

## 课程大纲

### COURSE SYLLABUS

1.	<b>课程代码/名称</b> Course Code/Title	脂质生物学与研究方法 Lipid Biology and Research Approaches
2.	<b>课程性质</b> Compulsory/Elective	选修课 Elective
3.	<b>开课单位</b> Offering Dept.	医学院药理学系 Department of Pharmacology, School of Medicine
4.	<b>课程学分/学时</b> Course Credit/Hours	3 学分/48 学时 3 Credits/48 Class hours
5.	<b>授课语言</b> Teaching Language	英语 English
6.	<b>授课教师</b> Instructor(s)	陈默 Mo Chen
7.	<b>开课学期</b> Semester	2023 年秋季 Fall semester of 2023
8.	<b>是否面向本科生开放</b> Open to undergraduates or not	否 No
9.	<b>先修要求</b> 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.) 否 No
10.	<b>教学目标</b> Course Objectives	<p>本课程将深入探讨脂质信号的作用机制和生物学意义。所涉及的主题包括各种脂质信号分子的生物合成代谢与运输、它们的作用方式、作用位点、在细胞信号通路中的作用以及失调的脂质信号传导所带来的病理后果。同时还将重点介绍前沿的脂质代谢和信号传导实验方法。</p> <p>本课程将帮助研究生夯实相关方面科研的基础知识, 同时了解相关的课题设计、实验手段、科学模型构建等研究方法, 紧跟科学前沿。课程考查设置前沿文献精读、科学模型设计与 PPT 展示环节, 锻炼学生针对某一领域进行文献的查找、解读和综述的能力, 同时也加强学生科技论文调研、科学模型构建与口头学术报告的能力。</p> <p>This course will provide an in-depth examination of the mechanisms and biological relevance of lipid signaling. Topics covered will include the biosynthesis, metabolism, and transportation of various lipid signaling molecules, their modes of action, their functional location, their roles in cell signaling pathways, and the pathological consequences of deregulated lipid signaling. Emphasis will also be placed on cutting-edge approaches in studying lipid metabolism and signaling.</p> <p>This course will help graduate students solidify their foundational knowledge of relevant scientific research areas, as well as understand research methods such as topic design, experimental methods, and scientific model building, to keep up with the forefront of science. The course includes examinations that cover advanced literature reading, scientific model design, and PPT presentations, which will develop students' abilities to search for, interpret, and summarize literature in a particular field. It will also enhance students' abilities in conducting research for scientific papers, constructing scientific models, and delivering oral academic reports.</p>
11.	<b>教学方法</b> Teaching Methods	<p>课堂教学、前沿文献精读讨论、实验方法介绍、科学模型设计与绘制、学生 PPT 展示</p> <p>Classroom teaching, in-depth discussion of cutting-edge literature, introduction to experimental methods, design and drawing of scientific models, and student presentation with PowerPoint.</p>
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>	脂质生物学简介/Introduction to Lipid Biology 1.1 Overview of lipid Biology and its importance 1.2 Basic principles of lipid metabolism 1.3 Classification of lipids
<b>Section 2</b>	脂质信号分子/Lipid Signaling Molecules 2.1 Phospholipids with an emphasis on phosphoinositides 2.2 Prostaglandins and related eicosanoids 2.3 Sphingolipids and ceramides
<b>Section 3</b>	脂质信号分子的生物合成、代谢与运输/Biosynthesis, Metabolism, and Transportation of Lipid Signaling Molecules 3.1 Enzymes involved in the biosynthesis of lipid signaling molecules 3.2 Regulation of lipid signaling by lipid kinase/phosphatase/phospholipase 3.3 Transportation of lipids by lipid transfer proteins
<b>Section 4</b>	细胞膜上的脂质信号/Lipid Signaling on plasma membrane 4.1 Plasma membrane lipid composition 4.2 Fluid mosaic model 4.3 Cell surface receptors and lipid signaling cascade
<b>Section 5</b>	内膜系统上的脂质信号/Lipid Signaling on endo-membrane system 5.1 Lipid signaling on endosomes and lysosomes 5.2 Lipid signaling on endoplasmic reticulum and Golgi complex 5.3 Lipid signaling on mitochondria and nuclear envelope
<b>Section 6</b>	非膜结构上的脂质信号/Lipid Signaling on non-membrane structures 6.1 Lipid signaling in nucleoplasm 6.2 Lipid signaling on stress granule 6.3 Lipid signaling anchored on proteins
<b>Section 7</b>	脂质信号在细胞通路中的作用/Role of Lipid Signaling in Cellular Pathways 7.1 Cell proliferation and differentiation 7.2 Cell survival and apoptosis 7.3 Immune response and inflammation
<b>Section 8</b>	脂质信号紊乱的病理后果/Pathological Consequences of Deregulated Lipid Signaling 8.1 Cancer and tumorigenesis 8.2 Cardiovascular disease 8.3 Neurodegenerative disorders
<b>Section 9</b>	脂质生物学的研究进展/Research Frontiers in Lipid Biology 9.1 Discussion of research articles for lipid signaling in lysosome repair 9.2 Discussion of research articles for nuclear lipid signaling 9.3 Discussion of research articles for lipid transfer proteins
<b>Section 10</b>	文献精读-学生 PPT 展示/ Literature review-Student PPT presentation
<b>Section 11</b>	研究脂质生物学的前沿方法-I/Cutting-edge Approaches in Lipid biology Study I 11.1 Lipid immunofluorescent staining 11.2 Lipid proximity ligation assay in cells and tissues

	11.3 Multi-channel fluorescent immunoblotting
<b>Section 12</b>	研究脂质生物学的前沿方法-II/Cutting-edge Approaches in Lipid biology Study II 12.1 Lipid biosensor 12.2 Lipid strip and lipid immunoprecipitation 12.3 Liposome sedimentation
<b>Section 13</b>	研究脂质生物学的前沿方法-III/Cutting-edge Approaches in Lipid biology Study III 13.1 Microscale thermophoresis 13.2 Lipid metabolic labelling and click reaction 13.3 Lipid transport assay
<b>Section 14</b>	研究脂质生物学的前沿方法-IV/Cutting-edge Approaches in Lipid biology Study IV 14.1 Membrane on a Chip/Microfluidic System 14.2 Native Mass Spectrometry 14.3 Stopped-Flow Fluorescence Spectroscopy
<b>Section 15</b>	绘制脂质生物学科学模型/Creating Scientific Illustrations for Lipid Biology 15.1 Tools for designing and creating scientific model/illustration 15.2 Practical session I: prepare scientific model for lipid isomers 15.3 Practical session II: prepare scientific model for lipid metabolism
<b>Section 16</b>	小综述与科学模型-学生 PPT 展示/Mini Review and Scientific Model Student PPT presentation
<b>13. 课程考核</b> <b>Course Assessment</b>	
	( 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.)  考核形式 考勤 (10%) + 课堂参与问答 (20%) + 科学模型设计与绘制 (30%) + 学生 PPT 展示 (40%) Attendance (10%) + Classroom engagement and Q&A (20%) + Scientific model design and drawing (30%) + Student PPT presentation (40%)
<b>14. 教材及其它参考资料</b> <b>Textbook and Supplementary Readings</b>	
	参考书 (《Lipid Signaling and Metabolism》, 《Lipid-Mediated Signaling》, 《Phosphoinositides: Methods and Protocols》, 《Lipid Signaling Protocols》), 以及与每个部分相关的研究前沿文献与综述。 References (《Lipid Signaling and Metabolism》, 《Lipid-Mediated Signaling》, 《Phosphoinositides: Methods and Protocols》, 《Lipid Signaling Protocols》) and relative cutting-edge research articles and reviews.