

# Maximilian E. Ororbia

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University of Pennsylvania  
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## Education

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### University of Pennsylvania, Philadelphia, PA

*Postdoctoral Fellow, Weitzman School of Design*  
*Polyhedral Structures Laboratory*

2023-Present

### Pennsylvania State University, University Park, PA

*Ph.D., Civil and Environmental Engineering*

2017-2023

Dissertation – “Discrete structural optimization as a sequential decision process solved using deep reinforcement learning”

### Bucknell University, Lewisburg, PA

*B.S., Civil and Environmental Engineering*

2013-2017

Honors thesis – “Analysis of statically indeterminate trusses for progressive collapse using graphic statics and complexity metrics”

## Employment

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### Research Experience

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#### Pennsylvania State University, University Park

*Research Graduate Assistantship*

2018-2023

Doctoral researcher under Dr. Gordon P. Warn.

*Summer Research Position*

2017

Research assistant for Dr. Gordon P. Warn and Dr. Aleksandra Radlinska, worked on PennDOT bridge design project.

#### Bucknell University

*Research Position*

2016-2017

Research assistant for Dr. Stephen Buonopane, worked on a project analyzing statically indeterminate truss structures for progressive collapse utilizing graphical methods and complexity parameters.

*Research Position*

2015-2017

Research assistant for Dr. Jeffrey Evans, assisted in the design, construction, and monitoring of a soil-bentonite slurry trench cutoff wall.

*Summer Research Position*

2014

Summer research assistant for Dr. T. Michael Toole, updated interface of a construction project management ‘flight’ simulator that employed systems thinking.

*Information Technology Consultant*

2013-2015

Assisted with networking and computing inquiries at the Bertrand Library Information Technology Desk.

### Teaching Experience

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#### Pennsylvania State University, University Park

*CE 341 (Design of Concrete Structures)*

2023

Teaching assistant: Held office hours and worked with Dr. Gordon Warn to design course assignments and exams.

- CE 340 (Structural Analysis) 2022  
Teaching assistant: Held office hours, provided software training, and worked with Dr. Kostas Papakonstantinou to design course assignments and exams.
- CE 337 (Civil Engineering Materials Laboratory) 2017  
Lecturer and teaching assistant for a laboratory course that investigated the physical and mechanical properties of civil engineering materials.
- Bucknell University**
- ENGR 100 (Engineering Design Experience) 2014-2015  
Teaching assistant: Graded assignments and assisted Dr. Jim Orbison with student activities related to engineering design projects.

## Publications and Conferences

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- 2023.....
- **Maximilian E. Ororbia**. "Discrete structural optimization as a sequential decision process solved using deep reinforcement learning." Ph.D. Thesis. <https://etda.libraries.psu.edu/catalog/23314meo9>
  - **Maximilian E. Ororbia** and Gordon P. Warn. "Design synthesis of structural systems as a Markov decision process solved with deep reinforcement learning." *Journal of Mechanical Design*, 1-19.
  - **Maximilian E. Ororbia**, Jaskanwal P. S. Chhabra, and Gordon P. Warn. "A sequential decision framework to support tradespace exploration of multi-hazard resilient and sustainable designs." *Book chapter, 48 pages. (In review)*
- 2022.....
- **Maximilian E. Ororbia** and Gordon P. Warn. "Structural optimization as a Markov decision process and deep reinforcement learning framework." *EMI/PMC: Symposium on Probabilistic Assessment, Inference, and Optimization Under Uncertainty. (Accepted talk)*
- 2021.....
- **Maximilian E. Ororbia** and Gordon P. Warn. "Design Synthesis through a Markov Decision Process and Reinforcement Learning Framework." *Journal of Computing and Information Science in Engineering*, 22:(2), 021002. American Society of Mechanical Engineers.
  - **Maximilian E. Ororbia** and Gordon P. Warn. "Structural Design Synthesis through a Sequential Decision Process." *EMI/PMC: Minisymposium on Advances in Artificial Intelligence for Stochastic Analysis, Control and Optimization of Structures and Infrastructure Systems. (Accepted talk)*
- 2020.....
- **Maximilian E. Ororbia** and Gordon P. Warn. "Structural Design Synthesis through a Sequential Decision Process." *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. Vol. 83983. American Society of Mechanical Engineers.
  - **Maximilian E. Ororbia**, Jaskanwal P.S. Chhabra, Gordon P. Warn, Simon W. Miller, Michael A. Yukish, Tong Qiu. "Increasing the Discriminatory Power of Bounding Models using Problem Specific Knowledge When Viewing Design as a Sequential Decision Process." *Structural and Multidisciplinary Optimization*: 1-20.
- 2019.....
- Vaclav Hasik, **Maximilian E. Ororbia**, Gordon P. Warn, and Melissa M. Bilec. "Whole Building Life Cycle Environmental Impacts and Costs: A Sensitivity Study of Design and Service Decisions." *Building and Environment* 163: 106316.
- 2017.....
- **Maximilian E. Ororbia**. "Analysis of Statically Indeterminate Trusses for Progressive Collapse using Graphic Statics and Complexity Metrics." *Bucknell Digital Commons*.
  - Jeffrey Evans, **Maximilian E. Ororbia**, James Gutelius, Daniel Ruffing, Landon Barlow, Michael Malusis. "Soil-Bentonite slurry trench cutoff wall lateral deformations, consolidation, stress transfer and hydraulic conductivity." *Proceedings of the 2nd Symposium on Coupled Phenomena in Environmental Geotechnics (CEPG2), Leeds, UK*.

## Professional Activities and Service

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### RIT Future Faculty Career Exploration Program (FFCEP)

*Selected Participant*

2021

Accepted into the 18th cohort of the Rochester Institute of Technology's (RIT) Future Faculty Career Exploration Program. Virtually participated in a three-day program consisting of workshops, panel discussions, and networking events focused on career development as a teaching and research faculty member.

### Structural Engineering Institute (SEI) Graduate Student Chapter

*Chapter President – <https://sites.psu.edu/seigsc/>*

2018-2023

Organized guest lectures, site visits, and hosted educational webinars to further SEI's mission to advance and serve the structural engineering profession.

### CSATS i-STEAM Workshop: 'It's a Matter of Truss: Designing Structures'

*Co-lecture & Co-organizer*

2018

Worked with Dr. Gordon Warn and Dr. Matthew Johnson from the Center for Science and the Schools (CSATS) to organize and host a K-12 educational workshop to introduce alternative teaching approaches to structural engineering.

### Fundamentals of Engineering (FE) Examination

*Engineer in Training (EIT) Certification*

2017

Passed the FE exam and received the Commonwealth of Pennsylvania EIT Certification.

### Bucknell Bridge Day Outreach Program

*Engineer and Educational Assistant*

2017

Taught elementary school students about civil engineering through various hands-on design activities.

## Funded Grants

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**2020:** Penn State College of Engineering's ROCKET Seed Grant program

PI: Dr. Gordon Warn; Project: *Design Synthesis through Deep Reinforcement Learning*

Contributor: Maximilian E. Ororbia, provided content and editorial assistance

## Scholarship and Awards

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- Alfred P. Sloan Foundation's Minority Ph.D. Fellowship (2018-2019 SLOAN Match Scholar cohort)
- Third place in the Bucknell Business Pitch Competition for the Small Business Development Center (2014, competition)