武汉大学研究生课程教学大纲

一、基本情况

开课（院）系	医学部			开课学期	2018 年-2019 学年第一学期
中文课程名称	国外生物医学研究前沿进展			授课语言	English
英文课程名称	Current Topics and Advances in Biomedical Research			授课对象	☑硕士 ☑博士
课程性质	硕士：□学科通开课□专业必修课□研究方向必修课☑选修课 博士：□学科通开课□专业必修课□研究方向必修课☑选修课				
适用专业	基础与临床各科硕士、博士研究生				
任课教师 1	Zhenyu Yue （岳振宇）	职称	教授	联系电话 （E-mail）	zhenyu.yue@mssm.edu
任课教师 2	Junmin Peng （彭隽敏）	职称	教授	联系电话 （E-mail）	(901)-336-1083 Junmin.peng@stjude.org
任课教师 3	Guomin Li （李国民）	职称	教授	联系电话 （E-mail）	guo-min.li@UTSW.edu
任课教师 4	Bing Xia （夏冰）	职称	教授	联系电话 （E-mail）	xiabi@cinj.rutgers.edu
任课教师 5	Xiongwei Zhu （祝雄伟）	职称	教授	联系电话 （E-mail）	Xiongwei.zhu@case.edu
任课教师 6	Chenleng Cai （蔡陈崚）	职称	教授	联系电话 （E-mail）	chenleng@iu.edu
任课教师 7	Hongliang Li （李红良）	职称	教授	联系电话 （E-mail）	lihl@whu.edu.cn
课内总学时数 （1 学分 18 学时）	42	学分数	2	考核方式	50%互动讨论 50%讨论报告
二、课程内容（应包括课程主要内容框架：各章节主要内容、目的和要求，各章节学时安排等，并说明教学方式等具体教学环节的安排）	教学内容			学时分配	
	任课教师： Zhenyu Yue(岳振宇) 1. Critical reading of literature and logic experimental design 2. Autophagy: cellular process and regulation 3. Molecular mechanisms of neurodegeneration			课堂讲授： 4 学时 讨论： 2 学时 实验： 0 学时	
	任课教师： Junmin Peng(彭隽敏) 1. Introduction of multi-omics and systems biology 2. Posttranslational Modifications of Proteins: Signaling and Regulation			课堂讲授： 3 学时 讨论： 3 学时 实验： 0 学时	

	3. Mass Spectrometry-based Proteomics to Understanding Human Disease	
	任课教师： Guomin Li（李国民） 1. Genome maintenance systems in cancer	课堂讲授： 4 学时 讨论： 2 学时 实验： 0 学时
	任课教师：Bing Xia(夏冰) 1. Molecular mechanisms of the DNA damage response 2. DNA damage response in cancer development and therapy	课堂讲授： 4 学时 讨论： 2 学时 实验： 0 学时
	任课教师：Xiongwei Zhu(祝雄伟) 1. Overview of mitochondrial dynamics and quality control 2. Molecular mechanism of neurodegeneration with a focus on mitochondrial dysfunction and oxidative stress	课堂讲授： 4 学时 讨论： 2 学时 实验： 0 学时
	任课教师：Chenleng Cai（蔡陈崚） 1. Cardiac Stem Cells in Heart Development, Repair and Regeneration	课堂讲授： 4 学时 讨论： 2 学时 实验： 0 学时
	任课教师：Hongliang Li（李红良） 1. Innate Immunity and NAFLD	课堂讲授： 4 学时 讨论： 2 学时 实验： 0 学时
三、预备知识或先修课程要求	任课教师： Junmin Peng(彭隽敏) The students are expected to have basic background knowledge on molecular and cell biology, biochemistry, gene expression and transcriptional regulation, protein modifications and degradation. Basic knowledge or exposure to experimental systems such as disease animal models. 任课教师： Guomin Li（李国民） 1. Students need to have a good background in cell biology, particularly cell division, cell cycle regulation and DNA replication. 2. Students are required to read several original papers that will be discussed in the class. 任课教师：Bing Xia(夏冰) Basic knowledge about DNA structure and replication as well as protein phosphorylation and ubiquitination.	

	任课教师：Xiongwei Zhu(祝雄伟) Strong background knowledge on molecular and cell biology. 任课教师：Chenleng Cai（蔡陈崚） 1. “人体解剖学”的心脏结构部分。 2. “发育生物学”的哺乳动物胚胎早期形态发育部分。 3. 哺乳动物“心脏发育生物学”形态发育部分。 任课教师：Hongliang Li（李红良） The students are expected to have related background knowledge in biology, medicine, and other relevant research background.
四、教学目的与要求（不少于 200 字）	任课教师： Zhenyu Yue（岳振宇） 1. Understand how to make sense of research papers in life science and medicine, how to ask the best questions and how to design the right experiments. 2. Understand the concept, process and regulation of autophagy and neuronal autophagy. 3. Understand common molecular mechanisms or cellular pathways underlying the pathogenesis of major human neurodegenerative diseases such as Alzheimer’s, Parkinson’s, Huntington’s diseases and Amyotrophic lateral sclerosis. 任课教师：Chenleng Cai（蔡陈崚） 1. 通过课前学习、听讲和课外阅读文献，让学生大致了解哺乳动物心脏发育的基本过程，认识开展心脏干细胞研究的重要性。 2. 课程将主要介绍早期心脏发育干细胞的多种来源，成体心脏干细胞的研究进展及心脏干细胞生物学的主要研究方法。 3. 建议学生课前预习并在课外阅读指定文献。 任课教师： Junmin Peng（彭隽敏） 1. Understand the chemical composition of living organisms, the basic concepts of multi-omics technologies and systems biology, and their application to fundamental biological and medical problems. 2. Understand the diversity and chemical reactions of posttranslational modifications (PTMs, such as phosphorylation and ubiquitination), and the basic function of PTMs in cellular signaling and regulation. 3. Understand the general approaches to probe disease mechanisms, and how to use mass spectrometry-based proteomics tools to discover novel disease

	mechanisms (e.g. cancer or Alzheimer's disease). (Note: the content may be adjusted to avoid overlapping with other speakers). 任课教师： Guo-Min Li（李国民） The goal of this course (these lectures) is to give students a better understanding as to how genome instability caused by loss of genome maintenance systems induces carcinogenesis. These systems include individual DNA repair pathways and error-prone and the properties of error-free DNA polymerases. The course will consist of formal lectures and original classic paper discussions. After the course, the students should 1) understand the detailed mechanisms of the individual genome maintenance systems, how these systems are genetically and epigenetically regulated in cells, and why their defects lead to genome instability and cancer predisposition; 2) be capable of forming their own hypotheses and deigning reasonable experiments to test their hypotheses. 任课教师：Bing Xia(夏冰) The goal of this course is for students to gain a reasonably comprehensive understanding of the molecular mechanisms of the DNA damage response, the role of DNA damage in cancer development, the role of DNA damaging agents in conventional chemotherapy, and the impact of DNA damage response research on the development of modern cancer therapies. More specifically, students are expected to grasp key concepts and principles of major DNA repair pathways, cell cycle checkpoints, genome instability, synthetic lethality, cancer genetics, and targeted and individualized cancer therapies. 任课教师：Xiongwei Zhu(祝雄伟) 1. Understand the concept, process and regulation of mitochondrial dynamics and mitochondrial quality control. 2. Understand the role of mitochondrial dysfunction in the pathogenesis of major neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease and Amyotrophic lateral sclerosis. 任课教师：Hongliang Li（李红良） 1. Understand the present situation of nonalcoholic fatty liver disease (NAFLD). 2. Understand the roles and functions of critical elements in the

	progression of NAFLD. 3. Understand the nature and complexity of innate immune signaling opens new avenues to novel therapies for NASH.
五、教材或参考书（作者、书名、出版社、出版时间等）	任课教师： Zhenyu Yue（岳振宇） 1. Junghyun Lim and Zhenyu Yue (2015) Neuronal aggregates: formation, clearance, and spreadingDevelopmental CellFeb 23;32(4):491-501. 2. Ai Yamamoto and Zhenyu Yue (2014) Autophagy and its Normal and Pathogenic States in the Brain Annual Reviews of Neurosciencevol 37, July 8th, PMID: 24821313. 任课教师： Junmin Peng（彭隽敏） Aebersold R, Mann M. Mass-spectrometric exploration of proteome structure and function. Nature. 2016 Sep 15; 537:347-55. Review. 任课教师： Guo-Min Li（李国民） Weinberg, R.A. (2014). The Biology of Cancer (2nd edition), Chapter 12, Maintenance of genomic integrity and the development of cancer. p511-575. 任课教师：Bing Xia（夏冰） 1. The DNA Damage Response: Making It Safe to Play with Knives Ciccia and Elledge, Molecular Cell, 2010. 2. The DNA damage response and cancer therapy Lord and Ashworth, Nature, 2012. 3. DNA repair, genome stability and cancer: a historical perspective Jeggo et al., Nature Reviews Cancer, 2016. 任课教师：Xiongwei Zhu（祝雄伟） Two most recent papers on mitochondrial dynamics and quality control in neurodegenerative diseases will be assigned to students two weeks in advance. All the students are required to read the papers before the class and be prepared to be called upon to discuss one or two figures in the papers. 1. Rugarli EI, Langer T. Mitochondrial quality control: a matter of life and death for neurons. EMBO J. 2012;31(6):1336-49. 2. Mishra P, Chan DC., Mitochondrial dynamics and inheritance during cell division, development and disease. Nat Rev Mol Cell Biol. 2014;15(10):634-46. 任课教师：Chenleng Cai（蔡陈崚）

1. 人类心脏解剖图
http://open.163.com/movie/2009/3/F/A/M6V0H51O2_M6V29M2FA.html
2. Developmental Cell. 2003 Dec;5(6):877-89.
3. Curr Top Dev Biol. 2010;90:1-41. doi: 10.1016/S0070-2153(10)90001-X.
4. N Engl J Med. 2010 Oct 21;363(17):1638-47. doi: 10.1056/NEJMra1003941
5. Cell. 2013 Aug 15;154(4):827-42. doi: 10.1016/j.cell.2013.07.039
6. Nature. 2014 May 15;509(7500):337-41. doi: 10.1038/nature13309
7. Nature Communications. 2015 Oct 30;6:8701. doi: 10.1038/ncomms9701
8. Science. 2009 Apr 3;324(5923):98-102. doi: 10.1126/science.1164680.
9. Nature. 2013 Jan 17; 493(7432): 433–436.
10. Nature Medicine. 2014 Dec;20(12):1386-93. doi: 10.1038/nm.3764.