

O553.5335 Natural-Based Polymers for Biomedical Applications

Prof. Meital Zilberman

**The Maurice and Gabriela Goldschleger Multidisciplinary Research Building in
Engineering and Exact Sciences, Room 413**

Tel: 03-6405842

e-mail: meitalz@eng.tau.ac.il

Course Outline

Polymers from natural sources are particularly useful as biomaterials and in regenerative medicine, due to their similarity to the extracellular matrix and other polymers in the human body. This course reviews both new and well known natural-based biomedical polymers, together with their applications as implantable biomaterials, scaffolds for tissue engineering and controlled release carriers. It includes the sources, processing and properties of various polysaccharides and proteins, as well as methods for surface modification to improve their functionality. Special emphasis will be given to collagen, hyaluronic acid, alginates and soy protein.

<u>Lecture</u>	<u>Topic</u>
1	Introduction: Polymers as biomaterials for Tissue Engineering and Controlled Drug Delivery
2-3	Natural polymers: structure, properties and application of proteins and polysaccharides.
4-5	Collagen in service of Medicine and Biotechnology
6	ECM based scaffolds
7	Chemical structure and its effect on biophysical properties
8-9	Gelatin in biomedical applications
10	Alginate as a biomaterial.
11	Soy-protein as a biomaterial.
12	Biopolymers for heart Tissue Engineering
13	Preparation for the final exam.

Course Requirements:

Final exam – 100%

Recommended literature:

1. "Natural-based polymers for biomedical applications", Edited by R.L. Reis, Wood head Publishing LTD, 2008.
2. "Principles of Tissue Engineering", Edited by Robert P. Lanza, Robert Langer and Joseph Vacanti, Academic Press, 2000 (or newer Ed.).
3. "Biomaterials Science – An Introduction to Materials in Medicine", Edited by: Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen and Jack E. Lemons, Academic Press, San Diego, 2000 (or newer Ed).
4. Review articles.