## BIOINFORMATIC PRINCIPLES AND OMICH METHODOLOGY

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| **Enrollment year** | 2020/2021 |
| **Academic year** | 2021/2022 |
| **Regulations** | DM270 |
| **Academic discipline** | ING-INF/06 (ELECTRONIC AND INFORMATION BIOENGINEERING) |
| **Department** | DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI" |
| **Course** | BIOTECHNOLOGY |
| **Curriculum** | PERCORSO COMUNE |
| **Year of study** | 2° |
| **Period** | 2nd semester (01/03/2022 - 14/06/2022) |
| **ECTS** | 6 |
| **Lesson hours** | 48 lesson hours |
| **Language** | Italian |
| **Activity type** | WRITTEN AND ORAL TEST |
| **Teacher** | PEVERALI ANTONIO FIORENZO (titolare) - 6 ECTS |
| **Prerequisites** | Basic knowledge of molecular biology, biochemistry and genetics is preferred. |
| **Learning outcomes** | Aims of the course are:<br>1. Get acquainted with several on-line bioinformatics tools;<br>2. Stimulate the students to a deeper and interdisciplinary knowledge of biological/biotechnological subjects by employing bioinformatics tools.<br>3. Gain a modern view of biology and biotechnology.<br>4. Learn data integration to gain insight into genotype-phenotype relationships of diseases;<br>5. Better understanding the relationships between life and environment (disease and pollution);<br>6. Plan new biotechnological tools (recombinant DNA, RNA or protein);<br>7. Gain insight into the interaction between small molecules and |

proteins.
8. Get an interdisciplinary integrated view of life science.
9. Gain basic knowledge of 'omics':
- Next Generation Sequencing
- Exome
- RNA sequencing
- ChIP sequencing
- Drug discovery and reposinioning
- Cancer Imunotherapy
- Oncoarray

| Course contents | Main topics of the teaching are:<br>1 - The first session of the teaching describes and uses several bioinformatics tools and databases available on-line covering the following topics:<br>Genome browsers such as ENSEMBL, NCBI, UCSC; scientific literature; genomic data; genetic variant databases; gene expression databases; sequencing; databases on enzymatic, structural and functional features of proteins; protein complex databases; protein interaction databases; small molecules; pathways; sequence comparison and alignment; recombinant DNA software; genotype-phenotype relationships of human diseases.<br>2 - The second session of the teaching is dedicated towards the 'omics': Principle and application of the Next generation sequencing; Whole Exome sequencing, RNA-sequencing; ChIP sequencing; Microarray; Drug discovery and repositioning; Cancer immunotherapy and omics.<br>The teaching is also integrated with seminars on omics topics and also with hands-on sessions (Tutoring) in computerized classrooms.<br>Details are available for the students on the e-learning portal 'kiro'. |
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| Teaching methods | Academic lectures will be carried out mainly in classrooms equipped with wi-fi. Tutorials and hands-on sessions will be carried out in computerized classrooms by employing the UniPV e-learning platform (kiro): https://elearning2.unipv.it/bio/login/index.php |
| Reccomended or required readings | Several "HELP", "Tutorials" and "TRAINING" tools are available for each<br>bioinformatics tool described in the course.<br>More in detail: NCBI Training and Tutorials; NCBI Handbook, NCBI shelves; EBI<br>training<br>online; GenEnsembl help, documentations and tutorials; UCSC genome bioinformatics help.<br>Additional reports, documents and exercises will be provided during the course and<br>uploaded on e-learning platform, kiro, of the University of Pavia: https://elearning2.unipv.it/bio/login/index.php |
| Assessment methods | Written examination will assess the Students' knowledge on the course topics. Assessment tests of about 20 questions in a form of: true/false; close, short, multiple or unique answers will be carried out on the e-learning platform, kiro: https://elearning2.unipv.it/bio/login/index.php |

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| **Further information** | please e-mail your requests to the university e-mail address only, messages sent to private or job e-mail addresses will be not considered |
| **Sustainable development goals - Agenda 2030** | $lbl_legenda_sviluppo_sostenibile |