

# Keith J. Lee / Curriculum Vitæ

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RESEARCH INTERESTS	High-performance computing in structural design; low-carbon structural systems; constructability and complexity; circular structural design; data-driven design and optimization	
ACADEMIC APPOINTMENTS	<a href="#">Massachusetts Institute of Technology</a> , Cambridge USA Postdoctoral Associate <i>Department of Civil and Environmental Engineering</i> Advisor: <a href="#">Caitlin T. Mueller</a>	2026-PRESENT
	Lecturer <i>Department of Architecture</i> 4.463 Building Technology Systems: Structures and Envelopes	2025
PROFESSIONAL	<a href="#">Forma Systems</a> , Boston USA Head of Structural Design and Computation	2025-PRESENT
	<a href="#">JJJJound</a> , Montréal Canada Design Consultant: B/02 Bicycle	2019-2020
	<a href="#">BA Blacktop</a> , North Vancouver Canada Subsurface Grader	2012-2013, 2014
EDUCATION	MIT <i>Department of Architecture</i> Doctor of Philosophy in Architecture: Building Technology • Dissertation: <i>Geometric interpretations of structural demand for the analysis and reduction of design complexity</i> • Advisor: Caitlin T. Mueller	2025
	<a href="#">McGill University</a> , Montréal Canada <i>Department of Civil Engineering and Applied Mechanics</i> Master of Engineering • Thesis: <i>Moment-induced block shear failure in bolted flange plate connections</i> • Advisor: <a href="#">Colin Rogers</a>	2020
	Bachelor of Engineering	2018
TEACHING	MIT <i>Department of Architecture</i> Instructor	
	• 4.463 Building Technology Systems: Structures and Envelopes Analysis and design of structural systems, integrated with core studio curriculum. with Holly Samuelson Fall 2025 Student evaluation: 6.9/7	2025
	• 4.181 OFFCUT/CUTOFF Design and fabrication with aluminum waste material. with Latifa Alkhayat, Maryam Aljomairi, Sheila Kennedy and Caitlin T. Mueller. Sitra, Bahrain. MIT Independent Activities Period (IAP) workshop	2025
	• 4.181 Digital Circularity: Tooling up for reuse with Odds & Mods Disassembly, design, and reuse of model-scale components using digital tools. with Rachel M. Blowes, Celia Chaussabel, Alex Htet Kyaw, Karl-Johan Sørensen,	2024

Sheila Kennedy and Caitlin T. Mueller

MIT IAP workshop

- 4.S44 In Tension: The computational design, engineering, and fabrication of large scale sculptural rope networks 2023  
Design and fabrication of large-scale tensile networks using computational simulation and optimization. with Alessandro Beghini, Adam Burke, Janet Echelman, Caitlin T. Mueller and Nicole Wang  
MIT IAP workshop

Teaching Assistant

- 4.462 Introduction to Structural Design 2021, 2025  
Instructor: John Ochsendorf  
Student evaluation: 7/7 (2025), 6.9/7 (2021)
- 4.450 Computational Structural Design and Optimization 2022, 2024  
Instructor: Caitlin T. Mueller  
Student evaluation: 6.6/7 (2024), 5.8/7 (2022)
- 4.463 Building Technology Systems: Structures and Envelopes 2021, 2023  
Instructor: Caitlin T. Mueller  
Student evaluation: 7/7 (2025), 6.8/7 (2021)

McGill

*Department of Civil Engineering and Applied Mechanics*

Teaching Assistant

- CIVE318 Structural Engineering II 2019, 2020  
Instructor: Colin Rogers
- CIVE385 Structural Steel and Timber Design 2018, 2019  
Instructors: Amir Mofidi (2018), Sherif Kamel (2019)

PEER-REVIEWED  
PUBLICATIONS

**Lee, K.J.** and Mueller, C.T. “Harmonic analysis of planar truss connections to measure and reduce design complexity” *International Conference on Structures and Architecture* (in preparation) 2027.

**Lee, K.J.**, Mueller, C.T. and Huang, Y. “Differentiable assignment for circularity-driven structural design and optimization” *Engineering Structures* (in preparation) 2026.

Donovan, I., Schnitzler, J., Mueller, C.T., Cañada, J. and **Lee, K.J.** “Experimental investigation of a modular precast concrete beam system for demountable structures” *International Association of Shell and Spatial Structures Annual Conference* (under review) 2026.

Nathansohn, N., **Lee, K.J.**, Tibbits, S. and Mueller, C.T. “Reviving Icelandic vernacular: Computational optimization of raw basalt stone arches” *CAADRIA* 2026.

Hong, C.S.H., **Lee, K.J.** and Mueller, C.T. “Reinforcement learning for generative structural design: Optimizing truss-based cantilever structures without predefined topologies” *International Association of Shell and Spatial Structures Annual Conference* 2025.

Fontaine, A., Moldow, O.I., Blowes, R.M., **Lee, K.J.**, Sørensen, K-J and Mueller, C.T. “Stock-constrained design of pseudo-standard walls from stud offcuts” *International Association of Shell and Spatial Structures Annual Conference* 2025.

**Lee, K.J.**, Huang, Y., Mueller, C.T. “A differentiable structural analysis framework for high performance design optimization” *Structures* 2025.

Blowes, R.M., **Lee, K.J.**, Mayencourt, P., Kennedy, S. and Mueller, C.T. “A digital circularity approach to leverage waste lumber in dowel-laminated timber slabs” *International Conference on Structures and Architecture* 2024.

Alkhayat, L., **Lee, K.J.** and Mueller, C.T. “The Crown Jewels: Algorithmic design of rubble trusses for the Arabian Peninsula” *ACADIA* 2024.

Curth, A., Pearl, N., Wissemann, E., Cousin, T., Alkhatat, L., Jackow, V., **Lee, K.J.**, Moldow, O.I., Ismail, M.A., Mueller, C.T. and Sass, L. "EarthWorks: Zero waste 3D printed earthen formwork for efficient reinforced concrete construction" *Construction & Building Materials* 2024.

**Lee, K.J.**, Hirt, N.K. and Mueller, C.T. "Geometry, strength, and efficiency: Tracing the standardization of North American structural steel, 1888-present" *8<sup>th</sup> International Congress on Construction History* 2024.

Donovan, I., Schnitzler, J., **Lee, K.J.**, Wongsittikan, P., Liu, E. and Mueller, C.T. "Pixelframe: A reconfigurable, precast, post-tensioned concrete structural system for a circular building economy" *International scientific conference on the Built Environment in Transition* 2023.

Burke, A., **Lee, K.J.**, Echelman, J., Feldman, D. and Mueller, C.T. "FDMremote: Interactive inverse design of tensile structures with differentiable FDM" *International Association of Shell and Spatial Structures Annual Conference* 2023.

**Lee, K.J.**, Danhaive, R. and Mueller, C.T. "Spherical harmonic shape descriptors of nodal force demands for quantifying spatial truss connection complexity" *Architecture, Structures and Construction* 2022.

**Lee, K.J.** and Mueller, C.T. "Adapting computational protein folding logic for growth-based, assembly driven spatial truss design" *International Association of Shell and Spatial Structures Annual Conference* 2021.

OTHER  
PUBLICATIONS

**Lee, K.J.**, Titova, A., Mueller, C.T. and Ochsendorf, J. "Achieving next-generation transportation infrastructure through lifecycle performance assessment, design excellence, and digital fabrication" *MIT Policy perspectives on infrastructure* 2021.

**Lee, K.J.** "Influence and compromise in post-war Korean architecture" *MIT Architecture: Imprint 02* 2021.

APPLIED  
RESEARCH &  
DESIGN  
PROJECTS

[Pixelframe](#) 2022 - PRESENT

Reconfigurable pre-stressed concrete systems.  
with Inge Donovan, Jenna Schnitzler, Pitipat Wongsittikan and Caitlin T. Mueller.  
Supported by [Holcim](#) and the [MIT Climate and Sustainability Consortium](#)

Octahedral-Tetrahedral Spaceframes 2022 - PRESENT

Reconfigurable spatial truss system design with reused scaffolding struts.  
with Jerome Arul.

[Programmable Mud](#) 2023 - 2025

Low-carbon earthen construction.  
with Eduardo Gascón Alvarez, Alexander Curth, Larry Sass and Caitlin T. Mueller.  
Under construction.

[Digital Circularity/Odds & Mods](#) 2023 - 2025

Computational approaches to circular structural design.  
with Rachel M. Blowes, Celia Chaussabel, Alex Htet Kyaw, Karl-Johan Sørensen,  
Sheila Kennedy and Caitlin T. Mueller.

Make/Shift: Algorithmic design for a circular material future 2023

Zero-waste timber offcut design. Competition finalist.  
with Juliana Berglund-Brown, Inge Donovan, Kiley Feickert, Jenna Schnitzler and Caitlin T. Mueller

COMPUTATIONAL  
DESIGN TOOLS

[DigitalCircularityToolkit](#) 2023 - PRESENT

Grasshopper plugin for circular design.

[Asap.jl/AsapOptim.jl](#) 2021 - PRESENT

Structural analysis and gradient-based optimization.

	<a href="#">FDMremote</a>	2022 - 2023
	Grasshopper plugin for inverse form-finding of equilibrium networks.	
FUNDING & AWARDS	MIT	
	• MIT Research Support Committee Grant, \$90,000 PI: Caitlin T. Mueller	2025 - 2026
	• Avalon Travel Award, \$600	2022, 2024
	• TODA Travel Award, \$1,000	2022, 2024
	McGill	
	• Graduate Excellence Award, \$5,000CAD	2019
	• Engineering Undergraduate Student Master's Award (MEUSMA), \$15,000CAD	2018 - 2019
	• Hydro Québec Scholarship, \$20,000CAD	2018 - 2019
	• Greville Smith Scholarship, \$40,000CAD	2013 - 2017
	<a href="#">National Science and Engineering Research Council of Canada</a>	
	• Alexander Graham Bell Scholarship - Master's (CGS-M), \$35,000CAD	2019
	• Undergraduate Summer Research Award (USRA), \$7,000CAD	2016, 2018
	<a href="#">Fonds de Recherche Québec Nature et Technologies</a>	
	• Bourse de Recherche de Première Cycle (BRPC), \$2,000CAD	2016, 2018
EXHIBITIONS	From Liquid to Stone: A reconfigurable concrete tectonic against obsolescence with Inge Donovan, Emily Liu, Caitlin T. Mueller, Jenna Schnitzler and Pitipat Wongsittikan. Venice Biennale.	2025
	Programmable Mud with Alexander Curth, Eduardo Gascón Alvarez, Larry Sass and Caitlin T. Mueller. Venice Biennale.	2025
INVITED REVIEWS & JURIES	1.562 Structural Design Project I Instructor: Paul Richardson MIT Civil and Environmental Engineering, Cambridge USA	2025
	GSD 01201 - Third Semester Core: Architectural Design Coordinator: Eric Höweler Harvard Graduate School of Design, Cambridge USA	2025
	4.153 Architectural Design Core Studio III Coordinator: J. Yolande Daniels MIT Architecture, Cambridge USA	2025
	4.462 Introduction to Structural Design Instructor: John Ochsendorf MIT Architecture, Cambridge USA	2022 - 2024
	4.463 Building Technology Systems: Structures and Envelopes Instructor: Caitlin T. Mueller MIT Architecture, Cambridge USA	2021 - 2024
	4.041 Advanced Product Design Instructor: Xavi L. Aguirre MIT Architecture, Cambridge USA	2023
	ARCH 448 Structural Systems in Architecture II Instructor: Jonathan Dessi-Olive Kansas State University, Manhattan USA	2021
INVITED TALKS	The geometry of what we want and the shape of what we have University of Manitoba Faculty of Architecture, CAST Lecture Series, Winnipeg Canada	2026

Computational Structural Optimization I, II	2025
Stanford CEE 280: Advanced Structural Analysis, Stanford USA	
Digital Circularity	2025
OFFCUT/CUTOFF, Muharraq Bahrain	
The Crown Jewels: Algorithmic design of rubble trusses for the Arabian Peninsula	2024
ACADIA2024, Banff Canada	
Digital Circularity: Algorithmic approaches to large-scale reuse	2024
Tecnológico de Monterrey, Santiago de Querétaro Mexico	
Structural analysis and optimization	2024
MIT 4.450 Computational Structural Design and Optimization, Cambridge USA	
Differentiable assignment for circularity-driven structural design and optimization	2024
ACM SIGGRAPH Symposium on Geometry Processing, Cambridge USA	
A differentiable assignment algorithm for high performance, inventory-driven structural design	2023
EPFL (in)visible reuse Research Symposium, Lausanne Switzerland	
Structural Steel	2021 - 2024
MIT 4.463 Building Technology Systems: Structures and Envelopes, Cambridge USA	
Introduction to the Finite Element Method	2022
MIT 4.450 Computational Structural Design and Optimization, Cambridge USA	
Pixelframe: Concrete structures against obsolescence	2022
MIT Climate & Sustainability Consortium Symposium, Cambridge USA	
Reducing embodied energy with novel building structures	2022
Groupe Bouygues - MIT Industrial Liason Program, Cambridge USA	
The similarity of forces in equilibrium: A geometric approach	2022
Foster + Partners, London UK	
Spherical harmonic shape descriptors of nodal force demands for quantifying spatial truss connection complexity	2022
5 <sup>th</sup> International Conference on Structures & Architecture, Aalborg Denmark	
Adapting computational protein folding logic for growth-based, assembly driven spatial truss design	2021
International Association of Shell and Spatial Structures Annual Conference, Surrey UK	
Complexity & similarity in structural design	2021
MIT Architecture SMarChS Colloquium, Cambridge USA	
ACADEMIC ADVISING	
MIT	
Thesis Reader	
• Jenna Schnitzler, <i>SM Building Technology</i> . Now Guy Nordenson and Associates	2024
• Inge Donovan, <i>SM Building Technology</i> . Now Faculty at University of Manitoba	2024
Research Mentor	
• Karl-Johan Sørensen, <i>SMArchS Computation</i> . Now PhD Student at MIT	2023 - 2024
• Natasha Hirt, <i>SM Building Technology</i> . Now PhD Student at MIT	2023 - 2024
• Jenna Schnitzler, <i>MArch</i> . Now Guy Nordenson and Associates	2022 - 2024
• Inge Donovan, <i>MArch</i> . Now Faculty at University of Manitoba	2022 - 2024
• Pitipat Wongsittikan, <i>SM Building Technology</i> . Now PhD Student at MIT	2022 - 2024
• Jerome Arul, <i>SM Engineering and Management</i> . Now Faculty at RISD	2022 - 2023
• Adam Burke, <i>SMArchS Building Technology</i> . Now PhD Student at MIT	2022

- Alena Titova, *MArch.* 2021
- Undergraduate Research Opportunity Program (UROP)
- Yanjun (Emily) Liu, *SB.* 2022 - 2023
- Collin Wen, *SB.* 2022
- Azariah (Azu) Beyene, *SB.* 2022

McGill

Summer Undergraduate Research in Engineering (SURE)

- Leilah Y.K. Sory, *B.Eng.* Now SM Building Technology at MIT, Arup 2020
- Jacob Burke, *B.Eng.* 2019
- Mairvat Abdulhamid, *B.Eng.* Now M.Eng McGill 2019

SERVICE

- Admissions Committee 2024
- MIT Architecture - Building Technology
- Stride into STEM: Generative Structural Design 2022
- Altair - Instructor
- Engineering Independence: Concrete Architecture in the Global South 2021
- MIT Architecture - Symposium Organizer

PATENTS

- Pixelframe 2023
- Reconfigurable precast concrete construction system for buildings designed through algorithmic engineering with inventory constraints*
- Serial No. 63/499,222
- Provisional.

WORKFLOW

- Languages
- English (native), French (proficient), Korean (proficient)
- Computation
- Programming: Julia, C#, Python, Matlab
- CAD: Rhinoceros3D/Grasshopper
- Engineering: Abaqus/CAE, Karamba3D
- Typesetting: LaTeX, Typst
- Design: Adobe Suite
- Structural Laboratory/Construction
- Hydraulic actuators/controllers (MTS)
- Measurement: LVDTs, string potentiometers, strain gauges, DAQ systems (Strainsmart, MTS)
- General powered/non-powered construction equipment
- Qualifications (Canada): Construction safety, forklift operation, bridge crane operation, working at heights, WHMIS

REFERENCES

- Caitlin T. Mueller (Associate Professor, MIT)
- John Ochsendorf (Professor, MIT)
- Sheila Kennedy (Professor, MIT)
- Guy Nordenson (Professor, Princeton)
- Colin Rogers (Professor, McGill)
- Contact information available upon request.

LAST UPDATED: 2026-06-01  
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