

INDA Hands-on NGS-GWAS course

10-19 September 2015
Saint-Louis, Senegal

Ouvrage d'art by ManuB

SYLLABUS COURSE

Day 1 (Introduction day)

Morning (8:30 - 12:30)

- Presentation of the course
- Introduction to HTS/NGS technologies (Illumina, 454, SOLiD, PacBio, NanoPore, etc.)
- Some basics stats/probability concepts; Particularities of NGS sampling; underlying distributions, etc.

Afternoon (14:00 - 18:00)

- Introduction to linux
- Introduction to R

Day 2 (Statistics day)

Morning (8:30 - 12:30)

- Introduction to experimental design applied to HTS experiments (basic theory of experimental design and some guidance in planning new experiments)
- Multivariate statistics
- Linear and logistic regression
- Hypothesis Testing and power

Afternoon (14:00 - 18:00)

- Examples in Experimental design/statistics
- Multivariate Data Reduction techniques

Day 3 (NGS day)

Morning (8:30 - 12:30)

- Mapping and assembling

- Quality analysis (error and bias of different technologies, quality metrics in sequencing, mapping, etc)
- Introduction to file formats (FASTA, SAM, BED, BAM...)
- Afternoon (14:00 - 18:00)**
- Alignment and mapping algorithms
- Bacterial genome assembly

Day 4 (NGS day)

Morning (8:30 - 12:30)

- Re-sequencing and variant analysis (mapping strategies, calibration, variant calling, etc)

Afternoon (14:00 - 18:00)

- Re-sequencing and variant analysis (GATK)

Day 5 (GWAS day)

Morning (8:30 - 12:30)

- Introduction to GWAS
- GWAS history
- Possibilities and limitations
- Trends
- The Genotype
- Genotypic variation and linkage disequilibrium
- Population structure and why it is a problem for GWAS (confounding)
- SNP array technology and design. Coverage
- The Phenotype

- What determines the phenotype? (Statistical genetics concepts)

Afternoon (14:00 - 18:00)

- Models for GWAS 1
- GWAS for case/control
- GWAS for quantitative traits (Mixed models)
- GWAS for Trios (Family-based association tests)
- Power
- Model building in practice
- Selecting covariates and transforming data
- Validating the results
- Visualization, p value distribution
- The Multiple testing problem

Day 6 to day 10 (Practice session)

Students will practice with their own data in groups.

Deadline
24 July
2015

Village des pêcheurs by André Thiel

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