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**COURSE: MOLECULA BIOLOGY**

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**ACADEMIC YEAR: 2017-2018**

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**TYPE OF EDUCATIONAL ACTIVITY: : Characterizing**

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**TEACHER: Prof. Magnus Ludvig Monné**

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e-mail: : **magnus.monne@unibas.it**

website:

phone: : **0971205088**mobile (optional):

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Language: **ITALIAN**

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ECTS: **10 (9 lessons and  
1 tutorials/practice)**n. of hours: **84 (72 lessons  
and 12 tutorials/practice)**Campus: **Potenza**  
Dept./School: **Department of  
Sciences**  
Program: **Pharmacy (LM-13)**Semester: **I**  
(**from 2 October  
2017 to 31 January  
2018**)

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**EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES**

- **Knowledge:** the fundamental processes of molecular biology in the flow of information from DNA to RNA and proteins. Mechanisms that reassures genome integrity and regulate gene expression. The development of methods and therapeutic products that have emerged from basic and applied research in molecular biology and bioinformatics.
  - **Applications:** Strategies to apply molecular cloning technology for the production of recombinant pharmacological proteins.
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**PRE-REQUIREMENTS**

It is necessary to have the basic knowledge provided by the courses "Animal and Vegetal Biology" (compulsory) and "Biochemistry" (advised).

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**SYLLABUS*****I. The flow of information.(34h+4h es/lab)***

The central dogma, structure and function of DNA, RNA and proteins. Topology of DNA and topoisomerases. Genes, genomes, nucleosomes and chromosomes.

**DNA replication:** DNA polymerases, other enzymes at the replication fork, regulation of initiation, telomerase.

**Mutations and damage of DNA, systems for repair, homologous recombination and transposons.**

**Transcription:** RNA polymerases, promoters, general transcription factors.

**Maturation of RNA:** 5'-capping, 3'-polyadenylation, various forms of splicing, the spliceosome, RNA editing.

**Translation:** mRNA, tRNA, amminoacyl-tRNA synthase, ribosomes.

**Transcriptional and translational regulation:** regulatory sequences and factors in trascription, epigenetic inheritance, chromatin remodelling. Riboswitches, miRNA, siRNA.

***II. Methods. (20h+4h es/lab)***

**Cloning:** PCR, gel electrophoresis, restriction enzymes, DNA ligase, vectors, transformation of cells, DNA sequencing.

**Production and manipulations of recombinant proteins.** Transgenic animals and metabolic engineering.

**Bioinformatics:** data banks, alignment and analysis of sequences, structures and interactions.

***III. Biotechnological products in the pharmaceutical industry. (18h+4h es/lab)***

Design, function, structure and production of pharmaceutical recombinant proteins (hormones, cytokines, enzymes, coagulation and thrombolysis factors), recombinant vaccines, recombinant monoclonal antibodies, gene therapy.

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**TEACHING METHODS**

The course consists of 84 hours divided between lectures and laboratory practice; 72 hours of lectures and 12 hours of laboratory practice.

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**EVALUATION METHODS**

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During the course there will be organized discussions based on quiz and problems in the form of overview lectures. A final oral exam in which the capacity to respond to questions on the basics, information flow processes in biological systems and methods or products will be evaluated. For higher marks, the capacity to connect, compare and reason logically on different aspects of the arguments of this course will also be evaluated.

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**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

- James Watson, Tania Baker, Stephen Bell, Alexander Gann, Michael Levine and Richard Losick. *Molecular Biology of the Gene*. 7th edition.
  - Terry A. Brown. *Molecular Biotechnology*. 2nd edition, Zanichelli.
  - Arthur M. Lesk. *Introduction to Bioinformatics*. 4th edition, Oxford University Press.
  - Daan J.A. Crommelin, Robert D. Sindelar and Bernd Meibohm. *Pharmaceutical Biotechnology*. 4th edition, Springer.
  - Lecture notes.
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**INTERACTION WITH STUDENTS**

Visiting hours: Thursdays 17-18 in the study of the lecturer (3A241).

It is also possible to contact the lecturer by e-mail.

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**EXAMINATION SESSIONS (FORECAST)<sup>1</sup>** 15/2/2018, 8/3/2018, 24/5/2018, 21/6/2018, 19/7/2018, 20/9/2018, 11/10/2018, 13/12/2018

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**SEMINARS BY EXTERNAL EXPERTS** NO

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**FURTHER INFORMATION**

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<sup>1</sup>Subject to possible changes: check the web site of the Teacher or the Department/School for updates.