

课程大纲

COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	高级微生物学/ Advanced Topics in Microbiology
2.	课程性质 Compulsory/Elective	Elective
3.	课程学分/学时 Course Credit/Hours	3 credits /48 hours
4.	授课语言 Teaching Language	English and Chinese
5.	授课教师 Instructor(s)	Tao Dong
6.	是否面向本科生开放 Open to undergraduates or not	No
7.	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.) Microbiology, Biochemistry 微生物学 / 生物化学
8.	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.) The main objective is to introduce important topics in microbiology to graduate students. These topics include quorum sensing, horizontal gene transfer, antibiotic resistance, and protein secretion systems. These topics are modular and are not interdependent. These modules could also be flexibly rotated in different terms to customize toward the student's needs and interests. In addition, students will also be trained in writing and presentation skills in the context of microbiology common practice by presenting and critically evaluating research advances from the research literature and through written assignments. 本课程的主要目的是向研究生介绍微生物学的一些重要的知识和前沿进展。内容包括群体感应、水平基因转移、抗生素耐药性和蛋白质分泌系统。不同内容将以模块化的形式进行, 彼此之间是独立的。这些模块也可以根据学生的需求和兴趣进行灵活的变化。此外, 学生还将通过报告展示、批判性地评估文献和书面作业的形式, 进行微生物学有关的写作和报告展示能力的训练。
9.	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.) The course will be structured in a hybrid format with 1/2 in-class lectures, 1/4 student presentations, and 1/4 group discussions. All required lecture materials and assignments will be available to students. Communication with the students will be primarily in person in class and email response after class. 课程将采用混合形式, 分别为 1/2 的课堂讲授、1/4 的学生报告和 1/4 的小组讨论。所有必需的课程材料和作业都将提供给学生。与学生的交流方式主要为课堂上的面对面交流和课后的邮件回复。
10.	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	Course information (requirement and expectation) and topic overview <ul style="list-style-type: none"> Prerequisites, grading, presentation and writing examples, and course introduction 课程信息 (要求和预期) 以及话题概述 <ul style="list-style-type: none"> 选课条件、评分、报告展示和写作范例以及课程介绍
	Section 2	Tools and skills in Microbiology <ul style="list-style-type: none"> Bacterial growth in monoculture and polyculture

	<ul style="list-style-type: none"> • Genetic screening • Transformation and conjugation • Power of Reporters <p>微生物学的工具和技能</p> <ul style="list-style-type: none"> • 单一培养和混合培养中的细菌生长 • 遗传筛查 • 转移和接合 • 报告基因的作用
Section 3	<p>Protein secretion systems</p> <ul style="list-style-type: none"> • Overview of secretion systems • Type 3 secretion • Type 6 secretion <p>蛋白分泌系统</p> <ul style="list-style-type: none"> • 分泌系统概述 • III型分泌系统 • VI型分泌系统
Section 4	<p>Horizontal gene transfer</p> <ul style="list-style-type: none"> • Mechanism of HGT • Impact of HGT <p>水平基因转移</p> <ul style="list-style-type: none"> • 水平基因转移的机制 • 水平基因转移的影响
Section 5	<p>Stress response and sigma factors</p> <ul style="list-style-type: none"> • Overview of gene regulation • Importance of stress response • Types of sigma factors <p>胁迫反应和sigma 因子</p> <ul style="list-style-type: none"> • 基因调控概述 • 胁迫反应的重要性 • sigma 因子的类型
Section 6	<p>Quorum sensing</p> <ul style="list-style-type: none"> • History and types of quorum sensing • Regulatory network <p>群体感应系统</p> <ul style="list-style-type: none"> • 群体感应系统的历史和类型 • 调控网络
Section 7	<p>Signal transduction</p> <ul style="list-style-type: none"> • Bacterial intracellular signal molecules • Magic spot • c-di-GMP <p>信号转导</p> <ul style="list-style-type: none"> • 细菌胞内信号分子 • 环鸟苷二磷酸
Section 8	<p>Antimicrobial resistance</p> <ul style="list-style-type: none"> • Mechanism of resistance • Discovery of new drugs <p>抗生素耐药</p> <ul style="list-style-type: none"> • 耐药机制 • 新药物的发现
Section 9	Phage and virus

	<ul style="list-style-type: none"> • Phage infection and CRISPR • Phage application 噬菌体和病毒 <ul style="list-style-type: none"> • 噬菌体感染和CRISPR • 噬菌体应用
Section 10	Microbiome <ul style="list-style-type: none"> • Host microbiome • Environmental microbiome 微生物组 <ul style="list-style-type: none"> • 宿主微生物组 • 环境微生物组
Section 11	Gut-Brain axis <ul style="list-style-type: none"> • Gut microbiome and immunity • Pain and infection 肠-脑轴 <ul style="list-style-type: none"> • 肠道微生物群和免疫 • 疼痛和感染
Section 12	Review of course materials <ul style="list-style-type: none"> • Review course topics • Question and Answer 课程内容回顾 <ul style="list-style-type: none"> • 课程回顾 • 问答
11. 课程考核	
Course Assessment	
(Ⓛ考核形式 Form of examination; Ⓜ.分数构成 grading policy; Ⓝ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.)	
Evaluation will be based on the following three sections 1: Participation 20% 2: Presentation 40% 3: Written report 40%	
评估将基于以下三个部分: 1: 出勤 20% 2: 报告展示 40% 3: 书面报告 40%	
12. 教材及其它参考资料	
Textbook and Supplementary Readings	
推荐阅读 Bacterial Pathogenesis – A Molecular Approach (4 th Edition) MOLECULAR BIOLOGY OF THE CELL- the Fifth edition (2008)	