**基因工程（A类）课程教学大纲**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 课程基本信息（Course Information） | | | | | | | |
| 课程代码  （Course Code） | BI382 | 学时  （Credit Hours） | 32 | 学分  （Credits） | | 2.0 | |
| 课程名称  （Course Name） | 基因工程（A类） | | | | | | |
| Principles of Genetic Engineering | | | | | | |
| 课程性质  (Course Type) | 培养计划内课程 | | | | | | |
| 授课对象  （Target Audience） | 生物技术专业本科生 | | | | | | |
| 授课语言  (Language of Instruction) | 中英双语  Chinese and English | | | | | | |
| 开课院系  （School） | 生命科学技术学院  School of Life Sciences and Biotechnology | | | | | | |
| 先修课程  （Prerequisite） | 遗传学、分子生物学、生物化学、细胞生物学和微生物学  Genetics, Molecular Biology, Biochemistry, Cell Biology, Microbiology | | | | | | |
| 授课教师  （Teacher） | 乔中东 | | 课程网址  (Course Webpage) | |  | |
| \*课程简介（Description） | 本课程为应用性的理论课，是现代生物学技术的理论基础，要求系统地介绍分子克隆的方法和原理，基因的各种分析方法的原理。通过对基因工程原理的学习，学生们应该能够在系统地掌握基因工程的学科前沿动态、能够进行课题的设计和操作，从而为今后的研究打下良好的基础。 | | | | | | |
| \*课程简介（Description） | This course isthe theory course of application technologies.It is the theoretical foundation of modern biology technology, and systematically introduces the principles of molecular cloning as well as various analytical methods of genes.Through this study, students are supposed to grasp the dynamic frontier of genetic engineering and be able to conduct the design and operation of research. | | | | | | |
| 课程教学大纲（course syllabus） | | | | | | | |
| \*学习目标(Learning Outcomes) | 1．了解当前基因工程的概貌、基本思路、原理和方法，及其与生命科学其他学科的联系。  Have a good understanding of the principles and methods of genetic engineering,  Make clear the linkage between genetic engineering and other subjects in life science.  2．系统地掌握基因工程的学科前沿动态、能够进行课题的设计和操作。  Grasp the frontier developments and trends in genetics,  Able to conduct the designing and operation of research.  3．为今后从事相关研究打下良好基础。  Lay foundations to get a further understandingofgenetic engineering. | | | | | | |
| \*教学内容、进度安排及要求(Class Schedule&Requirements) | | | | | | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 教学内容 | 学时 | 教学方式 | 作业及要求 | 基本要求 | 考查方式 | | 绪论：基因工程是实现人类梦想的新途径 | 2 | 课堂讲授 | 基因工程的概念和研究内容，基因工程的发展简史 | 掌握基因工程的概念，熟悉基因工程发展阶段中的大事件，了解基因工程的应用情况。 | 作业 | | Introduction: Genetic engineering is a new way to realize the human dream | 2 | Lecture | A brief history of the concept of genetic engineering, History of genetic engineering | Grasp the concept of genetic engineering, familiar with the large events in genetic engineering, and understand the application of genetic engineering. | Homework | | 凝胶电泳的原理 | 4 | 课堂讲授 | 1. 电泳的概念，2. 琼脂糖凝胶电泳，3. 聚丙烯酰胺凝胶电泳，4. SDS-PAGE， 5. RNA的凝胶电泳，6. 双向电泳。 | 掌握生物大分子在各种凝胶电泳中迁移率的影响因素，熟悉各种凝胶电泳的应用范围，了解各种凝胶电泳的具体步骤。 | 作业 | | Principle of gel electrophoresis | 4 | Lecture | 1 Concepts of electrophoresis, 2Agarose gel electrophoresis, 3Polyacrylamide gel electrophoresis, 4 SDS-PAGE, 5 RNA gel electrophoresis, 6 Two-dimensional electrophoresis. | Master the influencing factors of mobility of biological macromolecules, familiar with the application of various gel electrophoresis;grasp the specific steps of various gel electrophoresis. | Homework | | 核酸和蛋白质的分离纯化和分析技术 | 4 | 课堂讲授 | 1. DNA的分离纯化，2. RNA的分离纯化，3. 蛋白质的分离纯化，4. 各种印记方法 | 掌握生物大分子分离纯化的注意事项；掌握Southern-blot和Western-blot的过程，熟悉生物大分子分离纯化的方法；了解核酸印记的应用。 | 作业 | | Separation and purification techniques of nucleic acids and proteins | 4 | Lecture | 1 DNA separation and purification, 2Separation and purification of RNA, 3Separation and purification of proteins, 4 Various imprinting method | Grasp notes to separation and purification of biological macromolecules; mastering Southern-blot and Western-blot, familiar with the methods of separation and purification of biological macromolecules. | Homework | | 工具酶 | 4 | 课堂讲授 | 1. 限制性内切酶，2. 修饰酶 | 掌握II型限制性内切酶的概念、各种应用注意事项，掌握各种修饰酶的功能，熟悉各种修饰酶的应用范围。 | 作业 | | Tool Enzymes | 4 | Lecture | 1 The restriction endonucleases, 2 Modifying Enzymes | Grasp the concept of type II endonuclease restriction and notes of application; master the function of a variety of modified enzyme, familiar with the applications of various modifying enzymes. | Homework | | 克隆载体 | 4 | 课堂讲授 | 1. 质粒载体，2. 噬菌体载体，3. 粘粒载体，4. 穿梭载体 | 掌握DNA作为载体的条件，掌握接合质粒和非接合质粒的区别，掌握α互补的原理和应用，掌熟悉握载体的适用条件；了解载体的分子生物学。 | 作业 | | Cloning vectors | 4 | Lecture | 1 The plasmid vector, 2Phage vectors, 3Cosmic vectors, 4Shuttle vector | Master conditionsof DNA used as a carrier, grasp the differences between plasmids and non-engagement plasmid, grasp the principles and applications of α complementary, familiar with the applicable conditions of vectors,and understand the molecular biology of vectors. | Homework | | 克隆策略 | 4 | 课堂讲授 | 1. cDNA文库的构建，2. 基因组文库的构建 | 掌握cDNA文库和基因组文库的大小范围，熟悉cDNA文库和基因组文库的构建过程。 | 作业 | | Cloning strategy | 4 | Lecture | 1Construction of cDNA library, 2 Construction of genomic library | Grasp the construction of cDNA library and genomic library | Homework | | PCR | 4 | 课堂讲授 | 1. PCR的原理及其应用，2. PCR条件的优化，3. PCR的种类，4. 反转录PCR，5. 荧光定量PCR的原理及其应用。 | 掌握PCR的原理，掌握引物设计原则，掌握荧光定量PCR的原理；熟悉相关的专业术语；了解PCR的应用范围。 | 作业 | | PCR | 4 | Lecture | 1 Principles and applications of PCR, 2Optimization of PCR conditions, 3Types of PCR, 4 Reverse transcription PCR, 5 Principles and applications of quantitative PCR. | Master the principles of PCR, grasp primer design principles, grasp the principle of fluorescence quantitative PCR; familiar with the jargon; learn applications of PCR. | Homework | | 基因芯片技术及其应用 | 2 | 课堂讲授 | 1. 基因芯片的原理， 2. 芯片的分类，3. 芯片检测的技术流程和总体策略，4. 芯片的主要优势和应用 | 掌握芯片检测技术的原理、流程和分类，熟悉芯片检测的总体策略，了解芯片检测的原因范围。 | 作业 | | Gene Chip Technology and Its Application | 2 | Lecture | 1 Principle of gene chip, 2 Chip classification, 3Technical processes and overall strategy of microarray, 4 Main advantages and applications of the chip | Master the principles, procedures and classification of microarray technology; understand the application of chip detection. | Homework | | 基因系列表达技术 | 1 | 课堂讲授 | 基因系列表达技术的原理和应用范围 | 掌握基因系列表达技术的原理，熟悉基因系列表达技术与芯片检测技术之间的差异。了解基因系列表达技术的应用范围。 | 作业 | | Gene sequence expression technology | 1 | Lecture | Principles and applications of gene sequence expression technology | Master the principles of gene sequences expression technology, familiar with the differences between gene sequences expression and microarray technologies. Understand the scope of gene expression technology series. | Homework | | 基因诊断 | 2 | 课堂讲授 | 1.基因诊断的原理和方法，2. 基因诊断的应用 | 掌握各种基因突变的检测方法的原理，熟悉基因诊断的应用范围 | 作业 | | Genetic Diagnosis | 2 | Lecture | 1 The principles and methods of genetic diagnosis, 2Application of gene diagnosis | Master a variety of detection methods mutations principle, familiar with the application scope of genetic diagnosis | Homework | | 基因治疗 | 1 | 课堂讲授 | 1. 基因治疗的概念，2. 基因治疗的选择，3. 基因治疗的应用实例 | 掌握基因治疗的概念，熟悉基因治疗的途径，了解基因治疗的范围。 | 作业 | | Gene therapy | 1 | Lecture | 1 The concept of gene therapy, 2Gene therapy choice, 3 Gene therapy applications | Grasp the concept of gene therapy; understand the scope of gene therapy. | Homework | | | | | | | | |
| \*考核方式  (Grading) | 平时出勤、课堂互动和作业占总成绩的30%，期末考试占70%。  Attendance, Interaction and homework make up 30%, and the final exam makes up 70%. | | | | | | |
| \*教材或参考资料  (Textbooks & Other Materials) | 教材：基因工程原理，徐晋麟等编著，科学出版社2005年  Applied Molecular Genetics，网站：http://www.biochem.arizona.edu/classes/bioc471/pages/materials.html | | | | | | |
| 其它  （More） | “无” | | | | | | |
| 备注  （Notes） | “无” | | | | | | |

备注说明：

1．带\*内容为必填项。

2．课程简介字数为300-500字；课程大纲以表述清楚教学安排为宜，字数不限。