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 A Biomedical LaboratoryA
2.	**授课院系 Originating Department**	医学院 School of Medicine
3.	**课程编号 Course Code**	MED340
4.	**课程学分 Credit Value**	2
5.	**课程类别 Course Type**	专业核心课 Major Core Courses
6.	**授课学期 Semester**	春季/ Spring
7.	**授课语言 Teaching Language**	英语 English
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，医学院，zhangwy@sustech.edu.cn Zhang Wenyong, School of Medicine, zhangwy@sustech.edu.cn 张婷，医学院，zhangt1@mail.sustech.edu.cn Zhang Ting, School of Medicine, zhangt1@mail.sustech.edu.cn
9.	**实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact**	戴佳佳，医学院，daijj@mail.sustech.edu.cn Dai Jiajia, School of Medicine, daijj@mail.sustech.edu.cn
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			64		64

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	待定/To be determined
14.	其它要求修读本课程的学系 Cross-listing Dept.	待定/To be determined

教学大纲及教学日历 SYLLABUS

15. 教学目标 Course Objectives

本课程着重培养学生综合性的实验能力与科研思维。建立糖尿病研究模型综合性实验项目，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。

This course focuses on cultivating students' comprehensive experimental ability and scientific thinking. This course establishes an experimental projects of diabetes research model. It explains the functional changes that accompany the diabetic symdrome by detecting different physiological indicators. It helps student to understand pathophysiological process in the development of diabetes mellitus and master comprehensive experimental skills.

16. 预达学习成果 Learning Outcomes

1. 理解学习糖尿病发生发展的生理病理变化过程。
1. To understand pathophysiological change process in the development of diabetes mellitus.
2. 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。
2. 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.)

实验一	**绪论**
	糖尿病相关介绍
	实验室安全与垃圾分类
	动物实验基本操作技术
Lab 1	**Brief introduction**
	Introduction to diabetes Mellitus.
	Laboratory safety and waste classification.
	Basic techniques of animal experiment.
实验二	**口服葡萄糖耐量试验**
	观察小鼠糖尿病模型空腹血糖水平
	观察胰岛 β 细胞功能和机体对血糖的调节能力
Lab 2	**Oral glucose tolerance tests (OGTT)**
	Introduction for blood glucose levels in diabetes mice.
	Observation for the islet β-cells function and the organism 's regulation of blood glucose.
	The mice anatomy and sampling.
实验三	**糖化血红蛋白的检测**
	掌握糖化血红蛋白的检测原理
	学习糖化血红蛋白的检测的方法
Lab 3	**Glycated hemoglobin measurement**
	Master the principle of HbA1c determination.
	To learn the glycosylated hemoglobin (HbA1c) measurements.
实验四	**基因型鉴定**
	了解小鼠基因型鉴定的各种方法
	学习 PCR 的方法进行基因型鉴定
Lab 4	**Genotype Identification**
	Be familiar with the methods of mouse genotyping.
	Learn to do genotyping by PCR.
实验五	**皮肤切创愈合**
	掌握小鼠皮肤切创模型的建立
	观察比较糖尿病小鼠的伤口愈合不良
Lab 5	**Skin Wound Healing**
	Master the method to create murine model of wound healing.
	To observe impaired wound healing of diabetic mice model.
实验六	**脑与脊髓的取材**
	学习小鼠灌注、组织固定及组织脱水技术
	学习小鼠的脑与脊髓的取材
Lab 6	**Isolation of Brain and Spinal Cord**
	To learn the techniques of mouse perfusion, tissue fixation and tissue dehydration.
	To learn the techniques of dissecting brain out of the skull and isolation of spinal cord.
实验七	**脑与脊髓的切片**
	学习脑与脊髓的包埋与冰冻切片技术

学习鉴别脊髓的腰骶膨大区与脑片的海马区

Lab 7 Sectioning of Brain and Spinal Cord

Learn the techniques of brain and spinal cord embedding and frozen sectioning.

To identify the lumbosacral enlargement region of spinal cord and hippocampus of brain.

实验八 自选课题开题汇报

Lab 8 Thesis proposal of optional subjects

实验九 免疫荧光染色

学习免疫荧光染色的原理

观察比较实验组小鼠与对照组小鼠脊髓的病理变化

Lab 9 Immunofluorescent Staining

To learn about the principle of immunofluorescent staining

To observe histopathological changes in the spinal cord of the DB mouse

实验十 HE 染色与 TUNEL 凋亡检测

学习 HE 染色与 TUNEL 凋亡检测的原理

观察比较实验组与海马区域病理变化的区别

Lab 10 HE Staining and TUNEL Assay

Master the principle of HE staining and TUNEL assay

To observe histopathological changes in hippocampus of the DB mouse under a microscope.

实验十一 流式免疫学检测

了解流式细胞技术

学习运用流式细胞技术对糖尿病模型进行免疫学检测

Lab 11 Immunological detection by flow cytometry

Understanding flow cytometry features of single Cells and many features

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

实验十二 糖尿病眼病检测观察

视网膜取材与铺片观察

观察比较实验组与对照组之间的视网膜微血管病变

Lab 12 Detection of diabetic retinopathy

Retinal sampling and wholemount in mice.

To observe the retinal neovascularization differences between DB mice and control mice.

实验十三 组织蛋白提取

学习制备组织匀浆及从肝肺肾组织提取蛋白

学习 BCA 方法测定组织蛋白浓度的原理

Lab 13 Harvest of Tissue Proteins

To process tissue homogenate and to extract proteins from livers , lungs and kidneys.

To understand the principle of BCA protein assay and to determine the concentration of protein samples.

实验十四 SOD 的测定

学习 ELISA 的原理与实验操作

测定肝肺肾组织中的氧化应激情况

Lab 14 SOD Determination

To learn about the principle and procedure of ELISA assay.

To determine the levels of SOD in the livers , lungs and kidneys protein samples.

实验十五　热痛阈值的检测

观察不同实验组小鼠在加热过程中的热痛阈值反应

理解热痛阈值的定义

Lab 15　Determination of Thermal Nociceptive Thresholds

To observe nociceptive response to heat among different groups mice.

Master the identifcation of nociceptive response to thermal stimulation.

实验十六　总结汇报

Lab 16　Review presentation

Section	Time	Teaching Contents
1	4	绪论，动物实验基本操作 Brief introduction, Basic techniques of animal experiment
2	4	口服葡萄糖耐量试验 Oral glucose tolerance tests (OGTT)
3	4	糖化血红蛋白的检测 Glycated hemoglobin measurement
4	4	基因型鉴定 Genotype identification
5	4	皮肤切创愈合实验 Skin Wound Healing
6	4	脑与脊髓取材 Isolation of Brain and Spinal Cord
7	4	脑与脊髓切片 Sectioning of Brain and Spinal Cord
8	4	自选课题之开题报告 Thesis proposal of optional subjects
9	4	免疫荧光染色 Immunofluorescent Staining
10	4	HE 染色与凋亡检测 HE Staining and Tunel Assay
11	4	糖尿病眼病检测观察 Detection of diabetic retinopathy
12	4	流式免疫学检测 Immunological detection by flow cytometry
13	4	热痛反应阈值检测 Thermal nociceptive thresholds (TNTs)
14	4	组织蛋白提取 Harvest of Tissue Proteins
15	4	SOD 检测 SOD Determination
16	4	总结汇报 Review presentation

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. 2016

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		50		
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation		20		
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

本课程已经医学院教务处主任张文勇教授审核通过。