

# EML WEBINAR

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FRIDAY, 19 JUNE 2026

10 AM BOSTON, 10 PM BEIJING

4 PM PARIS, 3 PM LONDON



## ALAIN GORIELY

UNIVERSITY OF OXFORD

### TILINGS AND MOSAICS: SOFT CELLS AND THE TAINTED LOVE OF THE NAUTILUS

Mosaic patterns and tilings are ubiquitous in nature, appearing in systems ranging from cellular tissues and geological formations to biological shells and foams. Traditionally, these structures have been modeled using polyhedral tilings composed of flat faces, straight edges, and sharp corners. However, careful observation reveals that many natural tilings deviate significantly from this paradigm: their boundaries are curved with smooth interfaces. This realisation has motivated the introduction of a new class of shapes known as soft cells, which arise as smooth deformations of standard tilings. Such cells are found in the geometry of metal and liquid foam as well as in many micro-structures modelled by triply periodic minimal surfaces. They also appear naturally in morphogenesis. In this talk, I will explain the mathematics of mosaics, hard and soft, describe their construction and classification, and illustrate how they provide a more accurate geometric description of patterns found in biology, architecture, engineering, in the deepest sea and even in space.

**Alain Goriely** is a mathematician with broad interests in mathematical methods, mechanics, sciences, and engineering. He is well known for his contributions to fundamental and applied mechanics, and, in particular, for the development of a mathematical theory of biological growth, culminating with his seminal monograph *The Mathematics on Mechanics of Biological Growth* (2017). He received his PhD from the University of Brussels in 1994 where he became a lecturer. In 1996, he joined the University of Arizona where he established a research group within the renowned Program of Applied Mathematics. In 2010, he joined the University of Oxford as the inaugural Statutory Professor of Mathematical Modelling and fellow of St. Catherine's College. He is currently the Director of the Oxford Centre for Industrial and Applied Mathematics. In addition, Alain enjoys scientific outreach based on problems connected to his research including tendril perversion in plants, twining plants, umbilical cord knotting, whip cracking, the shape of seashells, brain modelling. He is the author of a *Very Short Introduction to Applied Mathematics* (2017) and the Gresham Professor of Geometry at Gresham College London where he gives public lectures on a broad range of mathematical topics. For his contribution to mathematics and sciences, he was elected Fellow of the Royal Society in 2022, received the Society of Engineering Science Engineering Medal in 2024 and the David Crighton Medal in 2025.

Discussion leader: **Ellen Kuhl**, Stanford University

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