Ubiquitous Genomics – Spring 2022 syllabus

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#	Date	Title	Topics
Module 1: Foundations			
1	4/3/22	Introduction to DNA	1. Why DNA? 2. The building blocks of DNA 3. RNA vs DNA 4. The world of DNA
2	11/3/22	DNA information flow	1. What's life? 2. DNA copying 3. Crick's Dogma and how to win a Nobel prize 4. The smallest organism 5. From gene to genome 6. Mutations
Module 2: Reading DNA			
3	18/3/22	Technologies to gather DNA information	1. qPCR 2. Arrays 3. Sequencing (Sanger, Illumina, PacBio, Oxford Nanopore)
4	25/3/22	Biological datasets and the main sequencing pipeline	1. Shotgun sequencing 2. Alignment 3. Variant calling 4. Imputation 5. FASTA/FASTQ 6. BAM 7. UCSC genome browser
5	1/4/22	SARS-CoV-2 genome presentations	
Module 3: Processing DNA (in human)			
6	8/4/22	Human genetics I: diseases	1. Quick guide to the human genome 2. Rare genetic diseases 3. Exome sequencing 4. GWAS 5. Polygenic risk scores
7	29/4/22	Human genetics II: relative matching	1. Recombination 2. Identify by descent (IBD) 3. Algorithms to identify IBD 4. Finding relatives
8	6/5/22	Ethical and privacy aspects of DNA information	1. The three main methods of genome hacking 2. Side channel leakages 3. Ethical discussion
9	13/5/22	Genome hacking presentations	
Module 4: Writing DNA			
10	20/5/22	DNA writing technologies	1. Why to write? 2. Writing technologies: column synthesis, ink jet printers, photolithography, chemical electric synthesis 3. On the mathematical representation of synthesis 4. Genome-scale synthesis

			5. Ethical discussions
11	27/5/22	Eldad Stibon: citizen scientists	
12	3/6/22	DNA Storage	1. Encoding decoding methods 2. DNA of things 3. Photo similarly search using DNA
13	10/6/22	Final presentations	