Shape: mathematics, physics and biology

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Mathematically, the shape of an object is defined as what is left over after scale, translation and rotation are eliminated. How can we describe, predict, design and perceive shape? Using the vast diversity of biological shapes as motivation, I will show how physical theories and experiments can build on geometrical descriptions to provide a predictive theory of shape in such contexts as stems and leaves, and guts and brains. Understanding these allows us to ask how we might solve the inverse problem of engineering shape, a question that I will answer by asking how we might grow a flower or a face. Finally, if there is time, I will describe some new mathematical approaches to how we perceive shape, probabilistically.

Monday, May 8, 2017 04:00pm - 05:15pm
Raiffeisen Lecture Hall, Central Building

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