**遗传学（A类）课程教学大纲**

Course Outline

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| 课程基本信息（Course Information） | | | | | | | |
| 课程代码  （Course Code） | BI310 | 学时  （Credit Hours） | 32 | 学分  （Credits） | | 2.0 | |
| 课程名称  （Course Name） | 遗传学（A类） | | | | | | |
| Genetics | | | | | | |
| 课程性质  (Course Type) | 培养计划课程 | | | | | | |
| 授课对象  （Target Audience） |  | | | | | | |
| 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） | 普通生物学  General Biology | | | | | | |
| 授课教师  （Teacher） | 乔中东 | | 课程网址  (Course Webpage) | | <http://www.icourses.cn/coursestatic/course_2940.html> | |
| \*课程简介（Description） | 本课程将系统介绍经典遗传学、分子遗传学和数量遗传学的知识。通过对遗传学的学习，使学生能了解当前遗传学的概貌、基本原理和遗传学方法，及其与生命科学其他学科的联系，从而使学生能够正确理解生命现象的本质，并为他们进一步在更深入的层次上了解遗传学的遗传机制打下基础。通过对遗传学的学习，学生们应该能够系统地掌握遗传学的学科前沿动态和发展趋势。 | | | | | | |
| \*课程简介（Description） | This course will systematically introduce knowledges on classical genetics, molecular genetics and quantitative genetics. Through study, students are supposed to have an overview understanding of the principles and methods of genetics. Meanwhile, students should make clear the linkage between genetics and other subjects in life science and get a good understanding of the essence of life phenomena. In all, the course laid the foundation for students to get a further understandingof the genetic mechanisms, and students are supposed to grasp the frontier developments and trends in genetics through this study. | | | | | | |
| 课程教学大纲（course syllabus） | | | | | | | |
| \*学习目标(Learning Outcomes) | 1. 了解当前遗传学的概貌、基本原理和遗传学方法，及其与生命科学其他学科的联系。  Have an overview understanding of the principles and methods of genetics,  Make clear the linkage between genetics and other subjects in life science.  2. 能够正确理解生命现象的本质，并为他们进一步在更深入的层次上了解遗传学的遗传机制打下基础。  Have a good understanding of the essence of life phenomena,  Lay foundations to get a further understandingof genetics.  3.系统地掌握遗传学的学科前沿动态和发展趋势。  Grasp the frontier developments and trends in genetics. | | | | | | |
| \*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 | 2 | 课堂讲授 | 1. 遗传学中的三个里程碑，2. DNA是遗传物质，3. 遗传和进化，4. 遗传分析的层次，5. 遗传学在人类生活中的应用。 | 掌握遗传物质的基础是核酸，掌握中心法则，掌握遗传分析的方法，熟悉遗传学研究中的三个里程碑，了解遗传学在人类生活中的应用。 | 作业 | | Introduction | 2 | Lecture | 1: Three Milestones in Genetics, 2: DNA is the genetic material, 3: Genetics and evolution, 4: Stage of genetic analysis, 5: The application of genetics in human life | Grasp that nucleic acid is genetic material; grasp the central dogma; master genetic analysis methods; familiar with three milestones; understand the application of genetics in human life. | Homework | | 细胞生殖 | 2 | 课堂讲授 | 1.细胞和染色体，2. 有丝分裂， 3. 减数分裂。 | 掌握原核细胞与真核细胞的区别，掌握染色体的结构和功能，掌握减数分裂的结构，掌握联会、交换、解聚等概念；熟悉有丝分裂和减数分裂的各个时相；了解各细胞器的结构和功能。 | 作业 | | Cellreproduction | 2 | Lecture | 1: Cell and chromosome, 2: Mitosis, 3, Meiosis. | Grasp the difference between prokaryotes and eukaryotes, master the structure and function of chromosome, grasp the structure of meiosis, master concepts of Federation, exchange and de-polymerization; familiar with the phases in mitosis and meiosis; understand the structure and function of organelles. | Homework | | 孟德尔理论：遗传的基本原则 | 2 | 课堂讲授 | 1. 孟德尔遗传的研究，2. 孟德尔原则的应用，3. 遗传假说的建立和测试，4. 孟德尔原理在人类遗传学中的应用 | 掌握孟德尔理论的三个基本原则，掌握遗传分析的基本方法，掌握家系图谱中的各种符号的含义；熟悉各种遗传分析方法的应用范围；了解遗传咨询的应用范围。 | 作业 | | Mendel's theory: the basic principles of heredity | 2 | Lecture | 1: Research of Mendelian genetic, 2: Application of Mendelian principles, 3: Build and test of genetic hypothesis, 4: Application of Mendel principles in human genetics | Master the three basic principles of Mendelian theory, grasp the basic methods of genetic analysis, and grasp the meaning of various pedigree symbols; familiar with the range of application of various methods of genetic analysis; understand the application of genetic counseling. | Homework | | 孟德尔理论的延伸 | 4 | 课堂讲授 | 1. 等位基因变异和基因功能，2. 从基因型到表型 | 掌握显性、隐性、不完全显现、共显性、复等位基因、等位基因系列、外显率和表达度、上位性等概念，掌握影响基因功能的因素；熟悉基因的交互作用、基因的多效性等，了解突变显性和隐性的规律。 | 作业 | | Extending of Mendel’s theory | 4 | Lecture | 1: Allelic variation and gene function, 2: From genotype to phenotype | Grasp concepts of dominant, recessive, not fully apparent, co-dominant, complex alleles series, penetrance, expression degree and epistasis, grasp factors that influence gene function; familiar gene interactions, understand the laws of dominant and recessive mutations. | Homework | | 孟德尔理论的染色体基础 | 4 | 课堂讲授 | 1. 染色体，2. 遗传的染色体理论，3. 人类的性连锁基因，4. 性染色体和性别决定，5. X-连锁基因的剂量补偿。 | 掌握基因与染色体的关系，掌握减数分裂时基因的重组和分离的规律，掌握性染色体和性别决定的基本理论，掌握性别决定过程中的X-连锁基因剂量补偿的原则；熟悉人类性染色体连锁疾病的种类和诊断原则；了解相关模式生物染色体的数量。 | 作业 | | Chromosome foundation of Mendel’s theory | 4 | Lecture | 1: chromosome, 2: Chromosome theory of heredity, 3: Human sex-linked genes, 4: Sex chromosomes and sex determination, 5: Dosage compensation X- linked genes | Grasp the relationship between genes and chromosomes, master the law of recombinati0on and separation in meiotic, master the basic theory of sex chromosomes and sex determination, master the principles of dosage compensation ofX- linked gene in sex determination; familiar with types and principles of diagnosis of human sex chromosomes disease; understand the chromosome number of relevant model organisms. | Homework | | 染色体数量和结构的变异 | 4 | 课堂讲授 | 1. 研究染色体的相关细胞学技术，2. 多倍性，3. 非整倍体，4. 染色体结构的重排。 | 掌握多倍性、非整倍体等概念，掌握染色体重排的方式以及对生物表型的影响，熟悉染色体数量和结构异常造成的疾病，了解研究染色体的相关细胞学技术。 | 作业 | | Variation of number and structure of chromosome | 4 | Lecture | 1: Related cytological methods in researchingchromosome, 2: Polyploidy, 3: Aneuploidy, 4: Rearrangement of chromosome structure | Grasp the concepts of polyploidy, aneuploidy and others, master the principles of chromosomal rearrangements and its impact on biological phenotype, familiar with the diseases caused by chromosome number and structural abnormalities, understanding related cytological methods in researching chromosome. | Homework | | 真核生物的连锁、交换和染色体作图 | 4 | 课堂讲授 | 1. 连锁、重组和交换，2. 染色体作图，3. 细胞遗传性作图，4. 人类连锁分析， 5. 重组和进化。 | 掌握连锁、重组和交换与染色体图距的关系，掌握利用基因连锁、重组和交换作图的方法，掌握人类基因连锁分析的方法；熟悉重组与进化的关系。 | 作业 | | law of linkage and crossing-over in Eukaryotes and chromosomal mapping | 4 | Lecture | 1: Linkage, restructuring and exchange, 2: Chromosome mapping, 3: Cell genetic mapping, 4: Human Linkage Analysis, 5: Restructuring and evolution | Master relationship between linkage, restructuring, exchange and chromosome map distance, master the use of genetic linkage, recombination, and method of exchanging mapping, grasp the human genome linkage analysis methods; familiar with the relationship between restructuring and evolution. | Homework | | 微生物遗传学 | 4 | 课堂讲授 | 1. 病毒的遗传学，2. 细菌的遗传学， 3. 细菌的遗传物质交换的机制，4. 细菌遗传交换的进化特征，5. 酵母的遗传学。 | 掌握噬菌体溶厡与溶菌交换的遗传机制，掌握转化、接合、转导等概念，掌握利用F’因子或性质粒进行遗传分析的方法，掌握利用四分子进行酵母作图的方法；熟悉噬菌体和细菌的分子生物学特征；了解细菌的遗传交换与进化的关系。 | 作业 | | Microbial Genetics | 4 | Lecture | 1: Virus Genetics, 2: Bacterial genetics, 3: Mechanisms of exchange of genetic material in bacteria, 4: Evolution characteristics of genetic exchange in Bacteria, 5: Yeast genetics | Master the genetic mechanisms of lysogenic and lyticexchange in phage, master concepts of transformation, conjugation, transduction, master the use of F 'factor or plasmid genetic analysis methods, master the use of four molecules of yeast mapping method; familiar with the molecular biological characteristics of phage and bacteria, understand the relationship between bacterial genetic exchange and evolution. | Homework | | 复杂性状的遗传 | 2 | 课堂讲授 | 1. 遗传的复杂形式，2. 数量遗传学的统计学方法，3. 数量性状的分析，4. 近亲繁殖和共同祖先的分析，5.亲缘关系间的相关性，6. 人类行为性状的数量遗传学。 | 掌握遗传因素与环境因素互作对表型的影响，掌握数量性状的特征；熟悉分析复杂性状的统计学方法；了解人类行为性状的数量遗传学。 | 作业 | | Heredity of complex traits | 2 | Lecture | 1 Complex genetic forms, 2statistical methods of quantitative genetics, 3 analysis of quantitative traits, 4 analysis inbreeding and common ancestor, 5 relevance between kinship, 6 quantitative genetics in human behavior traits. | Master the effect of genetic and environmental Interactions on phenotype, master quantitative characters; familiar with statistical methods to analyze complex traits; understand quantitative genetics in human behavior traits. | Homework | | 群体遗传学 | 2 | 课堂讲授 | 1. 等位基因频率理论，2. 自然选择，3. 随机遗传漂流，4. 遗传平衡中的群体。 | 掌握等位基因频率的遗传学分析方法，掌握Hardy-Weinberg原理，掌握突变、选择和漂流对等位基因频率的影响；熟悉基因频率变化对群体生殖和死亡的影响；了解群体生殖过程中等位基因频率变化的不可预见性。 | 作业 | | Population genetics | 2 | Lecture | 1: Theory of allele frequency, 2: Natural selection, 3: Random genetic drift, 4: population in Genetic Equilibrium | Grasp the analysis methods of allele frequencies, master the principle of Hardy-Weinberg, ascertain the effect of mutation, selection, and rafting on allele frequencies; Familiarwith the effect of gene frequency change on population reproduction and death; understand the unpredictability of allele frequency change in reproductive process. | 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) | Principles of Genetics, Sixth Edition, Sunstad Simmons, John Wiley & Sons, Inc. 2012 | | | | | | |
| 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。