

# MEDICAL BIOTECHNOLOGY AND NANOBIOTECHNOLOGY (LM49)

(Lecce - Università degli Studi)

## Teaching CELL-BIOMATERIAL INTERACTION

GenCod A004558

**Owner professor** Michele MAFFIA

**Teaching in italian** CELL-BIOMATERIAL INTERACTION **Course year** 2

**Teaching** CELL-BIOMATERIAL INTERACTION

**Language** INGLESE

**SSD code** BIO/09

**Curriculum** NANOBIOTECNOLOGICO

**Reference course** MEDICAL BIOTECHNOLOGY AND

**Course type** Laurea Magistrale

**Location** Lecce

**Credits** 6.0

**Semester** Primo-Semestre

**Teaching hours** Ore-Attività-frontale: 48.0

**Exam type**

**For enrolled in** 2019/2020

**Assessment**

**Taught in** 2020/2021

**Course timetable**

<https://easyroom.unisalento.it/Orario>

## BRIEF COURSE DESCRIPTION

The study of the interactions of bio-materials with living cells and organisms play a fundamental role for the preparation of the figure of a biotechnologist in the use of bio-materials in the biomedical and biotechnological field.

The course aims to provide specific knowledge on the physiology of the interactions between cells and materials in vivo and in vitro by deepening the mechanisms underlying these interactions, the physiological response processes as well as the study techniques for these phenomena.

- Control and regulation of cellular functions such as adhesion, migration and trans membrane transport mechanisms.
- Physiological role of receptors and membrane proteins (channels, transporters, structural membrane proteins; adhesion proteins) in cell-material interactions; signal transduction mechanisms.
- Cellular responses to natural materials.
- Proteomics, lipidomics and mass spectrometry approaches for the analysis of proteins and lipids involved in cell-material interaction processes.
- Physiology of stem cells.

## REQUIREMENTS

### Prerequisites:

Teaching requires basic knowledge of chemistry, physics, general biology, biochemistry, human anatomy.

No preparatory provisions are foreseen in the current educational system.

## COURSE AIMS

Acquisition of basic concepts on the physiology of cell-material interactions in vivo and in vitro. Learning of the main study techniques of the molecules involved in the cell-material interaction processes. Ability to apply this knowledge in the biotechnological and biomedical fields for the realization of devices for drug delivery and other clinical applications.

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**TEACHING METHODOLOGY**

Face-to-face lessons: 48 h.

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**ASSESSMENT TYPE**

Learning is assessed through an oral exam during which the acquisition of the correct scientific language and that of the discipline is verified. The student must demonstrate that he has acquired the physiological foundations of cell and bio-material interactions in vivo and in vitro, the techniques for studying interactive phenomena and applicability in the biomedical and biotechnological field.

The mark is expressed in thirtieths on the basis of the evaluation of the Exam Commission with reference to the above aspects

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**ASSESSMENT SESSIONS**

<https://www.scienzemfn.unisalento.it/536>

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**OTHER USEFUL INFORMATION****Office hours:**

At the teacher's office. Monday 9.30-10.30

Tel. 0832-298670; e-mail: [michele.maffia@unisalento.it](mailto:michele.maffia@unisalento.it)

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**FULL SYLLABUS**

Cell-biomaterial interaction: INTRODUCTION

Cellular Physiology: Cell modifications in response to external and internal stimuli

Cell / biomaterial interaction: PART I

Control and regulation of cellular functions such as adhesion, migration and trans membrane transport mechanisms.

Biomaterial cell interaction: Part II

Control and regulation of cellular functions such as adhesion, migration and trans membrane transport mechanisms.

Biomaterial cell interaction: PART III.

Physiological role of receptors and membrane proteins (channels, transporters, structural membrane proteins; adhesion proteins) in cell-material interactions; signal transduction mechanisms.

Cellular responses to natural materials.

Biomaterial cell interaction: Part IV

Proteomics, lipidomics and mass spectrometry approaches for the analysis of proteins and lipids involved in cell-material interaction processes. Physiology of stem cells.

**CASE STUDIES**

Nano capsules.

Applications of nanoparticles in diagnostics and therapy.

Nanoparticles as contrast media.

Drug Delivery.

Applications of nano-particles for drug delivery to the blood brain barrier.

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**REFERENCE TEXT BOOKS**

Silverthorn, Human Physiology, Ed. Pearson; PowerPoint presentations; Complementary teaching material; Scientific articles and reviews.