



Universidad de Buenos Aires



FACULTAD DE INGENIERIA
Depto de Ingeniería Mecánica

CIDIDI

CENTRO DE INVESTIGACIÓN,
DESARROLLO, INNOVACIÓN
Y DISEÑO EN INGENIERÍA

MATERIALS IN MEDICINE: FROM TISSUE REPLACEMENT TO ORGAN REGENERATION

Prof. Diego Mantovani

(Laval University, Quebec City, Canada)

12 al 16 de Noviembre, 2007 18-21 hs

Salón Auxiliar del Consejo Directivo (P.B.)
Paseo Colón 850, Ciudad de Buenos Aires

Idioma del Curso: INGLÉS

Inscripción y consultas: Dpto. de Ingeniería Mecánica
mecanica@fi.uba.ar, cididi@fi.uba.ar

Solicitar inscripción enviando los siguientes datos:

- Nombre y Apellido
- DNI
- Estudiante (indicar carrera y año) / Graduado (indicar título)
- Lugar de Trabajo
- Teléfono de contacto

Certificados: Asistencia / Aprobación

Para la obtención del Certificado de Aprobación se deberá aprobar un Trabajo Especial o Monografía, según sea solicitado por el Profesor.

Costo del Certificado: \$20,00.

Atención de Consultas y Discusión de Trabajos Científicos:

El Prof. Diego Mantovani atenderá consultas y podría visitar laboratorios. Para poder organizar las reuniones y posibles visitas a Laboratorios, relacionados con el tema del curso, se sugiere que los interesados escriban al Dpto. de Ingeniería Mecánica enviando los siguientes datos:

- *Nombre y Apellido*
- *Estudiante / Graduado*
- *Lugar de Trabajo*
- *Tema de Interés*
- *Teléfono de contacto*



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Course content

GOALS

This fifteen hours course is mainly addressed to those (graduate or undergraduate) students from Faculty of science and engineering interested to deep their knowledge in materials in medicine, artificial organs, tissue engineering and reparative medicine. Students from Medicine Faculty are also welcome. First, some basic topics in biology and physiology will be addressed. Second, the main challenges in material in medicine will be discussed. Selected applications will be then presented. Finally, the student will be asked to think on the general problem of implanting materials in the human body, and their selection of the required physiological functions and envisaged applications to help diseased people to restore lost or damaged functions. The pro-active implication of the students is required and stimulated all over the course.

STRUCTURE

The course is articulated over 15 hours in five days.

PROFESSOR

Diego Mantovani, PhD

Director, Laboratory for Biomaterials and Bioengineering

Professor, Dept Materials Engineering

Scientist, University Hospital Research Center

Laval University, Quebec City, Canada

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TOPICS

Engineering of the Cardio-Vascular and Orthopaedic System (3 h)

- ◆ Component of a living system
- ◆ Physiology and anatomy to control and regulate cardiovascular system
- ◆ The heart as a machine. Efficiency. The model of Guyton.
- ◆ Blood rheology and hemodynamics.
- ◆ Bone and its structure.
- ◆ Bone physiology and anatomy.
- ◆ Different type of bone. Bone vascularisation.
- ◆ Cells, hemo-compatibility, biocompatibility. Cell culture.
- ◆ Elements of toxicology.

Materials in Medicine (6 h)

- Biomaterials for the cardiovascular system.
- Metals, polymers, ceramics. Structure/properties relationships.
- Biomaterials for artificial heart, valves, vessels, kidney, lungs.
- Biomaterials for bone, cartilage, ligaments and tendons.
- Biomaterials in dentistry
- Other types of biomaterials (nervous, esthetic, others).
- Introduction to biomaterials for tissue engineering.

Materials for Tissue Engineering and Regenerative Medicine (3 h)

- Need for 3D cell culture
- Materials for scaffolding cell culture
- Material processing for porous structures
- Degradable or not degradable materials?
- Bioreactors, or putting materials working with cells ...
- Cell sources

Materials in Medicine: What's next? (3 h)

- Inert or pro-active materials?
- Material processing
- Cells: The dilemma of stem cells
- From Lab to Patient
- Industry: Large scale production and stock management
- Ethical considerations

REFERENCES

1. Silbernagl S., Despopoulos A. *Physiology*, Médecine - Sciences, Flammarion, 1992.
2. Ratner B.D., Hoffman A.S., Schoen F.J., Lemons J.E. *Biomaterials Science: An Introduction to Materials in Medicine*, Academic Press, 2004.

A complete list of web site of major interests will be furnished to students.