**Exploring the Human Genome**

**4-8th November**

Next-generation sequencing technology made it possible to sequence our genomes in no time and for an affordable price. Hundreds of thousands of genomes are already sequenced. What kind of information can be retrieved from the genome of an individual? We can ask and find answers to all kind of questions related to origin and phenotype of this person.

Did you know that our genome stores information not only about our own phenotypes, but also about the phenotypes and the history of our families and populations? For example, we now know that someday *Homo Sapiens* were living next to Neanderthals and even were able to produce offspring with them. Many of us carry pieces of Neanderthal genome as a footprint of these events. Our genome can give us a lot of information not only about distant past, but also about the present and even the future. We can predict eye colour of a person, gender and very often even a family name. Moreover, genome can tell many things about health and disease risk of an individual.

**Aims of the course:**

To teach the participants the structure and organization of human genome, main classes of polymorphisms and the mechanism of their occurrence. To teach the participants to interpret a personal human genome in terms of the person’s origin, physical appearance and disease risk.

**Target group**: PhD candidates in biomedical science at the first half of their PhD trajectory

**Educator:** Michel Georges (GIGA Medical Genomics, ULiège)

**Course duration**: 5 working days (one week)

**Types of course activities:** Lectures, project work, self-study

**By the end of the course, the participants should be able to:**

* Describe the structural and functional organization of human genome
* Discuss and give examples of Mendelian traits and diseases
* Discuss and give examples of complex traits and diseases

**Support materials:** MOOC “From disease to genes and back”, Coursera; research articles

**The course syllabus/schedule:**

**Day 1 Anatomy of human genome**

**9:00 - 10:00**– Self-study. Video lectures from the online course. Week 1

**10:00 - 10:30** – Course introduction. Goals, structure, logistics.

**10:30 - 12:00** – Anatomy of human genome.

**12:00 - 13:00** – Lunch break

**13:00 - 14:00** – Anatomy of human genome. Part 2 (genomic browsers)

**14:00- 16:30** – NGS

**16:45 - 18:00** – Project work. Introduction

**Day 2 Population and evolutionary genomics**

**9:00 - 10:00**– Self-study. Video lectures. Week 2

**10:00 - 11:00** – Q&A session

**11:00 - 12:00** – Essentials of populational genetics and evolutions I

**12:00 - 13:00** – Lunch

**13:00 - 14:00** – Essentials of populational genetics and evolutions II

**14:00 - 18:00** – Project work

**Day 3 “Mendeliome”**

**9:00 - 10:00**– Self study. Video lectures

**10:00 - 11:00** – Q&A session

**11:00 - 12:00** – Mendeliom I

**12:00 - 13:00** – Lunch

**13:00 - 14:00** – Mendeliom II

**14:00 - 18:00** – Project work

**Day 4 “Galtoniome”**

**9:00 – 10:00** – Self study. Video lectures

**10:00 - 11:00** – Q&A session

**11:00 - 12:00** – GWAS (multiple testing from Statistics!), GCTA

**12:00 - 13:00** – Lunch

**13:00 - 14:00** – Cancer, etc

**14:00 - 18:00** – Project work

**Day 5** **Projects presentations and conclusion**

**9:00 - 10:00** – Self study. Video lectures

**10:00 - 11:00** – Q&A session

**11:00 - 12:00** – Project work

**12:00 - 13:00** – Lunch

**13:00 - 15:00** – Project work

**15:00 - 17:00** – Presentations