Division of Life Science
The Hong Kong University of Science and Technology

LIFS 3002A Human Genetics in Practice
Spring semester, 2017-2018

Instructors: Dr. Ho Yi MAK (E-mail: hym@ust.hk) (course coordinator)
Dr. Jessica C M TANG (E-mail: bocemun@ust.hk)

Time and Venue:	Tutorial	Friday	10:30 - 11:50	Rm 5508
	Laboratory sessions - to be arranged with instructors			CYT-UG002

Credits: 3
Pre-requisites: LIFS3110
Quota: 15

Social Media page: https://www.facebook.com/humangenetics.hkust/

Course goals
This course will impart essential skills for communicating science to a lay audience in the laboratory setting. Students will work in groups to devise a mini-laboratory workshop for detecting human genetic variants. They will then serve as instructors of the workshop in outreach activities for high school students.

Intended Learning Outcomes
On successful completion of this course, students are expected to be able to:

1. Work as a member of a group to evaluate genetic data published in international journals and assess their relevance to a specific human trait.
2. Summarize scientific literature in writing and in oral presentations to high school students.
3. Effectively transfer their laboratory skills to high school students and exercise safe laboratory practice.

Course description
Using molecular biology techniques, students will optimize experiments for detecting specific human genetic variants in an iterative process. A laboratory manual will be composed by the students, which will be used in outreach workshops for participants from high schools. Students will be trained to give introductory presentations and laboratory instructions effectively prior to the workshops.

Teaching approach
The primary delivery mode of the course will be instructor-led, interactive discussions in classroom and laboratory settings. Active learning will be encouraged through scientific literature review and iterative optimization of experimental procedures. Experiential learning will be achieved through the transfer of laboratory skills and scientific knowledge to high school students.

Assessment scheme

	Percentage	Intended Learning Outcomes assessed
Composition of a laboratory manual [a, b]	40%	1, 2
Laboratory skills [b]	25%	3
Oral presentation [b, c]	20%	1, 2
Participation [d]	10%	2, 3
Feedback from workshop participants	5%	2, 3

a. This is a written assignment to be completed by the end of week 11, before workshops for high school students commence in week 11.

b. Peer evaluation will be conducted (5% of each component) for individual contribution within a group.

c. Oral presentations during tutorial sessions and workshops will be assessed.

d. Full attendance by students is vital to ensure that they are sufficiently trained to lead the workshops.

Assessment rubrics

Laboratory manual

	Needs improvement	Good	Excellent
Summarizes the scientific background of the workshop	Inaccurate information on the scientific background. Citation from scientifically inaccurate sources.	Accurate information on the scientific background. Exercise good judgment between scientifically accurate and inaccurate sources.	Accurate information on the scientific background. Exercise good judgment in selecting the most relevant primary research papers as reference.
Describes the experimental procedures of the workshop	Inaccurate or imprecise documentation of experimental procedures.	Accurate documentation of experimental procedures.	Accurate documentation of experimental procedures. Relevant background information to aid the understanding of experimental procedures.
Describes how experimental data can be analyzed and interpreted	Inaccurate instructions for data analysis and interpretation.	Accurate instructions for data analysis and interpretation.	Accurate instructions for data analysis and interpretation. Include FAQs for troubleshooting.
Appropriate use of language	Direct copying of passages without citing the source. Recurrent typographical or grammatical errors.	Mostly appropriate incorporation of source material by paraphrasing. Occasional typographical or grammatical errors.	Appropriate incorporation of source material by paraphrasing. No typographical or grammatical errors.

Additional assessment rubrics will be discussed at the beginning of the course.

Student learning resources

Course material will be drawn from primary scientific literature.

Course outline

The course will be divided into three phases.

Phase I (Week 1 to 2)

Certain traits, such as hair thickness in Asians versus Caucasians, can be determined by a single nucleotide substitution in the human genome. At the beginning of the course, a single-nucleotide polymorphism (SNP) will be chosen by the instructors. Students will work in groups of 3 to review the primary scientific literature on the selected trait and the SNP that underlies it. They will be asked to write an introduction to the topic, which will be used in the laboratory manual for high school students.

Phase II (Week 3 to 11)

Students will review methods used for extracting genomic DNA, and genotyping single-nucleotide polymorphism (SNP) by polymerase chain reaction with fluorescently labeled probes. They will then work iteratively on a genotyping assay for the chosen SNP. At the end of Phase II, students will document their optimized experimental procedures as part of the laboratory manual for high school students.

Phase III (Week 12 to 13)

High school students will be invited to attend hands-on workshops led by our undergraduate students. Our students will be required to give pre-lab oral presentations, instruct high school students at the bench, and guide them through data analysis.