Summary
The course will be split into three parts which will respectively cover bio-filaments, bio-membranes and morphoelasticity.

Content
-- statistical mechanics of different chains of growing complexity.
-- classical rod mechanics (Kirchhoff and Cosserat).
-- Geometry of surfaces and its application to mechanics.
-- Fluid bio-membranes.
-- Axisymmetric Membranes and Shells in linear and nonlinear elasticity.
-- Growth of rods.
-- A brief introduction to classical nonlinear elasticity.
-- Volumetric growth.

Keywords
nonlinear elasticity
growing bodies
bio-filaments
bio-membranes

Learning Prerequisites
Required courses
Analysis I-III
Physics I

Recommended courses
Physics II

Learning Outcomes
By the end of the course, the student must be able to:
• Develop models of different systems in the framework of continuum mechanics.
• Solve typical problems related to mechanics and growth.
• Propose well motivated approximations.

Expected student activities
Besides attending the lecture and exercise sessions (which are both recommended albeit not compulsory), the curious students will be strongly encouraged to also do some home reading.

**Assessment methods**

oral exam

"Dans le cas de l’art. 3 al. 5 du Règlement de section, l’enseignant décide de la forme de l’examen qu’il communique aux étudiants concernés."

**Supervision**

<table>
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<td>Forum</td>
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**Resources**

- Virtual desktop infrastructure (VDI)
  - No

**Websites**

- [http://mathgeomsrv2.epfl.ch/teaching/MathematicalMechanicalBiology/](http://mathgeomsrv2.epfl.ch/teaching/MathematicalMechanicalBiology/)