
Thursday, September 23, 2021 | 3:00 PM – 4:00 PM
[REGISTRATION LINK](#) | [ZOOM LINK](#) | Passcode: 156138
In-person Class Held in Malone G33/35 (open to first 50 people)

“Utilizing Digital Fabrication to Drive Innovation in (Multi-)Functional Materials”

Presented by [Professor Jochen Mueller](#)

Department of Civil and Systems Engineering, Johns Hopkins University

Human creativity paired with modern, computational tools can derive the most captivating designs. The physical realization, however, remains a challenge, as both academia and industry continue to strive for a process that is economical, fast, repeatable, and that enables unlimited design freedom. Digital Fabrication and, in particular, Additive Manufacturing (AM) has emerged as a potent alternative to conventional processes and is considered by many the holy grail. Despite the hype, however, AM still lacks behind the expectations and is often incapable of handling the required complexity, which significantly limits progress in dependent research fields.

In the seminar talk, I will address both the digital design of novel materials and structures with outstanding properties, and the fabrication thereof. I will show how the mutual exclusivity between strength and toughness can be overcome and how (multi-)functionality, such as actuation and sensing, can be integrated on a materials level. This requires AM-based solutions specifically tailored to such complex designs that cannot be fabricated in any other way. I will further address the general limitations of AM and show ways on how they can be overcome.



Jochen Mueller, an assistant professor in the Department of Civil and Systems Engineering at Johns Hopkins University, performs research that combines additive manufacturing, functional materials, and computational design in order to create programmable matter. Developing novel fabrication processes to enhance the structural complexity, material versatility, and throughput speed in 3D printing, Mueller’s Laboratory for Digital Fabrication and Programmable Matter combines the fabrication processes with computational tools to create or manipulate existing materials and structures in order to change their properties

and improve their performance. In 2020, Mueller received the Lopez-Loreta Prize to conduct research on how to improve the materials used in prosthetic devices. Holding a doctorate from ETH Zurich, a master’s in Advanced Mechanical Engineering from Imperial College London, and a bachelor’s in Mechanical Engineering from Albstadt-Sigmaringen University, Mueller recently completed a postdoctoral fellowship at Harvard University in the Wyss Institute for Biologically Inspired Engineering. He received the ETH Medal in 2018 for his doctoral dissertation.