversarial Norm Training with Moral Axioms*, AAAI-23, Washington D.C., 2023. |
| | *Towards Unifying the Prescriptive and Descriptive for Machine Ethics*, AAAI-22 Spring Symposium on "Approaches to Ethical Computing Metrics for Measuring AI's Proficiency and Competency for Ethical Reasoning", Spring 2022. |
| | *Learning Norms via Natural Language Teachings,* The Ninth Advances in Cognitive Systems (ACS) Conference, 2021. |
| | *Artificial Intelligence in Curriculum Design*, National Conference for McNair Scholars and Undergraduate Research, University of Maryland, March 2018 |
| | *Artificial Intelligence and Recommender Systems*, McNair Seminar Series, University of Northern Iowa, September 2017. |
| | *Recommendation System Developer*, Joint Research Experience for Undergraduates Summer Symposium, Harvard University, August 2017. |

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| **Honors & Awards** | IBM PhD Fellowship, Northwestern University, 2023-2024 |
| | Cognitive Science Travel Grant, Northwestern University, 2023 |
| | Cognitive Science Fellowship, Northwestern University, 2018-2019 |
| | 4th Place, Midwest Instruction and Computing Symposium Programming Contest, 2017 |
| | 1st Place at site, ACM Programming Contest, 2016 |

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| | Ronald E. McNair Postbaccalaureate Achievement Program, 2016 - 2018 |
| | Student of the Month, Kirkwood Community College, 2014 |
| | NSF Engineering Scholarship, Kirkwood Community College, 2012-2014 |
| | Engineering project featured in local newspaper, 2012 |
| | All-Region Basketball, Kirkwood Community College, 2012-2014 |
| **Teaching** | Instructor, Machine Ethics Seminar, University of Iowa, Fall 2025 |
| | Instructor, Introduction to Cognitive Modeling, Northwestern University, Fall 2024 |
| | Guest lecturer, *Deontic Logic,* Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2024 |
| | TA, Introduction to Cognitive Modeling, Northwestern University, Fall 2020 – 2023 |
| | Guest lecturer, *Knowledge Representation,* Introduction to Cognitive Modeling, Northwestern University, Fall 2023 |
| | Guest lecturer, *Intelligent Tutoring Systems,* Introduction to Cognitive Modeling, Northwestern University, Fall 2022 |
| | Guest lecturer, *Deontic Logic,* Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2022 |
| | Guest lecturer, *Intelligent Tutoring Systems,* Introduction to Cognitive Modeling, Northwestern University, Fall 2021 |
| | Guest lecturer, *Philosophy and KRR - Deontic Logic,* Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2021 |
| | Guest lecturer, *Statistical Modeling - Introduction to Neural Networks,* Introduction to Cognitive Modeling, Northwestern University, Fall 2020 |
| | TA, AI and Experimental Narrative, Northwestern University, Spring 2020 |
| | Guest lecturer, *Philosophy and KRR,* Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2020 |
| | Guest lecturer, *Philosophy and KRR,* Knowledge Representation and Reasoning (KRR), Northwestern University, Winter 2019 |
| | URM Stem Tutor, University of Northern Iowa, 2016-2018 |
| **Service & Outreach** | IJCAI Reviewer, 2024 |
| | Mentor, High School Independent Study - Parsing and Knowledge Representation, Summer 2024 |
| | Mentor, Undergraduate Independent Study - Machine Ethics, Northwestern University, 2022 |
| | Grad Cohort for URMD, CRA-WP, Austin, TX, 2020 |
| | STEM Mentor, Morning Mentors, Nichols Middle School, Evanston, IL, 2019-2020 |
| | Reading Mentor, America Reads, Lincoln Elementary School, Cedar Falls, IA, 2016-2018 |
| **Software** | **Norms Reasoner:** https://github.com/TeeOhh/Norms-Reasoner |
| | An application and web interface for running our model of Moral Intuition and Construction on the Moral Conventional Transgression (MCT) Task experiment. |
| | **tRECS:** https://github.com/TeeOhh/tRECS |

Python NLP package and graphical interface capable of cleaning text data, building various statistical and vector space models, and creating recommender systems. With Janie Neal, Christiana Prater-Lee, and Eshita Nandini.

**UMLS-Similarity-Viewer**

Python package for graphical user interface to UMLS-Similarity, a similarity querying package built on top of the UMLS database of medicines, chemical compounds, and adverse drug reactions.