

## 课程大纲

### COURSE SYLLABUS

1.	<b>课程代码/名称</b> <b>Course Code/Title</b>	Frontiers in Bioseparations 前沿生化分离技术
2.	<b>课程性质</b> <b>Compulsory/Elective</b>	Major Elective course 专业选修课
3.	<b>开课单位</b> <b>Offering Dept.</b>	School of Life Sciences 生命科学学院
4.	<b>课程学分/学时</b> <b>Course Credit/Hours</b>	2 / 32
5.	<b>授课语言</b> <b>Teaching Language</b>	中英双语 English & Chinese
6.	<b>授课教师</b> <b>Instructor(s)</b>	Xin GONG, Department of Biology, Rm.206 Building B 龚欣, 生物系, B 栋 206, gongx@sustech.edu.cn
7.	<b>开课学期</b> <b>Semester</b>	Spring 春季
8.	<b>是否面向本科生开放</b> <b>Open to undergraduates or not</b>	No 否
9.	<b>先修要求</b> <b>Pre-requisites</b>	(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.)  Biochemistry 生物化学
10.	<b>教学目标</b> <b>Course Objectives</b>	(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.)  《Frontiers in bioseparations》 is a major elective course for master students in Biology. The goal of this course is to teach students cutting-edge biochemical separation techniques. Through the study of this course, students will be able to understand and master the principles and research ideas of biochemical separation techniques, be familiar with commonly used cutting-edge biochemical separation techniques, and eventually learn to apply the knowledge and skills to solve research problems in biology.  《前沿生化分离技术》是一门生物学专业硕士研究生的专业选修课。本课程的目标是为学生传授前沿的生化分离技术。通过本课程的学习, 让学生能够理解并掌握前沿生化分离技术的原理和研究思路, 熟悉常用的前沿生化分离技术, 并最终学会应用这些知识和技巧来解决生物学中的研究问题。
11.	<b>教学方法</b> <b>Teaching Methods</b>	(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.)  This course will consist of one 2-hour class session per week, during which students will be required to prep for class discussions. In addition, as a part of the comprehensive training, students will be required to give a presentation related to the content of this course at the end of the course.  这门课程将包括每周1次2小时的课程, 学生需要预习, 以为课堂讨论做准备。另外, 作为综合训练的一个环节, 学生们在课程最后需要结合本门课程的内容进行相关的综合报告。

**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.)

<b>Section 1</b>	Introduction 绪论  Classification and Characteristics of Bioproducts 生物制品的分类及特性  General Process and Unit Operation 生化分离的一般过程及单元操作
<b>Section 2</b>	Analytical Methods for Bioseparations 生化分离的分析方法  Analysis of Biological Activity 生物活性的分析  Analysis of Biological Activity 纯度的分析  Microbiology Assays 微生物学分析
<b>Section 3</b>	Cell Lysis 细胞破碎  Chemical Methods for Cell Lysis 化学法细胞破碎  Mechanical Methods for Cell Lysis 机械法细胞破碎  Extraction of Membrane Proteins 膜蛋白的提取  Flocculation 絮凝
<b>Section 4</b>	Filtration 过滤  Filtration Principles 过滤的原理  Filter Media and Equipment 过滤介质及设备  Membrane-based Bioseparations 基于膜介质的生化分离技术
<b>Section 5</b>	Sedimentation 沉降  Sedimentation Principles 沉降的原理  Methods for Analysis of Sedimentation 沉降的分析方法
<b>Section 6</b>	Precipitation 沉析  Protein Solubility 蛋白质的溶解度  Methods of Precipitation 沉析的方法
<b>Section 7</b>	Extraction 萃取  Extraction Principles 萃取的原理  Aqueous/non-aqueous Extraction 水相-非水相萃取

	<p>Aqueous Two-Phase Extraction 双水相萃取</p> <p>Supercritical Fluid Extraction 超临界流体萃取</p>
<b>Section 8</b>	<p>Adsorption 吸附</p> <p>Affinity Adsorption 亲和吸附</p> <p>Ion-Exchange Adsorption 离子交换吸附</p> <p>Hydrophobic Interaction-based Adsorption 疏水相互作用吸附</p> <p>Reverse Phase Adsorption 反相吸附</p>
<b>Section 9</b>	<p>Chromatography 色谱/层析</p> <p>Chromatography Principles 色谱/层析的原理</p> <p>Thin Layer Chromatography (TLC) 薄层色谱/层析</p> <p>Column Chromatography 柱色谱/层析</p> <p>Size Exclusion Chromatography 分子排阻色谱/层析</p> <p>Chromatography System 色谱/层析系统</p> <p>HPLC 高效液相色谱</p> <p>Gas Chromatography 气相色谱</p>
<b>Section 10</b>	<p>Bioproducts Polishing 生物技术产品的精制</p> <p>Crystallization 结晶</p> <p>Drying 干燥</p>
<b>Section 11</b>	<p>Case studies 案例研究</p> <p>Spliceosome 剪接体</p> <p>Transcriptional initiation supercomplexes 转录起始超级复合物</p> <p>Respirasome 呼吸体</p> <p>Phycobilisome 藻胆体</p> <p>Photosystem supercomplexes 光合系统超级复合物</p> <p>Ryanodine receptor 兰尼碱受体</p> <p>Voltage-gated Nav/CaV channels 电压门控钠离子/钙离子通道</p> <p>CatSpermasome CatSper 通道体</p> <p>TMC-1 mechanosensory transduction complex TMC-1 机械感知传导复合物</p>

13.	<p><b>课程考核</b> <b>Course Assessment</b></p> <p>(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.)</p> <p>Letter Grading 十三等级制</p> <table border="0"> <tr> <td>Attendance + Class performance (15%)</td> <td>出勤 + 课堂表现 (15%)</td> </tr> <tr> <td>Quiz (15%)</td> <td>小测 (15%)</td> </tr> <tr> <td>Presentation (20%)</td> <td>课堂报告 (20%)</td> </tr> <tr> <td>Final Exam (50%)</td> <td>期末考试 (50%)</td> </tr> </table>	Attendance + Class performance (15%)	出勤 + 课堂表现 (15%)	Quiz (15%)	小测 (15%)	Presentation (20%)	课堂报告 (20%)	Final Exam (50%)	期末考试 (50%)
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14.	<p><b>教材及其它参考资料</b> <b>Textbook and Supplementary Readings</b></p>								
	<p>Reference Book/参考书: Bioseparations Science and Engineering, Second Edition, Roger G. Harrison et al., 2015; Principles of Bioseparations Engineering, Raja Ghosh, 2006.</p>								