

## MECHANICAL ENGINEERING MSc SEMINAR

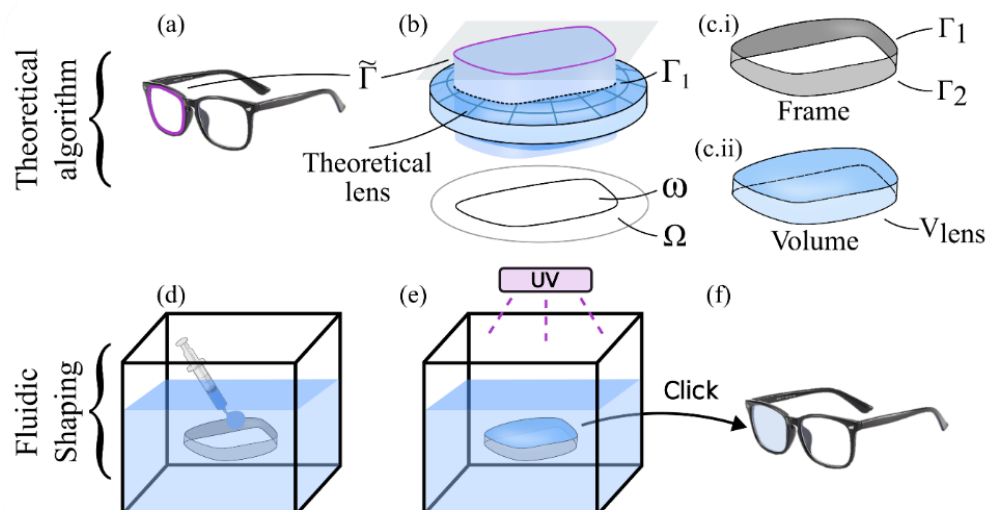
Monday, July 13, 2026, at 16:10-16:40, Lady Davis Building, Room 440

### Zero-waste manufacturing of ophthalmic lenses by direct Fluidic Shaping in arbitrary domains

Yotam Katzman

Adviser: Prof. Moran Bercovici

Traditional manufacturing of ophthalmic lenses relies heavily on mechanical grinding and polishing. These subtractive processes are not only expensive and time-consuming but also inherently wasteful. While Fluidic Shaping offers a promising alternative by utilizing surface tension to naturally create exceptionally smooth optical surfaces, this method has conventionally been restricted to simple, elliptical boundaries. In this seminar, I will present a novel methodology that overcomes this limitation, enabling the manufacture of optical components by utilizing Fluidic Shaping directly on arbitrary boundary domains. I will introduce the *Cookie Cutter* algorithm - a theoretical and experimental framework that dictates the exact boundary conditions required to precisely control the topography of a bounded liquid volume. I will start by detailing the mathematical derivation of our governing equations. Next, I will discuss the physical fabrication process and the experimental setups used to transition these theoretical models into solid, UV-cured polymer lenses. Finally, I will present a sensitivity analysis and our experimental validation together with an evaluation of the optical performance of the resulting lenses, demonstrating the potential of this approach for customized, zero-waste optics manufacturing.



**Figure 1** – The Cookie Cutter algorithm and fabrication process via Fluidic Shaping. First row: the theoretical Cookie Cutter algorithm. Second row: the Fluidic Shaping lens fabrication process.