细胞生物学及实验方法课程教学大纲

课程代码：74120710

课程中文名称：细胞生物学及实验方法

课程英文名称：Cell Biology and Experimental Methods

学分：3.0　　周学时：2.0-2.0

面向对象：

预修要求：普通生物学

一、课程介绍

（一）中文简介

本课程使用Bruce Alberts等最经典的细胞分子生物学教科书，该书的免费电子版本可以在http://www.ncbi.nlm.nih.gov/books/NBK21054/ 获取。该书的引论和概念部分从生物分子的结构与功能开始，涉及细胞与基因组、细胞化学与生物合成、蛋白的结构与功能、染色体机构与功能、DNA修复、基因表达；该书的方法部分包括分子技术操作、细胞成像等；细胞内部结构部分讲述细胞膜、膜运输、蛋白分类和传递、细胞器、细胞信号传递、细胞骨架、细胞周期调控；细胞之间信号传递部分包括细胞节点、细胞之间吸附、细胞周边物质、细胞发育等。最后，该书还涉及快速发展的领域包括干细胞、癌、获得性免疫、感染等。该教材图文并茂，文字简介易懂，是最受欢迎的细胞生物学教科书之一。作者Bruce Alberts毕业于哈佛大学，是美国科学院主席，加州大学旧金山分校生化生理学教授。

（二）英文简介

This course is based on the textbook “Molecular Biology of the Cell” authored by Bruce Alberts et al, its electronic copy can be obtained from the website http://www.ncbi.nlm.nih.gov/books/NBK21054/. The first part of this book describes Cells and Genomes, Cell Chemistry and Biosynthesis, Proteins, DNA and Chromosomes, DNA Replication, Repair, and Recombination, Control of Gene Expression; in the methodology part, it covers Manipulating Proteins, DNA, and RNA and Visualizing Cells; In the cellular internal organization part, it includes Membrane

Transport of Small Molecules and the Electrical Properties of Membranes, Intracellular Compartments and Protein Sorting, Intracellular Vesicular Traffic, Energy Conversion, Cell Communication, The Cytoskeleton, The Cell Cycle and Programmed Cell Death; In the cell social context, it introduces Cell Junctions, Cell Adhesion, and the Extracellular Matrix, Germ Cells and Fertilization, Development of Multicellular Organisms, The Lives and Deaths of Cells in Tissues, Cancer, The Adaptive Immune System, Pathogens, Infection, and Innate Immunity.

2. 学习目标及可测量结果

Aim of the course and assessment

学习目标：本课程的教学目的是让学生获得细胞生物学的基础知识，并能结合学生的相关研究课题，解决在实际工作中遇到的问题，特别是海洋生物学专业、海洋药学专业等的本科生和研究生。比如海洋微生物合成的活性分子是如何避免对自身细胞的毒性作用等，这需要了解这些活性分子的合成代谢与储存的细胞部位。 了解细胞如何避免自身中毒，有助于开发增加合成与储存活性物质的技术等。

可测量结果：了解细胞生物学的基本概念、熟悉细胞生物学常用的研究方法。

Aim of the study: This course is meant to introduce the basic concepts of Cell Biology to students and to allow students to use these concepts in their research projects to resolve practical issues faced by the students, especially whom in the major of marine biology and marine pharmacology. For example, one may want to know how microbes to avoid own synthesized bioactive compounds from poisoning itself. To address this question, one needs to know how the bioactive compounds are synthesized and where they are stored in cell. Understanding its regulation of biosynthesis and storage, it can help to develop methods in improving the production of the bioactive compounds.

Assessment of the study: To understand the concept of Cell Biology and to know the methodologies routinely used in laboratories.

3. 课程要求

Course delivery

课程要求和方式:课程内容包括五大部分共二十五章节,以课堂讲解为主,同时还有实验课。课堂讲解包括作业、小测验、期末读书报告等。

Course requirement and delivery: Contents of the course including five divisions with a total of 25 chapters are delivered in classrooms. At the same time, it has laboratory courses. Classroom lectures include home works, regular tests, and final journal paper presentations.

考核与评价方式：期末考试以读书报告的形式，占总成绩的 40%；出席率、作业、小测验各为 20%。

Examination and evaluation methods: final examination is in a form of journal paper presentation, which takes 40% of the total scores. Attendances, home works, and regular tests attribute 20% each to the total scores.

4. 教学安排

Course schedule

课堂讲解

Classroom lecturing

第一周（课时 1-4）

部分 I，细胞简介：细胞与基因组，细胞化学与生物合成，蛋白质

第二周（课时 5-8）

实验室工作 1，观察酵母细胞

第三周（课时 9-12）

部分 II，基本遗传机制：脱氧核糖核酸与染色体，脱氧核糖核酸复制，修复与重组，从脱氧核糖核酸至蛋白质，基因表达调控

第四周（课时 13-16）

部分 III，方法：操作处理蛋白质，脱氧核糖核酸，和核糖核酸，显现细胞

第五周（课时 17-20）

实验室工作 2，酵母细胞脱氧核糖核酸染色观察

第六周（课时 21-24）

部分 IV：细胞内部组织：膜结构，膜运输，蛋白质分拣，泡囊转运

第七周（课时 25-28）

部分 IV 续：能量转换，细胞通讯，细胞骨架，细胞周期与规划细胞凋亡，细胞分裂机制

第八周（课时 29-32）

实验室工作 3，识别减数分裂细胞与非减数分裂细胞

第九周（课时 33-36）

部分 V：细胞的社会属性：胞外基质，性细胞与受精，多细胞生物的发育

第十周（课时 37-40）

组织学，癌，适应性免疫系统，病原体，感染，先天性免疫

第十一周（课时 41-44）

实验室工作 4，观察细胞周期缺陷细胞

第十二周（课时 45-48）

期末读书报告

Week 1. (Lecture 1-4)

Part I. Introduction to the Cell:Cells and Genomes,Cell Chemistry and Biosynthesis, Proteins

Week 2. (Lecture 5-8)

Laboratory work 1. Visualization of yeast cells

Week 3. (Lecture 9-12)

Part II. Basic Genetic Mechanisms: DNA and Chromosomes, DNA Replication, Repair, and Recombination, From DNA to Protein, Control of Gene Expression

Week 4. (Lecture 13-16)

Part III. Methods: Manipulating Proteins, DNA, and RNA, Visualizing Cells

Week 5. (Lecture 17-20)

Laboratory work 2. DNA visualization in yeast cells

Week 6. (Lecture 21-24)

Part IV. Internal Organization of the Cell: Membrane Structure, Membrane Transport, Protein Sorting, Vesicular Traffic,

Week 7. (Lecture 25-28)

Part IV continued. Energy Conversion, Cell Communication, The Cytoskeleton

The Cell Cycle and Programmed Cell Death, The Mechanics of Cell Division

Week 8. (Lecture 29-32)

Laboratory work 3. Differentiate mitotic cells from interphase cells

Week 9. (Lecture 33-36)

Part V. Cells in Their Social Context: Extracellular Matrix, Germ Cells and Fertilization, Development of Multicellular Organisms

Week 10. (Lecture 37-40)

Part V continued. Histology, Cancer, The Adaptive Immune System, Pathogens, Infection, and Innate Immunity

Week 11. (Lecture 41-44)

Laboratory work 4. Observation of cell cycle-defective cells

Week 12. (Lecture 45-48)

Journal paperpresentations

5. 参考教材

Reference

Textbook: Molecular Biology of the Cell

Authors: Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter.

Publishing House: Garland Science, Taylor and Francis Group

ISBN: 978-0-8153-4464-3