UNIVERSTY OF BARI

FACULTY OF MEDICINE AND SURGERY

DEGREE IN MEDICINE AND SURGERY

(*BARI ENGLISH MEDICAL CURRICULUM*)

PROGRAM OF

Molecular Biology

1. Structure of nucleic acids. Genes and genomes.

2. Mechanisms of DNA replication in prokaryotes and eukaryotes.

3. DNA recombination: homologous recombination, site-specific recombination, transposons.

4. Mechanisms of DNA repair: mismatch repair, excision repair, error-prone translesion repair.

5. Transcription. Prokaryotic and eukaryotic RNA polymerases. Mechanisms of RNA synthesis. Initiation complex. Structure and function of RNA polymerase II. RNA maturation. Splicing mechanisms. rRNA transcription and processing. tRNA transcription and post-transcriptional modifications. Rybozymes. mRNA quality control pathways.

6. The genetic code and the structure of tRNAs. Protein biosynthesis. Aminoacid activation; initiation, elongation and termination steps.

7. Protein targeting and degradation. Signal sequences and nuclear localization signals. Lysosomal degradation. Ubiquitinilation and proteasomal degradation.

8. Regulation of gene expression in prokaryotes: the lac operon and the trp operon. Principles of eukaryotic gene expression. Promoter, enhancer and other responsive elements. Trans-activators. Structural motifs of DNA-binding regulatory proteins (HTH, Zn-finger, b-Leu-zipper, HLH).

9. Chromatin organization: nucleosomes, hystones. Notion of epigenetics.

10. Recombinant DNA technology: cloning; expression vectors; library screening; Southern and Northern blotting. Polymerase chain reaction. Sanger dideoxynucleotide sequencing method. Pyrosequencing and principles of next-generation sequencing.

The exam will consist of a written test with open and/or multiple choice questions to ascertain students' proficiency in molecular biology and will be held in conjunction with the Biochemstry (II) exam.