课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	**课程名称 Course Title**	生物医学综合实验，Biomedical Laboratory
2.	**授课院系 Originating Department**	医学院，School of Medicine
3.	**课程编号 Course Code**	MED308
4.	**课程学分 Credit Value**	1
5.	**课程类别 Course Type**	专业核心课 Major Core Courses
6.	**授课学期 Semester**	春 Spring
7.	**授课语言 Teaching Language**	中 Chinese
8.	**授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation& Contact （For team teaching, please list all instructors）**	张文勇，教授，南方科技大学医学院 zhangwy@sustc.edu.cn 0755-88018026 Zhang Wenyong, Professor, School of Medicine, Southern University of Science and Technology Email: zhangwy@sustc.edu.cn 0755-88018026 董金堂，教授，南方科技大学医学院 dongjt@sustc.edu.cn 0755-88018032 DONG Jintang, Professor, School of Medicine, Southern University of Science and Technology Email: dongjt@sustc.edu.cn 0755-88018032 卢奕，副教授，南方科技大学医学院 luy3@sustc.edu.cn 0755-88015570 Lu Yi, Associate Professor, School of Medicine, Southern University of Science and Technology Email: luy3@sustc.edu.cn 0755-88015570

		刘泉，副教授，南方科技大学医学院 liuq3@sustc.edu.cn 0755-88018055 Liu Quan, Associate Professor, School of Medicine, Southern University of Science and Technology Email: liuq3@sustc.edu.cn 0755-88018055 陈国安，副教授，南方科技大学医学院 cheng@sustc.edu.cn 0755-88018042 Chen Guoan, Associate Professor, School of Medicine, Southern University of Science and Technology Email: cheng@sustc.edu.cn 0755-88018042 张志潜，研究助理教授，南方科技大学医学院 zhangzq@sustc.edu.cn 0755-88018032 ZHANG Zhiqian, Research Assistant Professor, School of Medicine, Southern University of Science and Technology Email: zhangzq@sustc.edu.cn 0755-88018032
9.	实验员/助教、所属学系、联系方式 **Tutor/TA(s), Contact**	无 NA
10.	选课人数限额(可不填) **Maximum Enrolment（Optional）**	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other（Please specify）	总学时 Total
学时数 Credit Hours	0	0	32	0	32

12.	先修课程、其它学习要求 **Pre-requisites or Other Academic Requirements**	无 None
13.	后续课程、其它学习规划 **Courses for which this course is a pre-requisite**	无 None
14.	其它要求修读本课程的学系 **Cross-listing Dept.**	无 None

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本实验课程设置两个实验项目，建立小鼠糖尿病模型和肿瘤研究模型。

This lab course has set up two independent experimental projects: diabetic mouse model and tumor research model.

1.小鼠糖尿病模型实验是一个综合性的实验，通过检测不同的生理指标，观察其相应的生理功能变化，进而理解学习糖尿病的生理病理发展变化进程并掌握一定的综合实验技能。For mouse diabetic model: a comprehensive laboratory involving physiology and pathophysiology. It explains the functional changes that accompany the diabetic syndrome by detecting different physiological indicators. It helps student to understand pathophysiological process in the development of diabetes mellitus and master comprehensive experimental skills.

2.肿瘤模型中：建立与小鼠皮下移植肿瘤模型，使学生加深对肿瘤生长的认识，探讨肿瘤基因及抑癌基因的作用功能；设计体外检测，检测抗肿瘤药物的作用效果。For tumor research model: the establishment of mouse subcutaneous injection tumor model can be helpful for student to deep understand tumor growth and explore the function of tumor genes and tumor suppressor genes. This model also involves in vitro detection assays to test the effect of anti-tumor drugs.

16. 预达学习成果 Learning Outcomes

1. 掌握小鼠糖尿病模型及肿瘤研究模型这两种常用动物模型。To understand the common animal models of diabetes research model and tumor research model.

2. 理解学习糖尿病及肿瘤的发生发展的生理病理变化过程。To understand pathophysiological change process in the development of diabetes mellitus and tumor.

3. 本课程着重培养学生独立思考科学问题的能力、独立设计实验和分析实验结果的能力，为后续学生参加科技创新项目及生物医学科学研究打下坚实的基础。This course focuses on cultivating students' ability to think scientific problems independently, design experiments and analyze experimental results independently. Thus, this course lays a solid foundation for the follow-up projects of science and technology innovation and biological sciences research.

17. 课程内容及教学日历 （如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

SECTION A: Tumor Model

实验一　癌细胞培养的基本技术

掌握细胞培养的无菌操作和细胞计数

熟悉不同种类的癌细胞的常规培养方法

掌握癌细胞的传代培养方法以用于其功能性实验检测。

Lab 1　Essential techniques of cancer cell culture

Fundamentals in aseptic technique and Hemacytometer counting.

Be Familiar with routine maintenance of different cancer cells.

Learn to seed cancer cell for functional assays.

实验二　小鼠皮下注射肿瘤模型

掌握小鼠皮下移植肿瘤的操作技术

观察肿瘤生长曲线

Lab 2　Mouse subcutaneous injection tumor model

Master the operation technique of subcutaneous tumor in mice.

Observation tumor growth curve.

实验三　癌细胞增殖分析

观察药物治疗后癌细胞生长的差异

体外检测评价抗癌药物的作用效果

Lab 3　Cancer cell proliferation assay

Observation the difference of cancer cell growth after drug treatment.

Evaluate anti-cancer drug's function in *in vitro* assay.

实验四　癌细胞凋亡分析

应用 Annexin V 染色和选择性碘化丙啶（PI）检测抗癌药物处理后的癌细胞凋亡情况

体外检测评价抗癌药物的作用效果

Lab 4　Cancer cell apoptosis assay

Detection cancer cell apoptosis using annexin V staining and optional propidium iodide (PI)

Evaluate anti-cancer drug's function in in *vitro* assay.

实验五　癌细胞迁移实验

量化细胞移动，观察癌细胞迁移后贴壁生长的情况

评价趋化因子的作用

Lab 5　Cancer cell transwell Assay

Quantify cell movement and measure migration of adherent cells.

Evaluate chemoattractant properties.

实验六　RNA 提取和实时荧光定量 PCR

测定靶基因的表达

掌握 RNA 提取和基因表达数据分析的实验技巧

Lab 6　RNA extraction and Real-time qPCR

Determine the expression of target genes.

Acquire the experiment skills of RNA extraction and gene expression data analysis.

SECTION B: Diabetes Model

实验一　口服葡萄糖耐量试验和 β-羟丁酸检测

观察小鼠糖尿病模型的酮酸与空腹血糖水平

观察胰岛 β 细胞功能和机体对血糖的调节能力

Lab 1　Oral glucose tolerance tests (OGTT) and β-HB measurements

Introduction for keto acid and blood glucose levels in diabetes mice.

Observation for the islet β-cells function and the organism 's regulation of blood glucose.

实验二　皮肤切创愈合实验和糖化血红蛋白的检测

掌握小鼠皮肤切创愈合模型

观察糖尿病小鼠的皮肤愈合问题

掌握 Elisa 检测糖化血红蛋白的方法

Lab 2 **Skin Wound Healing and glycosylated hemoglobin (HbA1c) measurements**

Master murine model of wound healing in mice.

To observe impaired wound healing of diabetic mice model.

To learn the glycosylated hemoglobin (HbA1c) measurements with Elisa.

实验三 **SOD 和 MDA 检测，胰岛素（C 肽）释放试验**

掌握化学发光法检测的方法与原理

观察糖尿病小鼠的氧化应激反应

Lab 3 **Detection of SOD and MDA, Insulin release test (IRT)**

Master the method and principle of chemiluminescence.

Identified oxidative stress reaction in diabetes mice.

实验四 **基因型鉴定**

掌握基因型的鉴定方法与原理

对照组、STZ-1 组、STZ-2 组、Lepdb/db 组小鼠，鉴定不同组别的基因型

Lab 4 **Genotype identification**

Master the method and principle of genotype identification.

Identified genotypes in control group, STZ-1 group, STZ-2 group and Lepdb/db group.

实验五 **热痛反应阈值检测**

掌握热痛反应阈值的定义

观察糖尿病神经病变的痛觉过敏现象

Lab 5 **Thermal nociceptive thresholds (TNTs)**

Master the definition of thermal nociceptive thresholds.

To observe hyperalgesia phenomenon for painful diabetic neuropathy.

实验六 **质谱流式进行免疫学检测**

了解质谱流式细胞技术

学习运用质谱流式细胞技术对糖尿病模型进行免疫学检测

Lab 6 **Immunological detection by mass cytometry**

Understanding mass cytometry features of single Cells and many features

To learn the Immunological detection by mass cytometry in diabetic mice model.

实验七 **质谱流式细胞技术的数据分析**

学习质谱流式数据在线分析

了解质谱流式数据分析软件： Cytobank

Lab 7 **Introduction of mass cytometry data analysis**

To learn data online analysis of mass cytometry.

Understanding mass cytometry data analysis software: Cytobank.

Section	Experiment	Time
1	Essential techniques of cancer cell culture	2h

	癌细胞培养的基本技术	
2	Cancer cell proliferation assay 癌细胞增殖分析	2h
3	Mouse subcutaneous injection tumour model 小鼠皮下注射肿瘤模型	2h
4	Cancer cell apoptosis assay 癌细胞凋亡分析	2h
5	Cancer cell transwell assay 癌细胞迁移实验	2h
6	Cancer cell RNA extraction 癌细胞 RNA 提取	2h
7	Mouse tumour isolation and histological analysis 小鼠肿瘤分离和组织学分析	2h
8	Real-time PCR 实时荧光定量 PCR	2h
9	Fasting blood glucose and oral glucose tolerance test (OGTT), β-HB measurements 空腹血糖与口服葡萄糖耐量试验，β-羟丁酸检测	2h
10	Skin wound healing and glycosylated hemoglobin (HbA1c) measurements 皮肤切创愈合实验，糖化血红蛋白的检测	2h
11	Detection of SOD and MDA, Insulin release test(IRT) SOD 和 MDA 检测，胰岛素（C 肽）释放试验	2h
12	Genotype identification 基因型鉴定	2h
13	Determination of thermal nociceptive thresholds 热痛反应阈值检测	2h
14	Immunological detection by mass spectrometer 质谱流式细胞技术进行免疫学检测	2h
15	Introduction of mass cytometry data analysis 质谱流式细胞的数据分析	2h
16	Experiment summary and data analysis 实验总结和数据分析	2h

18. 教材及其它参考资料 Textbook and Supplementary Readings

Ian A.Cree. Cancer Cell Culture Methods and Protocols. 2nd edition. Hummana Press. 2011

扈瑞平, 郑明霞. 生物医学综合实验指导. 北京大学医学出版社. 20166.

课程评估 ASSESSMENT

19.

评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes

出勤 Attendance		10		
课堂表现 Class Performance		20		
小测验 Quiz				
课程项目 Projects				
平时作业 Assignments		70		
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation				
其它（可根据需要改写以上评估方式） Others (The above may be modified as necessary)				

20. 记分方式 **GRADING SYSTEM**

☑ A. 十三级等级制 **Letter Grading**
☐ B. 二级记分制（通过/不通过） **Pass/Fail Grading**

课程审批 REVIEW AND APPROVAL

21. **本课程设置已经过以下责任人/委员会审议通过**
This Course has been approved by the following person or committee of authority