Programa de Pós-graduação Multidisciplinar em Física Aplicada, IF-UFRJ

Prof. Nathan Bessa Viana

Disciplina: *Tópicos em Elasticidade e Reologia de Materiais Moles*

Carga horário: 60 horas

Créditos: 4

Ementa

Primeira parte, livro texto: **Feynman Lectures on Physics, volume 2**, R. P. Feynman

Chapter 38 - Elasticity: Hooke's law, uniform strains, the torsion bar, the bent beam, buckling.

Chapter 39 – Elastic Materials: the tensor of strain, the tensor of elasticity.

Segunda parte, livro texto: **The Phenomenological Theory of Linear Viscoelastic Behavior**, N. W. Tschoegl.

Chapter 1 – Introductory Concepts: constitutive equations, stress, strain and rate of strain, pure elastic linear response for homogeneous and isotropic materials, the generalized Hooke's law, purely viscous response.

Chapter 2 – Linear Viscoelastic Response: linear time-dependent behavior, the impulse response functions, the step response functions, the slope response functions, the harmonic response functions, excitation and response in the time domain.

Chapter 3 – Representation of Linear Viscolastic Behavior by Series-Parallel Models – Theory of model representation, electromechanical analogies, elementary rheological models, models with minimum number of elements, models with of elements.

Terceira parte – artigos:

- X. Trepat, L. Deng, S. S. An, D. Navajas, D. J. Tschumperlin, W. T. Gerthoffer, J. P. Butler, and J. J. Fredberg, Universal physical responses to stretch in the living cell, Nature (London) 447, 592 (2007).

- M. Balland, N. Desprat, D. Icard, S. Féréol, A. Asnacios, J. Browaeys, S. Hénon, and F. Gallet, Power laws in microrheology experiments on living cells: Comparative analysis and modeling, Phys. Rev. E 74, 021911 (2006).

- Y. A. Ayala, B. Pontes, B. Hissa, A. C. M. Monteiro, M. Farina, V. Moura-Neto, N. B. Viana, and H. M. Nussenzveig, Effects of cytoskeletal drugs on actin cortex elasticity, Exp. Cell Res. 351, 173 (2017).
- Fran Gómez , Leandro S. Silva, Glauber Ribeiro de Sousa Araújo , Susana Frases, Ana Acacia S. Pinheiro, Ubirajara Agero, Bruno Pontes, and Nathan Bessa Viana,

Effect of cell geometry in the evaluation of erythrocyte viscoelastic properties, PHYSICAL REVIEW E 101, 062403 (2020)

Critérios de avaliação

a) Mapas conceituais: 25%

b) Listas de exercícios: 25%

c) Trabalho: 25%

d) Prova: 25%

Bibliografia auxiliar

Mechanics of the Cell, David Boal.