INTEGRATED APPLIED GENETICS TRAINING - AppGENEdu

A Project Financed through the EEA Grants 2014-2021, Education, Scholarships, Apprenticeships and Youth Entrepreneurship Programme in Romania, Cooperation projects in The Higher Education Area

Summer School Programme

Week 1

Day 1
Students Welcome Genetics perspective – Prof. Bohiltea L Epidemiology perspective - Conf. Pitigoi D
Genetics Fundamentals I – Bohiltea L, Radoi V, Ursu R
Genetics Fundamentals II – Bohiltea L, Radoi V, Ursu R

Day 2
Statistics and Bioinformatics - Manolescu A, Poenaru E • Fundamental elements of biostatistics • Fundamental elements of statistical genetics • Elements of statistical study design
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Workshop – Poenaru E, Dogaru C, Iordache P, Poenaru C • Statistical tools; R • Statistical basic processing
Workshop – Poenaru E, Dogaru C, Iordache P, Poenaru C • Statistical basic processing • Basic data visualization

Day3
Fundamentals of Genetic Epidemiology – Pitigoi D, Manolescu A • Quantitative Statistical Tests, linear regression (smoking) • Phenotype - genotype correlations
Fundamentals of Genetic Epidemiology – Pitigoi D, Manolescu A
Workshop – Iordache P, Poenaru E, Manolescu A, Poenaru C

- Phenotype - genotype correlations
- Example of epidemiology study design based on provided "use-cases"

Workshop – Iordache P, Poenaru E, Manolescu A, Poenaru C
- Phenotype - genotype correlation
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Day3

Elements of genetic risk analysis, Part I – Manolescu A, Iordache P, Ursu R, Radoi V
- Genetics: LD frequencies, HWE
- Relative risk

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- Genetics: LD frequencies, HWE
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Workshop biostatistical tools - plink – Iordache P, Ursu R, Radoi V, Poenaru E, Manolescu A, Poenaru C
- Missingness by phenotype
- Missingness by genotype
- Hardy-Weinberg
- Allele frequencies
- LD-based SNP pruning
- Mendel errors

Workshop biostatistical tools - plink – Iordache P, Ursu R, Radoi V, Poenaru E, Manolescu A, Poenaru C
- Missingness by phenotype
- Missingness by genotype
- Hardy-Weinberg
- Allele frequencies
- LD-based SNP pruning
- Mendel errors

Day5

Elements of genetic risk analysis, Part II – Manolescu A, Iordache P, Ursu R, Radoi V
- Genetics: linkage disequilibrium, haplotypes
- Example of population admixture

Bioinformatics methods & principles
- Elements of genetic risk analysis, Part II – Manolescu A, Iordache P, Ursu R, Radoi V
- Genetics: LD frequencies, HWE

Workshop – Iordache P, Ursu R, Radoi V, Poenaru E, Manolescu A, Poenaru C
- Case/control
- Fisher's exact
- Stratified analysis
- Quantitative trait
- Linear and logistic models
- Multiple-test correction

Workshop – Iordache P, Ursu R, Radoi V, Poenaru E, Manolescu A, Poenaru C
- Missingness by phenotype
- Missingness by genotype
- Hardy-Weinberg
- Allele frequencies
- LD-based SNP pruning
- Mendel errors

Week 2

Day 6

Elements of Data Science – Poenaru C, Iordache P, Poenaru A
- Data load
- Data cleansing
- Data visualization
- Data processing
- Data comparison
- Reproducible research

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Workshop – Poenaru C, Iordache P, Poenaru E, Dogaru C
- Example of data processing (from problem to result)
- Bioinformatics exercises

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- Example of data processing (from problem to result)
- Bioinformatics exercises

Day 7

Bioinformatics - Iordache P, Ursu R, Radoi V
- Biologic consequences of genetic variants/gene mutations
- Genetic variances in Genetic Epidemiology context (GWAS)

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Workshop – Iordache P, Ursu R, Radoi V, Poenaru E
- GWAS study
- Output analysis

Workshop – Iordache P, Ursu R, Radoi V, Poenaru E
- GWAS study
- Output analysis

Day 8

Advanced Applied Genetics – Ursu R, Radoi V, Iordache P
- Replication studies
- Quantitative trait loci
- Genetic pathways & gene integration

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- Replication studies
- Quantitative trait loci
- Genetic pathways & gene integration

Workshop – Iordache P, Ursu R, Radoi V
- Replication study
- Visual representation

Workshop – Iordache P, Ursu R, Radoi V
- Replication study
- Visual representation

Day 9

Bioethics principles – Curca C, Chirica V
- Informed consent
- GDPR elements
- Elements of ethics of scientific publication

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- Informed consent
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Elements of Research methodology – Halldorsson B, Mates D, Manolescu A, Iordache P, Specific steps and examples for genomics data science projects

Specific steps and examples for genomics data science projects – Halldorsson B, Mates D, Manolescu A, Iordache P

Day 10

Prepare and writing a scientific article – Vinereanu D

Project bid and presentations

Week 3

Day 11

Visits to the clinics associated with the project topic – Jinga V, Rascu S, Sima C, Jinga M, Vasile D, Vinereanu D, Trasca L, Mehedinti A
- Phenotypic and epidemiological data collection
- Genetic sampling
- Clinical visit
- Clinical case report

Day 12

Visits to the clinics associated with the project topic – Jinga V, Rascu S, Sima C, Jinga M, Vasile D, Vinereanu D, Trasca L, Mehedinti A
- Phenotypic and epidemiological data collection
- Genetic sampling
- Clinical visit
- Clinical case report

Project work

Day 13

Project work

Day 14

Project work

Day 15

Project presentation and evaluation