



PhD Program in Clinical and Molecular Medicine

“Biostatistics and Data Analysis”

October 2021

Teachers:

Dr. Giulio Spinozzi (giulio.spinozzi@unipg.it)

Dr. Giovanni Bellomo (giovanni.bellomo@unipg.it)

6th October 2021, 2 PM - Lesson 1 (2h): Dr. Giulio Spinozzi

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“Introduction to Bioinformatics and Information Systems”

- Who are the bioinformaticians? Roles, tasks and necessary knowledge
- What does the bioinformatician do?
- First steps, sequence analysis and limits of not having an information system
Information systems and databases
- Data backup
- Analysis pipelines
- Live session: CREO information system

13th October 2021, 2 PM - Lesson 2 (2h): Dr. Giovanni Bellomo

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“Introduction to Biostatistics”

- Why do you need biostatistics?
Probability density functions: Normal, Binomial, Student’s
- Parametric tests: t-test

- Non-parametric tests based on rank: Wilcoxon-Mann-Whitney test (U-test)
- Pearson's and Spearman's correlation coefficients.
- ROC analysis

20th October 2021, 2 PM - Lesson 3 (2h): Dr. Giulio Spinozzi

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“Genomics (RNA-Seq application)”

- Genomics, basic concepts
- Our genome, DNA, RNA and Central Dogma
- RNA-Seq General Pipeline
- ARPIR: automatic RNA-Seq pipelines with interactive report
- Live session: ARPIR - The Unipg pipe for data analysis

27th October 2021, 2 PM - Lesson 4 (2h): Dr. Giovanni Bellomo

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“Introduction to Machine Learning”

- Supervised vs unsupervised classifiers
- Principal Component Analysis (PCA)
- Linear Discriminant Analysis (LDA)
- Live session: PCA and LDA examples on R
- Unsupervised learning: EM-clustering, K-means, Hierarchical clustering
- Supervised learning: logistic regression, support vector machines

3rd November 2011, 2 PM- Seminar (1 h) - Meet the company: Idea-Re **“Applications of machine learning, artificial intelligence and big data analysis”**

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