四川轻化工大学课程实施大纲

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| **课程名称：专业英语** |
| **授课班级：2020级生物制药** |
| **任课教师：陈咏梅** |
| **工作部门：化工学院** |
| **联系方式：电话** |

**四川轻化工大学 制**

**2022年9月**

**《专业英语》课程实施大纲**

**基本信息**

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| **课程代码：**  **课程名称：专业英语**  **学 分：2**  **总 学 时：32**  **学 期：2022-2023年上学期**  **上课时间：第10-17周**  **上课地点：**N1-410**，**N1-426  **答疑时间和方式:课间和课后，面对面，电话**  **答疑地点：**N1-410，N1-426**和第一实验楼517**  **任课教师：陈咏梅**  **学院：化学工程学院**  **邮箱： 676555924@qq.com**  **联系电话：13558910780** |

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1. **教学理念**

本门课程的教学理念是让学生养成自主学习专业英语的习惯，帮助已有一定英语基础的学生提高其阅读、翻译专业英语的能力。旨在拓宽学生的专业词汇量和阅读量，力求将英语与专业紧密结合，了解科技论文的文体特点和写作方法，为将来的学术论文的阅读写作和交流打下坚实的基础。

**2．课程介绍**

**2.1课程的性质**

专业英语是面向生物制药高年级本科生开设的限选课程，本课程教学内容主要涉及普通生物、微生物学、遗传学、分子生物学等领域的专业基础知识。通过本课程，向学生介绍如何撰写科技论文、投稿等方面的知识；扩大专业英语的词汇量，掌握专业英语书刊的阅读技巧、了解文献检索及写作知识。

**2.2课程在学科专业结构中的地位、作用**

专业英语重点提高专业英语的词汇量，掌握专业英语文献的阅读技巧、了解文献检索及写作知识；是今后学术论文撰写的必需前提。

**2.3课程的历史与文化传统**

本课程的先修课为大学英语，科技论文写作可作为后续课程。

**2.4课程的前沿及发展趋势**

本课程是提高专业学术能力的基础课程，通过专业英语的学习可以提高专业英语文献的阅读、写作能力，为从事专业、科研事业奠定必要的基础。

**2.5课程与经济社会发展的关系**

目前国际交流频繁，学术论文及专业资料知识的获得大部分需要通过英语获得，专业英语的学习对提高本国科技实力具有重要影响，为本国缩小与发达国家之间的科技和经济水平差距具有重要作用。

**2.6课程内容可能涉及到的伦理与道德问题**

本课程涉及生物制品或克隆技术时可能涉及到一些伦理与道德问题。如人们对生物工程食品的安全性的担忧，宗教信仰上的矛盾，克隆技术引发的巨大争议等。这些技术可能会对社会行为造成巨大冲击，如克隆技术可能打破以往的生育模式，可能会对家庭的组成产生极大的影响。

**2.7学习本课程的必要性**

通过本课程，向学生介绍如何撰写科技论文、投稿等方面的知识；扩大专业英语的词汇量，掌握专业英语书刊的阅读技巧、了解文献检索及写作知识，使同学熟练和逐步适应书面语体的特点和表达形式，能够准确、流畅的阅读、翻译生物技术英语文献，并能熟练的掌握英语工具，获取专业所需的信息，初步具备撰写科研论文的能力。

**3．教师简介**

**3.1教师的职称、学历**

博士、讲师

**3.2教育背景**

2010年本科毕业于中山大学生物技术专业，随后于中山大学生物化学与分子生物学专业直接攻读博士学位，博士期间主要从事进化基因组学及群体遗传学研究，2015年博士毕业后就职于四川理工学院。

**3.3研究兴趣（方向）**

群体遗传学、药用植物资源开发与保护、药食同源产品的开发与研制。

**4．先修课程**

大学英语

**5．课程目标**

通过本课程，向学生介绍如何撰写科技论文、投稿等方面的知识；扩大专业英语的词汇量，掌握专业英语书刊的阅读技巧、了解文献检索及写作知识。

本课程帮助已有一定英语基础的学生提高其阅读、翻译专业英语的能力。

拓宽学生的专业词汇量和阅读量，力求将英语与专业紧密结合，了解科技论文的文体特点和写作方法，为将来的学术论文的阅读写作和交流打下坚实的基础。

**6．课程内容**

**6.1课程的内容概要**

（一）**Lesson one Introduce**

1.基本要求：

掌握专业英语的特点及学习方法。理解专业英语的概念。了解学习专业英语的意义。掌握专业英语的常用网络资源。

2. 基本内容：

1）、生物专业英语的概念。

2）、专业英语的特点。

3）、学习专业英语的意义。

4）、专业英语的学习方法。

5）、生物专业英语的常用网络资源。

3、作业或报告：无

4、实验：无

（二）**Lesson two Inside the living cell: structure and function of internal cell parts**

1.基本要求：

掌握关于植物细胞各种细胞器的英文词汇、词根，熟悉相关的一些扩展词汇。了解英语科技论文的组成部分以及标题的写作注意事项。

2.基本内容：

1）、单词

2）、词组

3）、重点句型分析分析

4）、英语科技论文的组成部分。

5）、英语科技论文标题的写作注意事项。

3、作业或报告：翻译1题

4、实验：无

(三)**Lesson three photosynthesis**

1.基本要求：

掌握关于植物光合作用的原理及过程、反应步骤中所涉及的专业词汇和句型。熟悉英语论文摘要和关键词的写作技巧。

2. 基本内容：

1）、单词

2）、词组

3）、重点句型分析分析

4）、英语论文摘要和关键词的写作技巧。

3、作业或报告：翻译1题

4、实验：无

（四）**Lesson four Cellular reproduction: mitosis and meiosis**

1.基本要求：

掌握细胞有丝分裂和减数分裂过程中涉及的各种专业词汇和句型。理解课文中虚拟语气的用法及强调句的形式。熟悉英语论文引言部分的写作技巧。

2.基本内容：

一、单词

二、词组

三、重点句型分析分析

四、英语科技论文的引言部分的语言特点和写作技巧。

3、作业或报告：翻译1题

4、实验：无

(五) **Lesson five Foundations of genetics**

1.基本要求：

了解早期的遗传理论，孟德尔的生平及其经典遗传实验，遗传定律。掌握英语科技论文的“材料与方法”部分的语言特点和写作技巧。

2.基本内容：

一、单词

二、词组

三、重点句型分析分析

四、论文中“材料与方法”的功能要求和语言特点。

3、作业或报告：专业词汇听写

4、实验：无

**（六）**  **Lesson six Discovering the chemical nature of the gene**

1.基本要求：

掌握基因的化学性质，核酸的化学和分子结构。理解DNA复制过程。了解在科学史上关于DNA分子结构的各种理论。熟悉科技论文中“结果与讨论”部分的功能要求和语言特点。

2.基本内容：

一、单词

二、词组

三、重点句型分析分析

四、专业论文写作中“结果与讨论”的写作技巧。

3、作业或报告：翻译1题

4、实验：无

(七) **Lesson seven The origin and diversity of life**

1.基本要求：

掌握生命起源和演化的历程。理解专业论文写作中“致谢、参考文献”的写作技巧。掌握专业论文写作与发表的一般程序和注意事项。

2.基本内容：

一、单词

二、词组

三、重点句型分析分析

四、论文中“致谢、参考文献”的写作技巧。

3、作业或报告：翻译1题

4、实验：无

（八） **Lesson eight Fungi:the great decomposers**

1.基本要求：

了解真菌的特征、分类和结构。掌握学术刊物的分类及常见学术刊物的载稿特点。了解世界四大科学索引－SCI、EI、ISTP、ISR的概况。

**2.**基本内容：

一、单词

二、词组

三、重点句型分析分析

3、作业或报告：翻译1题

4、实验：无

（九）习题讨论课

1、基本要求：针对学生在学习过程中存在的共性问题进行。

2、主要内容：

安排2学时，由任课教师根据授课情况确定。

**6.2教学重点、难点**

本课程重点在于向学生介绍学科专业术语和概念，进一步提高阅读、理解英语专业文献的能力；重点讲解英译汉的技巧，培养对科技文献的理解能力，使同学熟练和逐步适应书面语体的特点和表达形式，能够准确、流畅的阅读、翻译生物技术英语文献，并能熟练的掌握英语工具，获取专业所需的信息，初步具备撰写科研论文的能力。

**6.3学时安排**

课程总学时：32学时 其中理论教学：32学时，实验：0学时

|  |  |  |
| --- | --- | --- |
| 序号 | 主要内容 | 参考学时 |
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**7.课程实施**

**7.1教学单元一**

Lesson one Introduce

**7.1.1教学日期**

2022.11.01

**7.1.2教学目标**

掌握专业英语的特点及学习方法。理解专业英语的概念。了解学习专业英语的意义。掌握专业英语的常用网络资源。

**7.1.3教学内容（含重点、难点）**

本章重点

介绍专业英语与一般英语的区别及专业英语学习的方法，以及生物专业英语的常用网络资源。

本章难点

科技英语在语法、句子结构、词汇构成、表达方式及修饰手段上的特点。

讲授内容

**7.1.4教学过程**

**一、专业英语的概念。**

**二、专业英语的特点。**

**三、学习专业英语的意义。**

**四、专业英语的学习方法。**

**五、生物专业英语的常用网络资源。**

**7.1.5教学方法**

本课程采用自学与讲授相结合，理论与实践相结合的教学方法。教学中突出以学生作为主体，运用多媒体等教学手段对其进行专业英语的学习指导。同时为了提高学生英语听说读写的基础能力，可采取小组讨论式等灵活多样的教学形式，调动其学习积极性。

**7.1.6作业安排及课后反思**

学习使用专业英语的常用网络资源。

**7.2教学单元二**

Lesson two: Inside the living cell: structure and function of internal cell parts

**7.2.1教学日期**

2020.11.04

**7.2.2教学目标**

使学生掌握细胞的组成结构（各种细胞器以及它们在细胞中的位置），以及结构与功能之间的关系。各细胞器及功能相关英语词汇以及主要用法。

**7.2.3教学内容（含重点、难点）**

教学重点：各细胞器的概念和功能，及相关英语词汇的掌握

教学难点：专业英语词汇的记忆

**7.2.4教学过程**

Cytoplasm: The Dynamic, Mobile Factory

细胞质：动力工厂

Most of the properties we associate with life are properties of the cytoplasm. Much of the mass of a cell consists of this semifluid substance, which is bounded on the outside by the plasma membrane. Organelles are suspended within it, supported by the filamentous network of the cytoskeleton. Dissolved in the cytoplasmic fluid are nutrients, ions, soluble proteins, and other materials needed for cell functioning.

生命的大部分特征表现在细胞质的特征上。细胞质大部分由半流体物质组成，并由细胞膜（原生质膜）包被。细胞器悬浮在其中，并由丝状的细胞骨架支撑。细胞质中溶解了大量的营养物质，离子，可溶蛋白以及维持细胞生理需求的其它物质。

The Nucleus: Information Central（细胞核：信息中心）

The eukaryotic cell nucleus is the largest organelle and houses the genetic material (DNA) on chromosomes. (In prokaryotes the hereditary material is found in the nucleoid.) The nucleus also contains one or two organelles-the nucleoli-that play a role in cell division. A pore-perforated sac called the nuclear envelope separates the nucleus and its contents from the cytoplasm. Small molecules can pass through the nuclear envelope, but larger molecules such as mRNA and ribosomes must enter and exit via the pores.

真核细胞的细胞核是最大的细胞器，细胞核对染色体组有保护作用（原核细胞的遗传物质存在于拟核中）。细胞核含有一或二个核仁，核仁促进细胞分裂。核膜贯穿许多小孔，小分子可以自由通过核膜，而象mRNA和核糖体等大分子必须通过核孔运输。

Organelles: Specialized Work Units（细胞器：特殊的功能单位）

All eukaryotic cells contain most of the various kinds of organelles, and each organelle performs a specialized function in the cell. Organelles described in this section include ribosomes, the endoplasmic reticulum, the Golgi complex, vacuoles, lysosomes, mitochondria, and the plastids of plant cells.

所有的真核细胞都含有多种细胞器，每个细胞器都有其特定功能。本节主要介绍核糖体，内质网，高尔基体系，液泡，溶酶体，线粒体和植物细胞中的质体。

The number of ribosomes within a cell may range from a few hundred to many thousands. This quantity reflects the fact that, ribosomes are the sites at which amino acids are assembled into proteins for export or for use in cell processes. A complete ribosome is composed of one larger and one smaller subunit. During protein synthesis the two subunits move along a strand of mRNA, "reading" the genetic sequence coded in it and translating that sequence into protein. Several ribosomes may become attached to a single mRNA strand; such a combination is called a polysome. Most cellular proteins are manufactured on ribosomes in the cytoplasm. Exportable proteins and membrane proteins are usually made in association with the endoplasmic reticulum.

核糖体的数量变化从几百到几千，核糖体是氨基酸组装成蛋白质的重要场所。完整的核糖体由大亚基和小亚基组成。核糖体沿着mRNA移动并阅读遗传密码，翻译成蛋白质。一条mRNA上可能有多个核糖体，称多聚核糖体。大多数细胞蛋白是由细胞质中核糖体生产。输出蛋白和膜蛋白通常与内质网有关。

The endoplasmic reticulum, a lacy array of membranous sacs, tubules, and vesicles, may be either rough (RER) or smooth (SER). Both types play roles in the synthesis and transport of proteins. The RER, which is studded with polysomes, also seems to be the source of the nuclear envelope after a cell divides.

内质网，带有花边的生物囊，有管状，泡状之分，以及光滑和粗糙面区别。两种都与蛋白质的合成和运输有关。粗糙内质网上分布许多核糖体，也可能提供细胞分裂后所需的细胞膜。

SER lacks polysomes; it is active in the synthesis of fats and steroids and in the oxidation of toxic substances in the cell. Both types of endoplasmic reticulum serve as compartments within the cell where specific products can be isolated and subsequently shunted to particular areas in or outside the cell.

光滑内质网上无核糖体，主要作用是脂肪和类固醇的合成以及细胞内有毒物质的氧化。两种内质网合成的产物在其中进行分流或运输到细胞外。

Transport vesicles may carry exportable molecules from the endoplasmic reticulum to another membranous organelle, the Golgi complex. Within the Golgi complex molecules are modified and packaged for export out of the cell or for delivery else where in the cytoplasm.

运输小泡能够将可运输分子从内质网运输到高尔基复合体上。在高尔基复合体中修饰，包装后输出细胞或传递到细胞质中的其他场所。

Vacuoles in cells appear to be hollow sacs but are actually filled with fluid and soluble molecules. The most prominent vacuoles appear in plant cells and serve as water reservoirs and storage sites for sugars and other molecules. Vacuoles in animal cells carry out phagocytosis (the intake of particulate matter) and pinocytosis (vacuolar drinking).

细胞中的液泡好象是中空的，但实际上充满了液体和可溶分子。最典型的液泡存在于植物细胞中，储备水，糖以及其它分子。动物中的液泡起吞噬和胞饮作用。

A subset of vacuoles are the organelles known as lysosomes, which contain digestive enzymes (packaged in lysosomes in the Golgi complex) that can break down most biological macromolecules. They act to digest food particles and to degrade damaged cell parts.

溶酶体是液泡亚单位，含有消化酶，降解大部分生物大分子。消化食物微粒和降解损伤的细胞残片。

Mitochondria are the sites of energy-yielding chemical reactions in all cells. In addition, plant cells contain plastids that utilize light energy to manufacture carbohydrates in the process of photosynthesis. It is on the large surface area provided by the inner cristae of mitochondria that ATP-generating enzymes are located. Mitochondria are self-replicating, and probably they are the evolutionary descendants of what were once free-living prokaryotes.

线粒体是细胞中化学产能的场所。另外，植物细胞中的质体在光合作用中利用光能产生碳水化合物，线粒体内嵴上提供了很大的表面积并分布着产ATP酶。线粒体自我复制，并且可能是自由生活的原核生物在进化中形成的后代。

There are two types of plastids: leucoplasts, which lack pigments and serve as storage sites for starch, proteins, and oils; and chromoplasts, which contain pigments. The most important chromoplasts are chloroplasts-organelles that contain the chlorophyll used in photosynthesis. The internal structure of chloroplasts includes stacks of membranes called grana, which are embedded in a matrix called the stroma.

质体有两种类型：白色体，缺乏色素，是淀粉，蛋白质和油的储备场所；色质体，含有色素。叶绿体是最重要的色质体，含有与光合作用有关的叶绿素。叶绿体的内部结构是由多层膜形成的叶绿体基粒，其中包埋在基质中的基粒称子座。

The Cytoskeleton（细胞骨架）

All eukaryotic cells have a cytoskeleton, which is a convoluted latticework of filaments and tubules that appears to fill all available space in the cell and provides support for various other organelles. A large portion of the cytoskeleton consists of threadlike microfilaments composed mainly of the contractile protein actin. They are involved in many types of intracellular movements in plant and animal cells. A second protein, myosin, is involve in the contraction of muscle cells. Another main structural component of the cytoskeleton consists of microtubules, which are composed of the globular protein tubulin and together act as scaffolding that provides a stable cell shape. Cytoskeletal intermediate filaments appear to impart tensile strength to the cell cytoplasm. Mechanoenzymes such as myosin, dynein, and kinesin interact with the cytoskeletal filaments and tubules to generate forces that cause movements.

所有的细胞都有细胞骨架，网络结构的纤丝充满了它所能触及的全部空间并且对细胞器提供支持作用。细胞骨架大部分由微丝组成，微丝主要由可收缩的肌动蛋白组成。动植物细胞的许多种类型细胞内运动与肌动蛋白有关。第二类蛋白是肌球蛋白，它与肌肉细胞的收缩有关。细胞骨架的另一个主要结构成分是微管，由球状的微管蛋白组成，象脚手架一般维持细胞的稳定形态。细胞骨架的中间丝提供了细胞质伸缩动力。机械酶，例如，肌球蛋白，动力蛋白，驱动蛋白与微丝，微管相互作用产生动力而引起细胞运动。

Cellular Movements（细胞运动）

Although the cytoskeleton provides some stability to cells, its microtubules and filaments and their associated proteins enable cells to move by creeping or gliding. Such movements require a solid substrate to which the cell can adhere and can be guided by the geometry of the surface. Some cells also exhibit chemotaxis, the ability to move toward or away from the source of a diffusing chemical.

尽管细胞骨架提供了细胞的某些稳定性，微丝，微管及相关蛋白能使细胞爬行或滑动。这种运动需要固体基质依托并通过表面几何形状的改变而运动。某些细胞具备趋药性，即趋向或逃离扩散开的化学源。

Certain eukaryotic cells can swim freely in liquid environments, propelled by whiplike cilia or flagella. Both cilia and flagella have the same internal structure: nine doublets (pairs of microtubules) are arranged in a ring and extend the length of the cilium or flagellum, and two more microtubules run down the center of the ring. Every cilium or flagellum grows only from the cell surface where a basal body is located. Movement is based on the activities of tiny dynein side arms that extend from one of the microtubules of each doublet.

某些真核细胞能在液体液体中自由运动，由纤毛或鞭毛推动。纤毛和鞭毛具有同样的内部结构：九个双微管环形排列，纵向延伸，环中心是两个或以上微管组成。纤毛或鞭毛从细胞表面的基体出生长，双微管的动力蛋白臂从一侧延伸到另一侧而引起运动。

Nutrients, proteins, and other materials within most plant cells are moved about via cytoplasmic streaming. The process occurs as myosin proteins attached to organelles push against microfilaments arrayed throughout the cell. Microfilaments and microtubules are responsible for almost all major cytoplasmic movements. During cell division, microtubules of the spindle assembled from tubutin subunits near organelles called centrioles move the chromosomes.

大部分植物细胞的营养，蛋白质和其它物质由细胞质流运输。这个过程是由于依附在细胞器上的肌球蛋白反推排列在细胞周围的微丝形成的。绝大部分细胞质运动由微丝和微管完成。在细胞分裂期间，中心粒周围的由微管蛋白亚基装配形成的纺锤体微管移向染色体。

**7.2.5教学方法**

讲授方法：以学生翻译为主，老师讲解相关专业知识辅助学生理解。

**7.2.6作业安排及课后反思**

课后作业：第一第二篇阅读材料

**7.3教学单元三**

Lesson three photosynthesis

**7.3.1教学日期**

2022.11.8,2022.11.11

**7.3.2教学目标**

使学生掌握细胞的光合作用机理，光合系统Ⅰ与光合系统Ⅱ结构与功能之间的关系。相关英语词汇以及主要用法。

**7.3.3教学内容（含重点、难点）**

教学重点：光合作用中相关的概念和功能，及相关英语词汇的掌握

教学难点：专业英语词汇的记忆

**7.3.4教学过程**

Photosynthesis occurs only in the chlorophyll-containing cells of green plants, algae, and certain protists and bacteria. Overall, it is a process that converts light energy into chemical energy that is stored in the molecular bonds. From the point of view of chemistry and energetics, it is the opposite of cellular respiration. Whereas cellular respiration is highly exergonic and releases energy, photosynthesis requires energy and is highly endergonic.

光合作用只发生在含有叶绿素的绿色植物细胞，海藻，某些原生动物和细菌之中。总体来说，这是一个将光能转化成化学能，并将能量贮存在分子键中，从化学和动能学角度来看，它是细胞呼吸作用的对立面。细胞呼吸作用是高度放能的，光合作用是需要能量并高吸能的过程。

Photosynthesis starts with CO2 and H2O as raw materials and proceeds through two sets of partial reactions. In the first set, called the light-dependent reactions, water molecules are split (oxidized), 02 is released, and ATP and NADPH are formed. These reactions must take place in the presence of light energy. In the second set, called light-independent reactions, CO2 is reduced (via the addition of H atoms) to carbohydrate. These chemical events rely on the electron carrier NADPH and ATP generated by the first set of reactions.

光合作用以二氧化碳和水为原材料并经历两步化学反应。第一步，称光反应，水分子分解，氧分子释放，ATP和NADPH形成。此反应需要光能的存在。第二步，称暗反应，二氧化碳被还原成碳水化合物，这步反应依赖电子载体NADPH以及第一步反应产生的ATP。

Both sets of reactions take place in chloroplasts. Most of the enzymes and pigments for the lightdependent reactions are embedded in the thylakoid membrane of chloroplasts. The dark reactions take place in the stroma.

两步反应都发生在叶绿体中。光反应需要的大部分酶和色素包埋在叶绿体的类囊体膜上。暗反应发生在基质中。

How Light Energy Reaches Photosynthetic Cells（光合细胞如何吸收光能的）

The energy in light photons in the visible part of the spectrum can be captured by biological molecules to do constructive work. The pigment chlorophyll in plant cells absorbs photons within a particular absorption spectrums statement of the amount of light absorbed by chlorophyll at different wavelengths. When light is absorbed it alters the arrangement of electrons in the absorbing molecule. The added energy of the photon boosts the energy condition of the molecule from a stable state to a less-stable excited state. During the light-dependent reactions of photosynthesis, as the absorbing molecule returns to the ground state, the "excess" excitation energy is transmitted to other molecules and stored as chemical energy.

生物分子能捕获可见光谱中的光能。植物细胞中叶绿素在不同光波下吸收部分吸收光谱。在吸收分子中，光的作用使分子中的电子发生重排。光子的能量激活了分子的能量状态，使其从稳定态进入不稳定的激活态。

All photosynthetic organisms contain various classes of chlorophylls and one or more carotenoid (accessory) pigments that also contribute to photosynthesis. Groups of pigment molecules called antenna complexes are present on thylakoids. Light striking any one of the pigment molecules is funneled to a special chlorophyll a molecule, termed a reaction-center chlorophyll, which directly participates in photosynthesis. Most photosynthetic organisms possess two types of reaction-center chlorophylls, P680 and P700, each associated with an electron acceptor molecule and an electron donor. These aggregations are known respectively as photosystem Ⅰ (P700) and photosystem Ⅱ (P680).

所有的光合作用生物含有不同等级的叶绿素和一个或多个类胡萝卜素（光合作用的辅助色素）。称作天线复合体的色素分子群存在于类囊体中。激活色素分子的光能进入叶绿素反应中心，其直接参与光合作用。大部分光反应细胞器拥有两套反应中心，P680和P700，每个光系统都含有一个电子受体和电子供体。这些集合体就是大家熟识的光合系统Ⅰ和光合系统Ⅱ 。

The Light-Dependent Reaction: Converting Solar Energy into Chemical-Bond Energy

光反应：光能转化成化学键能

The photosystems of the light-dependent reactions are responsible for the packaging of light energy in the chemical compounds ATP and NADPH. This packaging takes place through a series of oxidation reduction reactions set in motion when light strikes the P680 reaction center in photosystem Ⅱ. In this initial event water molecules are cleaved, oxygen is released, and electrons are donated. These electrons are accepted first by plastoquinone and then by a series of carriers as they descend an electron transport chain. For each four electrons that pass down the chain, two ATPs are formed. The last acceptor in the chain is the P700 reaction center of photosystem Ⅰ. At this point incoming photons boost the energy of the electrons, and they are accepted by ferredoxin. Ferredoxin is then reoxidized, and the coenzyme NADP+ is reduced to the NADPH. The ATP generated previously and the NADPH then take part in the light independent reactions.

光反应的光系统将光能转化成化学复合物ATP和NADPH。当光激活光系统Ⅱ的光反应中心时，通过一系列的氧化还原反应实现能量的传递。反应开始时，水被分解，氧被释放并提供电子。电子首先传递给质体醌，然后通过一系列载体形成的电子传递链。每传递4个电子，形成2个ATP。最后一个受体存在于光反应系统Ⅰ的反应中心里。此处光子激活电子，电子传递给铁氧还蛋白。铁氧还蛋白再氧化，并且辅酶NADP+还原成NADPH。早期产生的ATP和NADPH进入暗反应。

The production of ATP from the transport of electrons excited by light energy down an electron transport chain is termed photophosphorylation. The one-way flow of electrons through photosystems II and I is called noncyclic photophosphorylation; plants also derive additional ATP through cyclic photophosphorylation, in which some electrons are shunted back through the electron transport chain between photosystems Ⅱ and Ⅰ.

由电子传递链偶连产生ATP的过程称为光合磷酸化。通过光合系统Ⅱ流经光合系统Ⅰ的电子路径称非循环式光合磷酸化；植物通过循环式光合磷酸化获得额外的ATP，一些电子在光合系统Ⅰ和Ⅱ之间的电子传递链中回流。

The Light-Independent Reactions: Building Carbohydrates

暗反应：碳水化合物的形成

In the light-independent reactions of photosynthesis, which are driven by ATP and NADPH, C02 is converted to carbohydrate. The reactions are also known as the Calvin-Benson cycle. Atmospheric CO2, is fixed as it reacts with ribulose biphosphate (RuBP), a reaction that is catalyzed by the enzyme ribulose biphosphate carboxylase. The reduction Of C02 to carbohydrate (fructose diphosphate) is completed via several more steps of the cycle. Finally, RUBP is regenerated so that the cycle may continue.

由ATP和NADPH驱动的暗反应中，二氧化碳转化成碳水化合物。即卡尔文循环。二磷酸核酮糖固定二氧化碳，由二磷酸核酮糖羧化酶催化。

Oxygen: An Inhibitor of photosynthesis（氧：光合作用的抑制因子）

High levels of oxygen in plant cells can disrupt photosynthesis and can also cause photorespiration-an inefficient fun of the dark reactions in which 02 is fixed rather than CO2 and no carbohydrate is produced.

Reprieve from Photorespiration: The C4 Pathway

Most plants are C3 plants; they experience decreased carbohydrate production under hot, dry conditions as a result of the effects of photorespiration. Among C4 plants, however, special leaf anatomy and a unique biochemical pathway enable the plant to thrive in and conditions. Thus C4 plants lessen photorespiration by carrying out photosynthesis only in cells that are insulated from high levels of CO2. They also possess a novel mechanism for carbon fixation.

大部分植物是碳3植物，在高温干旱条件下，由于光呼吸作用而使碳水化合物的合成降低。而在大多数的碳4植物中，由于叶脉的特殊构造和独特的化学路径使植物依然很茂盛。这是碳固定的一个新机制。

**7.3.5教学方法**

讲授方法：以学生翻译为主，老师讲解相关专业知识辅助学生理解。

**7.3.6作业安排及课后反思**

课后作业：第一篇阅读材料

**7.4教学单元四**

Lesson four Cellular Reproduction: Mitosis and Meiosis

**7.4.1教学日期**

2022.11.15,2022.11.18

**7.4.2教学目标**

使学生掌握细胞的光合作用机理，光合系统Ⅰ与光合系统Ⅱ结构与功能之间的关系。相关英语词汇以及主要用法。

**7.4.3教学内容（含重点、难点）**

教学重点：有丝分裂和无丝分裂中相关的概念和功能，及相关英语词汇的掌握

教学难点：专业英语词汇的记忆

**7.4.4教学过程**

The Nucleus and Chromosomes

The cell nucleus is the main repository of genetic information. Within the nucleus are the chromosomes tightly coiled strands of DNA and clusters of associated proteins. Long stretches of the continuous DNA molecule wind around these clusters of proteins, or histones, forming beadlike complexes known as nucleosomes. More coiling and supercoiling produces a dense chromosome structure. Each long strand of DNA combines with histones and nonhistone proteins to make up the substance chromatin.

细胞核是贮藏遗传信息的主要场所。DNA盘绕成螺旋线以及相关的成簇蛋白质。DNA螺旋线缠绕成簇的组蛋白形成珠链状的核小体。这些螺旋和超螺旋形成致密的染色体组结构。每个长链DNA与组蛋白和非组蛋白一起构成染色质物质。

A pictorial display of an organism's chromosomes in the coiled, condensed state is known as a karyotype. Karyotype reveal that in most cells all but sex chromosomes are present as two copies, referred to as homologous pairs. Non-sex chromosomes are called autosomes. Organisms whose cells contain two sets of parental chromosomes are called diploid; those with cells containing a single set of parental chromosomes are called haploid.

染色体致密的超螺旋状态我们称染色体组。除了性染色体外，大多数细胞的染色体组成对出现，称同源染色体对。非性染色体称常染色体。生物细胞含有两套父母本染色体的称二倍体；含有单套染色体的称单倍体。

The Cell Cycle

The cell cycle is a regular sequence in which the cell grows, prepares for division, and divides to form two daughter cells, each of which then repeats the cycle. Such cycling in effect makes single-celled organisms immortal. Many cells in multicellular organisms, including animal muscle and nerve cells, either slow the cycle or break out of it altogether.

在细胞生长过程中，细胞循环遵循特定程序，分裂准备，分裂成2个子细胞，子细胞再循环。此循环使得单细胞永生。多细胞生物中的许多细胞，包括动物肌肉和神经细胞，要么降低循环速度，要么同时分裂。

The normal cell cycle consists of four phases. The first three include G1, the period of normal metabolism; S phase, during which normal synthesis of biological molecules continues, DNA is replicated, and histones are synthesized; and G2, a brief period of metabolism and additional growth. Together the G1, S, and G2 phases are called interphase. The fourth phase of the cell cycle is M phase, the period of mitosis, during which the replicated chromosomes condense and move and the cell divides. It is believed that properties of the cell cytoplasm control the cell cycle, along with external stimulators and inhibitors such as chalones.

正常细胞循环由4个时期组成。头三期包括G1,正常新陈代谢；S期,正常新陈代谢同时，DNA复制，组蛋白合成； G2 期，短期的新陈代谢和少许生长。G1, S, 和G2称分裂间期。最后是M期，有丝分裂期，复制的染色体组浓缩，移动并细胞分裂。据称是染色质控制了细胞循环，伴随外部激活因子和抑制因子如抑素。

Mitosis: Partitioning the Hereditary Material

Biologists divide the mitotic cycle into four phases. At the beginning of prophase the chromosomes each consist of two highly condensed chromatids attached to each other at a centromere. As prophase ends and metaphase begins, the condensed chromosomes become associated with the spindle. Eventually the chromosomes become arranged in a plane (called the metaphase plate) at a right angle to the spindle fibers. Next, during anaphase, the two sister chromatids of each chromosome split, and one from each pair is drawn toward each pole of the cell. During telophase nuclear envelopes begin to form around each set of chromosomes, and division of the cytoplasm takes place.

生物学家将有丝分裂划分为4个阶段。分裂前期，高度浓缩的两个染色单体通过着丝粒连接在一起。在分裂前期后期和分裂中期前期，浓缩的染色体与纺锤体相连，最后以正确的角度排列在赤道板上。在分裂后期，两个姊妹单体分离，分别拽向细胞两极。在分裂末期，在每套染色体周围形成核膜，细胞质发生分裂。

As mitosis proceeds, the spindle microtubules play a crucial role in ensuring that both paired and separated chromatids move in the right directions at the proper times. Each half of the spindle forms as microtubules extend from each pole of a dividing cell to the region of the metaphase plate. During prophase, other microtubules, the centromeric fibers, extend outward from the spindle poles to structures on the chromosomes called kinetochores. During anaphase the fibers begin to shorten, and the chromatids begin to move apart.

在有丝分裂过程中，是纺锤体微管确保了染色单体在适当时间以正确方向进行分离。纺锤体微管由两极向赤道板延伸。在分裂前期，其它微管，着丝粒纤维延伸到染色体的动粒。在分裂后期，纤维开始变短，染色单体分离。

The spindle forms differently in plant and animal cells. In animals it is associated with centriole, while in plant and fungal cells spindle formation is associated with reions called microtubule organizing centers.

植物和动物细胞形成的纺锤体不同。动物细胞与中心粒相连，而在植物和真菌细胞中，纺锤体与微管组织中心的离子相连。

Cytokinesis: Partitioning the Cytoplasm

胞质分裂：细胞质分离

The division of the cell cytoplasm at the end of mitosis is called cytokinesis. In animal cells it takes place as a ring of actin filaments contracts around the cell equator, pinching the cell in two. In plant cells, which are bounded by a cell wall, cytokinesis involves the building of a new cell plate across the dividing cell at its equator. Cell wall material is then deposited in the region of the cell plate.

在动物细胞中，环形肌动蛋白丝延赤道板收缩而使细胞一分为二。在植物细胞中，在赤道板形成新的细胞板。

Meiosis: The Basis of Sexual Reproduction

Meiosis is a special form of cell division that takes place in the reproductive organs that produce sex cells. Like mitosis, it takes place after DNA replication has occurred and involves two sequential nuclear divisions (meiosis I and meiosis Ⅱ). These divisions result in four daughter cells, each with half the number of chromosomes of the parent cell. The phenomenon of crossing over during meiosis results in exchanges of genetic information between chromosomes. Hence, the homologous chromosomes distributed to different progeny cells are not identical.

减数分裂是性细胞分裂的特殊形式。如有丝分裂，它也是发生在DNA复制后并有连续的两个核分裂。产生4个子细胞，分别含有亲本一半的染色体数。

As in mitosis two chromatids exist for each chromosome at the beginning of prophase 1. During this phase the homologous chromosomes undergo synapsis, or pairing, which is brought about by a bridging structure of proteins and RNA called the synaptonemal complex. The homologous pairs stay together when they align on the metaphase plate. Unlike the anaphase of mitosis, however, during anaphase I the two chromatids of each chromosome stay joined at the centromere and move together to one of the two poles of the cell. It is this event that results in the halving of the chromosome number in the four daughter cells that result from meiosis.

正如在有丝分裂中一样，两个同源染色单体通过蛋白质和RNA桥配对形成联会复合体。与有丝分裂不同的是，每组染色体的两个染色单体连接在着丝点上并一起移向细胞两极的一级。由此而导致4个子细胞染色体数减半。

During telophase I nuclear envelopes enclose the chromosomes in nuclei, and in most species cytokinesis (the first nuclear division) follows. The second nuclear division begins with metaphase Ⅱ, in which the chromosomes in each daughter cell again align on a metaphase plate. The centromeres finally divide, and each sister chromatid moves to one of the poles of the spindle. The next phase is telophase , followed again by cytokinesis. The result of the entire process is four haploid cells in which parental chromosomes are randomly distributed.

第二次核分裂开始于分裂中期，子细胞中染色体重新排列在赤道板上。着丝粒最终分离，每个姊妹染色单体分向两极。接着胞质分裂。产生4个单倍体，父母染色体随机分配。

Asexual Versus Sexual Reproduction

Mitosis and meiosis, respectively, make simple cell division and sexual reproduction possible. Each means of passing on hereditary information has advantages. In asexual reproduction the parent organism gives rise to offspring that are genetic clones of the parent. The advantages of this type of reproduction are that it preserves the parent's successful genetic complement, requires little or no specialization of reproductive organs, and is more rapid than sexual reproduction. A major disadvantage of the asexual mode is that a single catastrophic event or disease may destroy an entire population of genetically identical organisms. A prime benefit of sexual reproduction is that it provides genetic variability and a ready mechanism for the elimination of deleterious mutations. It also allows "new" gene forms to arise and spread through populations.

有丝分裂和减数分裂在传递遗传信息过程中各有优势。体细胞的繁殖就是父母本的克隆，其优势是保留了父母本的成功遗传信息，不需要特殊器官，比性复制快的多。但一个简单灾难性事件或疾病都可能摧毁一个细胞群体。性复制的优势是它提供了遗传可变性和现存排除有害突变的机制。也可以产生新的基因并在种群中蔓延。

**7.4.5教学方法**

讲授方法：以学生翻译为主，老师讲解相关专业知识辅助学生理解。

**7.4.6作业安排及课后反思**

课后作业：第一篇阅读材料

**7.5教学单元五**

Lesson Four: Foundations of Genetics

**7.5.1教学日期**

2022.11.22,2022.11.25

**7.5.2教学目标**

教学目的：使学生了解遗传学的发展历程，掌握孟德尔遗传学的建立及经典实验。相关英语词汇以及主要用法。

**7.5.3教学内容（含重点、难点）**

教学重点：孟德尔遗传学的两个定律，及相关英语词汇的掌握

教学难点：专业英语词汇的记忆

**7.5.4教学过程**

Early Theories of inheritanee

Early ideas of inheritance included Hippocrates' theory of pangenesis and August Weismands germ plasm theory. Based on experiments with mice, Weismann proposed that hereditary information in gametes transmitted traits to progeny. Both of these early views incorporated the blending theory: they held that heritable traits of the two parents blend, so that the distinct characteristics of each are lost in offspring.

遗传学的早期理论包括泛生说和种质理论。基于小鼠实验，维丝曼提出遗传信息储存在配子中并将遗传信息传递给后代。这两个早期观点合起来形成融合理论：子代拥有父母本混合的遗传特征，而不完全象亲代。

Gregor Mendel and the Birth of Genetics

Gregor Mendel, an Augustinian monk in the monastery at Brunn, Austria, is known as the "father of genetics." Having been exposed to theories of the particulate nature of matter while a university student and having a background in mathematics, Mendel carried out a series of carefully planned experiments that demonstrated the particulate nature of heredity. His revolutionary ideas were neither understood nor accepted until many years after Mendel died.

孟德尔，众所周知的遗传学之父，是一名修道士。当他还是大学生时就提出了物质的粒子属性。孟德尔进行了一系列周密安排的实验来证实遗传的颗粒性。直到他去世后，他的理论才被理解和接受。

Mendel's Classic Experiments

Mendel studied genetics through plant-breeding experiments with the garden pea, a plant species that is self-fertilizing and h offspring is identical to the parent in the trait of interest). To test the blending theory, he focused his research on seven distinct characters. Each of these characters, such as seed color and plant height, present only two, clear-cut possibilities. He also recorded the type and number of all progeny produced from each pair of parent pea plants, and followed the results of each cross for two generations.

孟德尔通过豌豆实验研究遗传学，豌豆是自花授粉植物和纯品系。为验证融合理论，他的研究主要集中在7个特征上。例如，种子颜色，植株高度，这些特征只有两个明确的可能性。他记录了产生的每一个子代类型和数量，在杂交产生子2代。

For each of the characters he studied, Mendel found that one trait was dominant while the other was recessive. In the second filial (F2) generation, the ratio of dominant to recessive was 3:1. Mendel deduced that this result was possible only if each individual possesses only two hereditary units, one from each parent. The units Mendel hypothesized are today known as alleles, alternative forms of genes. Genes are the basic units of heredity. An organism that inherits identical alleles for a trait from each parent is said to be homozygous for that trait; if different alleles for a trait are inherited, the organism is heterozygous for that trait. When an organism is heterozygous for a trait, the resulting phenotype for that trait expresses only the dominant allele.Thus, the organism’s phenotype—its physical appearance and properties-differs from its genotype, which may include both a dominant and a recessive allele. A pictorial representation of all possible combinations of a genetic cross is known as a Punnett square.

对于每个特征而言，要么显形，要么隐性。在子2代中显形与隐性比为3∶1。只有在每个个体仅拥有两个研究遗传单元，并每个单元来自一个亲代时，实验结果才成立。此遗传单元就是今天共识的等位基因。两个一样的等位基因决定一个特征，称纯合。相反，称杂合。当生物是杂合时，它的表型由显性基因决定。因此，生物的表型与基因型是不同的。旁纳特方格可以陈列所有可能的遗传组合。

The results of Mendel's experiments on dominant and recessive inheritance let to Mendel's first law: the law of segregation.This law states that for a given trait an organism inherits one allele from each parent. Together these alleles form the allele pair. When gametes are formed during meiosis, the two alleles become separated (halving of chromosome number).To gain evidence for his theory Mendel performed test crosses, mating plants of unknown genotype to plants that were homozygous recessive for the trait of interest. The ratio of dominant phenotypes (if any) in the progeny makes clear whether the unknown genotype is heterozygous, homozygous dominant, or homozygous recessive.

分离定律，生物只遗传父母本等位基因对的一个等位基因。减数分裂期形成配子时两个等位基因分离。为验证此理论，他做了测交实验，即基因型未知的植物与纯合的隐性基因植物杂交。子代显性表型可以明确测得杂合基因或纯合基因的基因型。

Mendel's Ideas and the Law of independent Assortment

Mendel also performed dihybrid crosses, which enabled him to consider how two traits are inherited relative to one another. This work let to the law of independent assortment, which states that the alleles of genes governing different characters are inherited independently. An apparent exception to Mendel's laws is incomplete dominance, a phenomenon in which offspring of a cross exhibit a phenotype that is intermediate between those of the parents. However, incomplete dominance reflects the fact that both alleles for the trait in question exert an effect on the phenotype. The alleles themselves remain separate.

双因子杂合试验，两个特征是如何相互影响遗传的。试验结果产生独自分配定律，即等位基因独立遗传。特例是，不完全显性。子代的表型是父母本的中间类型。不完全显性说明了两个等位基因对表型都有影响。，等位基因会继续分离。

Mendel presented his ideas in 1866 in a scientific paper published by the Brunn Society for Natural History. Unfortunately, the meaning of his research was not understood by other scientists of the day. His work was rediscovered in 1900 by Carl Correns and Hugo de Vries.

1866年，孟德尔在自然史上发表了他的科学论文，陈诉了他的观点。不幸的是，他的研究不被当时科学家接受。在1900年，他的著作再被发现利用。

Chromosomes and Mendelian Genetics

Soon after Mendel's work was rediscovered, Walter Sutton and Theodor Boveri independently proposed that the hereditary units might be located on chromosomes. Experiments to prove this hypothesis were carried out by Thomas Hunt Morgan and his students at Columbia University, in research on the sex chromosomes of fruit flies. Morgan's studies were also the first exploration of sex-linked traits. It also led to the discovery in 1916 by Calvin Bridges of the phenomenon of nondisjunction, in which a chromosome pair fails to segregate during meiosis.

孟德尔著作被再发现不久，Walter Sutton 和Theodor Boveri提出，遗传单位可能定位在染色体组上。伴性遗传又导致了不分离现象的发现，即在减数分裂中，染色体对不分离。

**7.5.5教学方法**

讲授方法：以学生翻译为主，老师讲解相关专业知识辅助学生理解。

**7.5.6作业安排及课后反思**

课后作业：第一篇阅读材料

**7.6教学单元六**

Lesson Six: Discovering the Chemical Nature of the Gene

**7.6.1教学日期**

2022.11.29,2022,12.02

**7.6.2教学目标**

教学目的：使学生了解遗传学化学本质的发现过程，及相关假说，使学生掌握相关专业词汇以及主要用法。

**7.6.3教学内容（含重点、难点）**

教学重点：DNA分子组成及相关英语词汇的掌握。

教学难点：专业英语词汇的记忆

**7.6.4教学过程**

Genes Code for Particular Proteins

The first scientist to investigate the question of how genes affect phenotype was Sir Archibald Garrod, whose studies of alkaptonuria implied a relationship between genes and enzymes. Thirty years later Beadle and Ephrussi showed a relationship between particular genes and biosynthetic reactions responsible for eye color in fruit flies. Next, in a series of classic experiments on the effects of mutations in the bread mold Neurospora crassa, Beadle and Tatum explored the one-gene-one-enzyme hypothesis-the idea that each gene codes for a particular enzyme. Their work paved the way for other researchers to elucidate the precise ways in which enzymes affect complex metabolic pathways.In 1949, in research on the role of hemoglobin in sickle cell anemia, Linus Pauling helped refine the one-gene-one-enzyme hypothesis into the one-gene-one-polypeptide hypothesis.

Archibald Garrod是第一个研究基因是如何影响表型的科学家，他对尿黑酸症的研究揭示了基因与酶之间的关系。Beadle 和Ephrussi在三十年后对果蝇眼睛颜色的研究发现特殊基因与相关反应的生物合成有关。接着对面包发霉粗糙脉孢菌的突变试验得出一个基因一个酶的假说。他们的工作为其他工作者铺平了道路，即精确地阐明了酶影响了复杂的新陈代谢途径。在1949年，对镰刀状细胞贫血症的研究对一个基因一个酶的假说进一步上升为一个基因一个多肽。

The Search for the Chemistry and Molecular Structure of nucleic Acids

Nuclei acid, originally isolated by Johann Miescher in 1871, was identified as a prime constituent of chromosomes through the use of the red-staining method developed by Feulgen in the early 1900s. Frederick Griffith's experiments with the R and S stains of pneumococci showed that an as yet unknown material from one set of bacterial could alter the physical traits of a second set. In the 1940s the team of Avery, MacLeod, and McCarty showed that this unknown material was DNA. At about the same time P.A. Levene discovered that DNA contained four nitrogenous bases, each of which was attached to a sugar molecule and a phosphate group-a combination Levene termed a nucleotide.

在1871年，核酸最初是由Johann Miescher分离成功，并由Feulgen在1900年证实核酸是染色体组最基本的组成。Frederick Griffith对粗糙和光滑的肺炎球菌实验表明，不确定的某种物质可以从一组细菌转移到另一种细菌中。在1940年，确认该物质为DNA。四个碱基和磷酸分子分别连接在糖分子上，称核苷酸。

Disagreement over whether DNA could carry complex genetic information was ended in the early 1950s by Martha Chase and Alfred Hershey, whose work with E. coli showed clearly that DNA, and not protein, is the bearer of genetic information.

直到1950年，通过对大肠杆菌实验发现，遗传物质是DNA，而不是蛋白质。

Each DNA nucleotide contains a five-carbon sugar, deoxyribose, attached to one of four bases: adenine, guanine, cytosine, or thymine. Adenine and guanine molecules are double-ring structures called purines, while cytosine and thymine are single-ring structures called pyrimidines. The molecule made up of a base plus a sugar is termed a nucleoside. In each molecule of DNA a phosphate group links the five-carbon sugar of one nucleoside to the five-carbon sugar of the next nucleoside in the chain. This phosphate bonding creates a sugar-phosphate backbone.

每个核苷酸都含有一个五碳脱氧核糖，分别连接4个碱基，即：腺嘌呤，鸟嘌呤，胞嘧啶，胸腺嘧啶。碱基连接糖称核苷。磷酸键形成磷酸骨架。

Chargaff’s rules describe the fact that (1) the amount of adenine is equal to the amount of thymine in DNA, with amount of cytosine equal to that of guanine, and (2) the ratios of A to T and of C to G vary with different species.

（1）腺嘌呤与胸腺嘧啶，胞嘧啶与鸟嘌呤相等；（2）腺嘌呤与胸腺嘧啶，胞嘧啶与鸟嘌呤的比例随物种不同而不同。

The Research Race for the Molecular Structure of DNA

In the late 1940s and early 1950s, researchers looking for the structure of DNA drew upon Chargaff s insight, Levene's ideas on DNA components, and two other lines of evidence. One was the suggestion of Linus Pauling that DNA might have a helical structure held in place by hydrogen bonds, and the other was X-ray diffraction photos of DNA, showing a helical structure with distance between the coils, taken by Franklin and Wilkins.

直到40年代末50年代初，研究者在寻求DNA结构过程中，确立了Chargaff 的观点和, Levene的组成理论以及其他两个线索。一个是Linus Pauling的假设，DNA可能具有螺旋结构，通过氢键连接。另一个是X-衍射图片，Franklin and Wilkins提供。

Based on this information Watson and Crick proposed the double helix model of DNA-A twisted ladder-like molecule with two outer sugar phosphate chains and rungs formed by nucleotide pairs. Paired nucleotides, which always occur as A-T or G-C, are linked by hydrogen bonds. Watson and Crick also proposed that genetic information is encoded by the sequence of base pairs along the DNA molecule.

基于这些信息，Watson 和 Crick提出了双螺旋结构模型，成对的核苷酸通过氢键相连，遗传信息就贮藏在碱基对中。

How DNA Replicates

In their model of DNA structure and function, Watson and Crick hypothesized that DNA replicates itself by "unzipping" along the hydrogen bonds joining A to T and C to G. This process would produce two opposite halves that could then serve as templates for the construction of new, complementary strands. This model of semiconservative replication conservative because each new molecule has one half of the former parent molecule-was later confirmed by the work of

DNA进行复制是以拉链方式自我复制，产生的两个二分体分别为模板生成互补链，即半保留复制。并由Meselson 和 Stahl验证。

In E. coli DNA replication begins with the formation of a bubblelike structure on the circular chromosome that is produced by replication forks. Studies of bacterial DNA replication have shown that a growing DNA chain lengthens only in the 5' to 3' direction (from the 5' carbon of one sugar to the 3' carbon of the next). The leading strand is synthesized continuously, while the lagging strand is synthesized in short stretches known as Okazaki fragments. The enzyme DNA polymerase links free nucleotides as they line up on the template formed by the original strand of the parent molecule.

In eukaryotes DNA replication follows the same general principles as in prokarotes. On the long DNA molecules replication proceeds (in two directions at once) from hundreds or thousands of points of origin.

大肠杆菌复制开始时形成泡样复制叉，链生长方向由5′向3′端，前导链连续生成，后随链由冈崎片段组成，由DNA聚合酶催化。真核生物复制与原核生物复制相似，但有几百到几千个复制原点（原核一般只有一个复制原点）。

**7.6.5教学方法**

讲授方法：以学生翻译为主，老师讲解相关专业知识辅助学生理解。

**7.6.6作业安排及课后反思**

课后作业：第一篇阅读材料

**7.7教学单元七**

Lesson Seven: The Origin and Diversity of Life

**7.7.1教学日期**

2022.12.6,2022.12.9

**7.7.2教学目标**

教学目的：使学生了解生命的起源和多样性及相关假说，使学生掌握相关专业词汇以及主要用法。

**7.7.3教学内容（含重点、难点）**

教学重点：生物分类的组成及相关英语词汇的掌握。

教学难点：专业英语词汇的记忆

**7.7.4教学过程**

A Home for Life: Formation of the Solar System and Planet Earth

The story of life's origins begins with the formation of the earth. The sequence of events that gave rise to our planet began, in turn, with the cosmic explosion physicists call the Big Bang. The sun at the center of our solar system condensed from a cloud of primordial matter roughly 5 billion years ago; the planets, including the earth, condensed about 4.6 billion years ago. The earth is composed of a number of layers: a solid crust, a semisolid mantle, and a largely molten (liquid) core that has a solid center. Basic physical features of Earth that may have made the emergence of life possible include the planet's size, temperature, composition, and distance from the sun. The major current hypothesis holds that life arose spontaneously on the early earth by means of chemical evolution from nonliving substances.

生命起源于地球的形成。大爆炸是我们行星形成的开始。太阳在50亿年前生成，位于太阳系中心，行星，包括地球，在46亿年前生成。地球由多层组成：坚硬的地壳，半流体的地幔，一个很大的溶解中心中存在一个坚实的中心。地球的基本特征使生命起源成为可能，包括行星的大小，温度，组成以及离太阳的距离。当前主要假设认为，由非生命的化学物质进化过程自发产生了生命。

The Emergence of life: Organic and Biological Molecules on a Primitive Planet

Evidence for prelife stages of chemical organization comes from laboratory experiments that try to duplicate the physical environment and chemical resources of the early earth. These experiments, including the pioneering work of Miller and Urey, have successfully produced organic monomers including amino acids, simple sugars, and nucleic acid bases. The probable next step toward life was the spontaneous linking of such monomers into polymers such as proteinoids and nuclei acids. Current research suggests that likely sites for this polymerization were clay or rock surfaces.

通过创造出地球早期的自然条件和化学资源条件，科学家在实验室中已经获得了化学有机体生命前阶段的证据。这些实验包括米勒等早期所做工作，成功地产出了有机单体，包括氨基酸，单糖，核酸碱基。这些单体自发的连接成多聚体，如类蛋白和核酸，使进入生命状态成为可能。这些聚合作用可能发生在泥土或岩石表面。

Researchers have found that, when energy is available to a system, they can generate three kinds of organic molecular aggregates. The Russian Aleksandr Oparin obtained polymer-rich droplets, called coacervates from solutions of polymers. Sidney Fox generated proteinoid microspheres from mixtures of amino acids and water. A third laboratory structure is the liposome, a spherical lipid bilayer that forms from phospholipids. A structure similar to one or more of these aggregates may have been the precursor of true cells.

当一个系统获得能量时，可能发生3种有机分子的聚集。从多聚物的溶液中俄国科学家获得了富含小液滴的多聚物，即凝聚物。从氨基酸和水的混合液中Fox获得了类蛋白微球体。实验室第三个结构物质是脂质体，即由磷脂形成的球形脂双层结构。

Further steps in the appearance of cells on the earth included the development of RNA and DNA as biological information molecules. Evidence suggests that RNA, which can form spontaneously under conditions mimicking those of the early earth, was the first informational molecule. The discovery of RNA ribozymes-RNA that can act as an enzymelike catalyst suggests that such catalytic RNA also could have assembled new RNAs from early nucleotides. Certain catalytic RNAs can also carry out sexlike exchanges of pieces of RNA.

RNA可能是地球早期形成的第一个贮藏信息的物质。在实验室模拟早期地球自然条件下其可自发形成。核酶的发现说明它可以催化早期核苷酸形成新的RNA。某些催化RNA具备类似于RNA 片段性交换的功能。

Following the development of a lipid-protein surface layer and replicating RNA and DNA informational molecules, the events leading to the emergence of living cells would have included the origin of the genetic code; the sequestering of RNA or DNA into cell-like structures; and the development of metabolic pathways.

接下来脂蛋白表层的形成，RNA的复制,DNA信息分子的形成，最终导致活细胞的出现，包括最初的遗传密码，RNA或DNA被包裹进细胞样的结构中；及代谢途径的建立。

The Earliest Cells

The oldest fossils that may represent living cells are found in rocks that are about 3.5 billion years old. The cells were probably anaerobic heterotrophs, with autotrophs arising much later. The first autotrophs produced their own nutrients and released O,-a metabolic by-product that had a crucial impact on later life forms. The resulting ozone layer in the earth's atmosphere reduced the penetration of ultraviolet light. As a result, cells would survive in shallow water and on the land surface. The increasing quantity of atmospheric oxygen also permitted the evolution of aerobic cells and cellular respiration, which in turn signaled the beginning of the global carbon cycle.Although the earliest cells were all prokaryotes, by about 1.5 billion years ago eukaryotes appeared.

能说明活细胞存在的最古老化石大约有35亿年了。最早出现的细胞可能是厌氧异氧生物，自养生物很久后出现。最早的自养生物自己生产营养并释放氧气，这个新陈代谢副产品对后期生命的形成有一个深远的影响。臭氧层的出现减少了紫外线的渗透。结果，细胞就能够在浅水区和陆地上生存了。大气中氧气数量的增加使得需氧细胞进化并产生细胞呼吸，这预示着全球碳循环的开始。最早期的细胞都是原核生物，直到15亿年后，真核细胞才出现。

The Changing Face of planet Earth

Changes in land masses, the seas, and climate have greatly affected the evolution of life on the earth. The basic parts of the planet include a light, solid crust over a hot, semisolid mantle and an inner, partially molten core. Massive segments or plates of the crust move over the mantle in the process of continental drift. Over the past 500 million years, continental drift has sculpted the earth's crusts to produce the form and distribution of present-day continents. Climatic changes that greatly affected living organisms accompanied these plate movements; the period was marked by occasional waves of mass extinctions of living creatures. Organisms were also affected by periods of glaciation that followed variations in the earth's orbit and in the output of energy by the sun.

大陆板快，海洋的改变，以及气候对地球生命的进化都有深远影响。地幔上大板快地壳的挤压形成大陆漂移。大陆漂移雕塑了地壳的外观，使现在大陆形成。伴随板块运动，气候改变对活有机体有深远影响。在特定时期的生物大量灭亡高峰是这个时期的见证。生物也受冰河期影响，在冰河期，地球轨道和太阳能的输出都发生了很大变化。

Taxonomy: Categorizing the Variety of living Things

Biologists use the binomial system of nomenclature developed by Linnaeus to categorize the varieties of life on the earth. The system assigns each type of organism to a genus and species. Organisms are then further classified into higher taxonomic categories-family, order, class, division (plants), phylum (animals), and kingdom. Evidence from many subfields of biology, such as biochemistry and comparative anatomy, helps define species and higher taxa (taxon). And whereas species were originally defined in terms of morphological traits, today biologists generally use the criterion of a reproductively isolated population.

生物学家利用林奈发展的双名法对生物分类。系统选定每个类型的生物进入属和种，然后将生物进一步分类更高级类别中，即科，目，纲，门，界。来自于生物化学和比较解剖学等亚生物学领域的证据有助于划分物种和更高级的分类单位，然而物种最初依据形态学特征进行分类的，今天生物学家大体上使用生殖隔离群体作为标准。

Taxonomy reveals a great deal about the evolutionary relationships among organisms. A clade is a taxonomic unit whose members are derived from a common ancestor.

分类学揭示了物种间进化的大量关系。进化枝中的成员来自一个共同的祖先。

The Five Kingdoms

A phylogenetic tree is a graphic representation of evolutionary relationships. Your text uses a common five-kingdom arrangement: organisms are grouped into the kingdoms Monera, Protista, Fungi, Plantae, and Animalia. Although this system is a convenient organizational tool, the kingdoms are probably no true clades.

进化系统树是进化关系的图解表现。教材中使用一个通用的5界：原核生物，原生生物，真菌，植物，动物。尽管这个系统是一个便利的组织工具，5界划分可能不是正确的进化枝。

**7.7.5教学方法**

讲授方法：以学生翻译为主，老师讲解相关专业知识辅助学生理解。

**7.7.6作业安排及课后反思**

课后作业：第一篇阅读材料

**7.8教学单元八**

Lesson eight :Fungi:the great decomposers

**7.8.1教学日期**

2022.12.13,2022.12.16

**7.8.2教学目标**

教学目的：使学生了解动物的生育过程，胚胎发育的结构特点，使学生掌握相关专业词汇以及主要用法。

**7.8.3教学内容（含重点、难点）**

教学重点：动物发育过程及相关英语词汇的掌握。

教学难点：专业英语词汇的记忆

**7.8.4教学过程**

Production of Sperm and Eggs

In sexually reproducing organisms males and females produce sex cells, known as gametes. These are swimming sperm in males and ova (eggs) in females.

在性繁殖过程中，生物的雄性和雌性产生性细胞，称配子。雄性是能够游动的精子，雌性是卵子。

The process of sperm production, spermatogenesis, takes place in testes. The sperm originate in gonial cells (spermatogonia) in the walls of seminiferous tubules. Spermatocytes produced by mitosis in spermatogonia divide meiotically to generate haploid spermatids. The mature sperm has a tail, a nucleus containing haploid chromosomes, and a front end with an acrosome, the storage site for enzymes that will aid fertilization.

精子产生过程，即精子发生在睾丸中。精子产生于输精管壁的性母细胞（精原细胞）。精原细胞经有丝分裂再减数分裂产生单倍体精子细胞，即精母细胞。成熟精子有尾部，单倍体染色体组，头部有顶体，内部储存酶类，有助于受精。

Ova, which are produced during oogenesis, are generated in gonial cells (oogonia) of the female's ovaries. Oocytes then enter a stage of arrest in early meiosis. At a species-specific later point, a final ripening (ovulation) and the first meiotic division occur. A second meiotic division, followed by development of the embryo, takes place if the egg is fertilized.

在卵子发生过程中，由卵巢中的性母细胞产生。卵母细胞进入减数分裂的抑制阶段。第一次减数分裂产生一个成熟卵。如果卵受精，那么第二次减数分裂伴随胚胎的发育。

Eggs vary greatly in size from species to species and have complex structures. Virtually all developing animal ova are surrounded by helper cells, either follicle cells or nurse cells. Depending on the species, eggs also store varying amounts of yolk, a reservoir of nutrients produced by digestive-gland cells in the mother's body. Finally, follicle cells or cells of the maternal oviduct provide protective coatings for the egg, including albumen (egg white) and various types of outer membranes and shells.

品种间卵的大小变化很大，并且有复杂的结构。实际上，所有发育过程中的卵都辅助细胞环绕，要么是滤泡细胞，要么是抚育细胞。依赖物种的不同而不同，卵黄贮备也不同，即由母体消化腺细胞产生的营养储备。最后，滤泡或母体输卵管细胞产生保护性的卵膜，包括清蛋白和各种外部膜及壳。

Frog oocytes have served as model systems for studies of oocyte development. During maturation they produce huge numbers of ribosomes through gene amplification. Large quantities of mRNA may also be made and stored.

蛙卵母细胞作为卵母细胞发育的研究系统模型。在成熟过程中，通过基因扩增产生大量的核糖体。同时也产生和储备了大量的mRNA。

Fertilization: Initiating Development

Fertilization unites male and female gametes and initiates development. In some species fertilization is external; in others (including most terrestrial animals) it takes place internally. The first contact of the sperm head with the egg's jelly coat triggers the acrosome reaction, in which enzymes are released to digest a hole through the egg's protective layers, and the plasma membrane of the sperm is brought into position to bind to the ovum's surface. After fusion of the egg and sperm plasma membranes, the haploid male nucleus with its chromosomes moves into the egg cytoplasm. Fusion also triggers the egg's final meiotic reduction divisions. When sperm and egg nuclei unite, the two sets of chromosomes mingle to create a diploid set. The fertilized egg is now a zygote.

雌雄配子结合作用称受精作用，发育开始。某些物种中，是外部受孕；另一些物种，包括大部分陆生动物，是内部受孕。当精子和卵子的胶状膜发生接触时，触发了顶体反应。释放多种酶而将卵保护膜消化出一个洞。精子的原生质膜与卵子的表面连接起来。精卵原生质膜融合后，单倍体雄性核进入卵细胞质。融合也触发了最后的减数分裂。当精卵核结合时，两套染色体混合产生一二倍体，即受精卵。

The egg's cortical reaction serves as a barrier to the entry of more than one sperm. Initially, there is a temporary change in the egg's electrical state, and the egg cell is activated. The final stage of the reaction, the rapid elevation of the fertilization membrane, prevents further sperm penetration.

卵皮层阻止其他的精子进入，充当壁垒作用。开始时，卵电位发生暂时变化，卵细胞被激活。反应最后阶段，受精卵的膜快速隆起，阻止更多精子进入。

In some species fertilization is not necessary. Instead, parthenogenesis takes place: the egg is spontaneously activated and proceeds to normal embryonic development.

对某些物种而言，受精不是必须的。孤雌生殖，即卵自发地被激活并进入正常的胚胎发育过程中。

Cleavage: An Increase in Cell Number

Cleavage, the major developmental event immediately following fertilization, is a special form of cell division (mitosis). Cleavage produces a blastula, a sheet of cells rounded into a sphere that in most species surrounds a cavity. In the process, the single-celled zygote is divided into many small cells, and yolk, mRNA, ribosomes, and other materials arc distributed to each cell in precise ways. The cells of the blastula, called blastomeres, also each receive a full diploid set of chromosomes.

受精后，立即发生卵裂，细胞有丝分裂的特殊过程。卵裂产生一个囊胚，形成的细胞壁球形排列形成一个空腔。在这个过程中，单细胞的受精卵分裂成许多小细胞，卵黄，mRNA，核糖体和其他物质被精确分配到每个细胞中。这些囊胚细胞，称卵裂球，每个细胞都有一套二倍体染色体组。

There are different patterns of cleavage in different species. The amount of yolk present in the egg is a major factor in determining the pattern: in species having little yolk (such as mammals) the zygote cleaves completely through, forming cells that are roughly equivalent in size. In frogs, in which the egg has somewhat more yolk, cleavage proceeds more rapidly in regions of the embryo having less yolk. In bird eggs the yolk is so massive that cleavage divisions are restricted to a tiny area of cytoplasm.

不同物种，卵裂方式不同。决定因素主要取决于卵黄的含量。含有少量卵黄的物种（例如哺乳动物），合子分裂得很彻底，子细胞大致平均分裂。蛙卵，卵黄稍微多点，在胚胎的卵黄较少区域发育更快些。鸟卵卵黄很大，卵裂被限制在细胞质很小区域内。

In many species the precise distribution to blastomeres of molecular determinants in the cytoplasm is crucial to proper development of different cell types in the embryo. In mammal and bird species the fate of cells is determined by the position of a cell late in cleavage.

细胞质中分子遗传因素精确分配到卵裂球中，对许多物种而言，是发育成胚中不同类型细胞关键所在。对哺乳动物和鸟类而言，细胞的命运最终由细胞分裂后所处的位置决定的。

Gastrulation: Rearrangement of Cells（原肠胚：细胞重排列）

The rearrangement of the blastula into a three-dimensional organism with inner, middle, and outer layers occurs during gastrulation. The resulting gastrula consists of an outer ectoderm, an inner endoderm, and a mesoderm layer positioned between them.

在原肠胚形成过程中，囊胚重新排列，形成包括内层，中层，外层的三围组织。最终原肠胚由一个外肠胚，内肠胚，和一个中肠胚构成。

Each layer gives rise to specific tissues during embryonic development. A variation in gastrulation, involving the movement of cells into endodermal and mesodermal positions through the thickened primitive streak, arose in reptiles and can still be seen in bird and mammalian embryos, lending support to the theory that birds and mammals evolved from reptiles.

每个胚层产生特殊的胚胎组织。密实的原肠胚通过细胞运动进入内胚层和中胚层，爬虫，鸟，哺乳动物的胚胎都如此。因此提出这样的理论，鸟类和哺乳动物是由爬虫进化而来的。

Organogenesis: Formation of Functional Tissues and Organs

The organs and tissues of the embryo arise during organogenesis as cells inside the embryo and on its surface become specialized. Organogenesis actually includes two closely linked processes, morphogenesis and differentiation. During morphogenesis cells and cell populations change shape: an example is neurulation in vertebrate embryos, in which the edges of the flat neural plate fold upward and fuse, forming the beginnings of the hollow brain and spinal cord. During differentiation cells mature so that they may perform separate functions. This maturation may include taking on a function-related shape, such as the long, spindly shape of skeletal-muscle cells. Cell differentiation also results in responsiveness-the ability of a cell to be regulated within the organism through the action of hormones, neurons, and other signals.

胚经过内部细胞和表面细胞特化后，器官形成，发育成器官和组织。器官形成实质上包括两个联系紧密的过程，即形态发生和分化。在形态发生期间，细胞和细胞群体形状发生改变：例如，脊椎动物的神经胚，扁平神经板的边缘向上折叠并融合，是中空大脑和脊髓神经形成的开端。在分化期间，细胞成熟，执行各自功能。成熟包括功能相关的成型过程。例如，细长的骨骼肌肉细胞。细胞分化也产生应答能力，即细胞受生物体内激素，神经和其他信号的调控过程。

Embryonic Coverings and Membranes

The embryos of land vertebrates are enclosed within four extraembryonic membranes that afford protection while still permitting the exchange of gases, nutrients, and other materials.

脊椎动物的胚胎被4层膜包被，起保护作用，但仍能交换气体，营养和其他物质。

Growth: Increase in Size

Growth in embryos is largely due to an increase in the number of cells rather than to an increase in the size of individual cells. In many species the extent of embryonic growth is limited by the availability of food (yolk). In animals that develop entirely free of the maternal body, such as frogs and insects, the embryo give rise to a larval stage that can feed itself and later undergo metamorphosis to attain the adult stage. In many species the most spectacular growth phase takes place during the juvenile and adolescent phases of the life cycle. Actual growth generally stops once the organism reaches its typical adolescent phases of the life cycle. Actual growth generally stops once the organism reaches its typical adult size, although replacement of dead cells may continue.

胚的生长很大程度取决于细胞数量的增加而不是单个细胞大小的改变。在大多数物种中，胚的生长是受卵黄的量限制的。在动物细胞中，完全依赖于母体，例如蛙和昆虫，胚产生幼虫状态，后来经历变态而进入成年状态。在许多物种中，在少年和青春期，发生特别显著的生长。一旦细胞进入成年状态和成年大小，生长就停止了，尽管死细胞的替代不断发生。

A special type of growth, regeneration of lost body parts, can take place in adults of some species. Prior to such regeneration cells in stump tissue undergo dedifferentiation. They lose their functional phenotype, divide rapidly, and generate a population of cells that will regenerate the lost part. Compensatory hypertrophy is a different, temporary growth response in which residual tissue increases in mass and cell number: cells undergo mitosis but do not dedifferentiate.

一个特殊类型的生长，再生失去的部分躯体，发生在某些物种的成体中。在再生之前，残肢组织细胞经历了去分化过程。他们失去功能表型，快速分裂，产生细胞群来再生失去的部分。代偿式肥大是一个不同的，暂时的生长应答过程，残余组织在体积和细胞数量上增加：细胞经历了减数分裂，但没有去分化过程。

Aging and Death: Final Developmental Processes

Aging is an ongoing, time-dependent developmental process in which body parts deteriorate. Proposed causes include the degeneration of collagen (the fibrous proteins of the connective tissues) and limits on the number of times cells can divide. Other theories focus on a decline of the immune system or on the accumulation of lipofuscins (aging pigments).

老化是一个持续过程，随时间发育，身体部分恶化。可能原因包括胶质的退化（纤维蛋白）和能分裂活细胞的限制。另外理论认为，免疫系统的免疫下降或脂褐素的堆积造成的。

**7.8.5教学方法**

讲授方法：以学生翻译为主，老师讲解相关专业知识辅助学生理解。

**7.8.6作业安排及课后反思**

课后作业：第一篇阅读材料

**7.9教学单元九**

**习题讨论**

**7.7.1教学日期**

2022.12.20,2022.12.23

**7.7.2教学目标**

教学目的：讲解以往习题，进行课堂测试。

**7.7.3教学内容（含重点、难点）**

教学重点： 讲解习题。

教学难点：讲解习题。

**7.7.4教学过程**

**9．课程考核**

9.1出勤（迟到、早退等）、作业、报告等的要求

考勤分数占10%。

9.2成绩的构成与评分规则说明

考勤分数占10%，作业成绩占90%。

9.3考试形式及说明

以课堂和课后作业作为考查。

**10．学术诚信规定**

**10.1考试违规与作弊**

考试违规和作弊者，按照四川轻化工大学有关规定进行处理。

**10.2杜撰数据、信息等**

杜撰数据和信息者，按照四川轻化工大学有关规定，交学校学术委员会讨论处理。

**10.3学术剽窃等**

学术剽窃者，按照四川轻化工大学有关规定，交学校学术委员会讨论处理。

**11．课堂规范**

**11.1课堂纪律**

按照四川轻化工大学关于课堂纪律的要求执行。

教师认真授课，上课时不得接听或拨打电话，不得讲授与课程无关的内容，在整个教学过程中需维持课堂良好的纪律，以保证教学质量。

学生认真听讲，积极踊跃发言，在教师授课时，对于不懂的或有争议的问题，可以随时举手打断老师，进行讨论式的学习和讲解。不得在上课时打闹，吃零食，玩手机，做与课程无关的事。

**11.2课堂礼仪**

教师和学生的课堂礼仪按照四川轻化工大学关于课堂礼仪的规定执行。总的要求是教师应衣着规范，干净整洁，普通话标准，给人为人师表的形象，如无特殊情况，不得坐着授课；学生同样应衣着整齐，不得着奇装异服，应具备大学生应有的青春风貌。

**12．课程资源**

**12.1教材与参考书**

生物专业英语（第二版）[M].蒋悟生主编.高等教育出版社.2000年.

**12.2专业学术专著**

[1] Bruce Alberts et al. Molecular Biology of the Cell 4th[M]. Garland Science, 2002.

[2] Nelson D L, Lehninger A L, Cox M M. Lehninger principles of biochemistry[M]. Macmillan, 2008.

[3]生物工程、生物技术专业英语（第一版）[M].邬行彦等编.化学工业出版社.2002年.

[4]科技英语的特点和应用(第一版)[M]. 戴炜华、陈文雄编.上海外语教育出版社.1984年.

[5] 吴达俊，庄思永.制药工程专业英语[M].化学工业出版社，2010.

**12.3专业刊物**

1 中国抗生素杂志

2 药物生物技术

3 生物工程学报

4 中国生化药物杂志

5 中国医药工业杂志

**12.4网络课程资源**

百度文库（地址：http://wenku.baidu.com）

小木虫论坛（地址：http://emuch.net/bbs）

丁香园（地址：http://www.dxy.cn）

**12.5课外阅读资源**

图书馆的相关资源

电子图书馆中的中国知网、万方的相关资源。

**13.教学合约**

13.1阅读课程实施大纲，理解其内容

学生应认真阅读课程实施大纲，如有异议或建议，可以向授课教师提出，教师根据实际情况作出修改和调整；如无异议，则视为同意遵守课程实施大纲当中所确定的责任与义务。

13.2同意遵守课程实施大纲中阐述的标准和期望

课程实施大纲编写完成后旨在提高教学规范和效率，学生需按照达到本课程实施大纲所要求的标准进行学习。

**14.其他说明**

无