课程大纲
COURSE SYLLABUS

1.	**课程代码/名称 Course Code/Title**	**生物与医药基因组学 Biomedical Genomics**
2.	**课程性质 Compulsory/Elective**	**核心课**
3.	**开课单位 Offering Dept.**	**公共卫生及应急管理学院**
4.	**课程学分/学时 Course Credit/Hours**	**3**
5.	**授课语言 Teaching Language**	**中英双语**
6.	**授课教师 Instructor(s)**	**黄捷**
7.	**开课学期 Semester**	**秋季**
8.	**是否面向本科生开放 Open to undergraduates or not**	**是**
9.	**先修要求 Pre-requisites**	（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）无
10.	**教学目标 Course Objectives**	
	（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.） **本课程深入剖析生物与医药领域的基因组学大数据分析和实践应用。不同于以软件开发应用为主线的生物信息学课程，也不同于以生物学技术和遗传疾病为主线的医学遗传学课程，本课程以基因组和其他多组学大数据分析为主线。本课程以权威期刊发表的最新研究论文为主要学习参考资料，理论和实践相结合，提升学生的科研思考和分析实践能力。** This course provides in-depth learning on genomics big data and practical applications in the field of biomedicine. Different from bioinformatics courses that focus on software development and application, and different from medical genetics courses that focus on biological technology and genetic diseases, this course focuses on genomics and other multi-omics big data analyses. This course use research papers published in top journals as the main learning reference materials. It combines theory and practice to improve students' scientific research thinking and analytical skills.	
11.	**教学方法 Teaching Methods**	
	（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）	

本课程理论和实践相结合，致力于提升学生提炼科学问题和理清科研分析思路的能力。每一次课的上半部分讲述理论知识，下半部分对具体的文献进行剖析，特别是详细展示里面的数据分析。本课程的培养目标是学生能自己独立完成生物与医药基因组学领域的一个完整数据分析并写出一篇科研论文。

This course combines theory and practice and is committed to improving students' ability to come up with innovative scientific questions and crystal-clear analytic designs. The first hour of each class session describes theoretical knowledge, and the second hour elaborates on case study of chosen research papers. Through this course, the students can independently conduct data analyses and write a research paper in the area of biomedical genomics.

12. 教学内容 Course Contents

（如面向本科生开放，请注明区分内容。 If the course is open to undergraduates, please indicate the difference.）

Section 1	人类基因组学概述及几个诺奖成果解读 Introduction to Human Genetics and several related Nobel Prize research
Section 2	人类基因组测序及生物信息分析 Human genome sequencing and bioinformatics analyses
Section 3	人类进化与人种多样性 Human Evolution and Ancestry diversity
Section 4	罕见病病因探索及全基因组测序分析 Rare diseases genetic aetiology discovery
Section 5	相对罕见病病因探索及基因组测序分析 Relative rare disease genetic aetiology discovery
Section 6	常见病病因探索及基因组测序分析 Common diseases genetic aetiology discovery
Section 7	疾病共病机制探索及多组学分析 Disease shared aetiology discovery and OMICS
Section 8	期中汇报 Midterm presentation
Section 9	疾病风险预测与多基因风险评分 Disease risk prediction through polygenic risk score
Section 10	因果推断与孟德尔随机化概述 Causal inference and Mendelian randomization (MR) study
Section 11	系统生物学及药物靶点研究 System epidemiology and Drug target research
Section 12	基于基因组学的"老药新用"研发示例 Case study on drug-repurposing screening
Section 13	消费级基因检测及人工智能 DTC genetics: from All to AI
Section 14	专题报道：血脂基因研究及药物研发 Special report: Lipids genetic research and drug development
Section 15	专题报道：肠道菌群基因研究及药物研发 Special report: Gut microbiota genetic research and drug development
Section 16	期末考试 Final report

13. 课程考核

Course Assessment

	（①考核形式 Form of examination；②.分数构成 grading policy；③如面向本科生开放，请注明区分内容。If the course is open to undergraduates, please indicate the difference.） **十三级等级制 Letter Grading。** **25% 出勤，25% 期中汇报，50% 期末考试**
14.	**教材及其它参考资料** **Textbook and Supplementary Readings**
	1. 遗传流行病学（北京大学胡永华编著） 2. An Introduction to Genetic Epidemiology (Health & Society Series), 1st Edition, by Lyle J. Palmer, Paul Burton, George Davey Smith. 3. Statistical Methods in Genetic Epidemiology, 1st Edition, by Duncan C. Thomas)