

## 课程大纲 COURSE SYLLABUS

1.	课程代码/名称 Course Code/Title	植物分子生物学和基因组学前沿 Advanced Studies in Plant Molecular Biology and Genomics
2.	课程性质 Compulsory/Elective	选修课 Elective
3.	课程学分/学时 Course Credit/Hours	2 学分 2 points/32 hours
4.	授课语言 Teaching Language	中英文 Chinese and English
5.	授课教师 Instructor(s)	翟继先 Jixian Zhai
6.	先修要求 Pre-requisites	《普通生物学》 <i>General Biology</i>
7.	<b>教学目标 Course Objectives</b>	
	<p>Plant Molecular Biology and Genomics is a course is about genes - their structure and function- at the molecular level. The objective is to give you a firm and rigorous foundation in understanding gene expression and its regulation. We will begin with a review of structure of protein and nucleic acid, and the physical and chemical properties that drive interactions of protein with nucleic acid. Then we will study methods and technologies applied to study genes. Next, we will study the molecular mechanics of DNA replication, DNA damage repair, transcription in both prokaryotic and eukaryotic organisms, with an emphasis on how the activity of genes is regulated at the molecular level through nucleic acid-protein interactions. Lastly, genomics and systems biology will also be introduced and we will review advances in genomics projects that are altering our understanding of molecular biology.</p>	
8.	<b>教学方法 Teaching Methods</b>	
	<p>1. Lectures by Professor</p> <p>2. Group Discussion</p> <p>The teacher instructs students to give their own opinions about the issue, and make them to communicate and learn. Through discussion, students will help each other and learn from each other, deepen their knowledge, understanding and gain more new knowledge. Besides, their autonomy will also be encouraged in order to solve problems together.</p>	
9.	<b>教学内容 Course Contents</b>	
	<b>Section 1</b>	<ul style="list-style-type: none"> <li>i. Course Introduction</li> <li>ii. A brief history</li> <li>iii. Hot topics in molecular biology</li> <li>iv. Protein structure</li> <li>v. DNA structure and topology</li> <li>vi. Chromosome structure and its effects on DNA metabolism</li> <li>vii. Protein-DNA interaction</li> </ul>
	<b>Section 2</b>	<ul style="list-style-type: none"> <li>i. Cloning</li> <li>ii. Working with genes</li> <li>iii. Understanding the function of genes</li> <li>iv. DNA Replication</li> </ul>
	<b>Section 3</b>	<ul style="list-style-type: none"> <li>i. DNA mutation and repair</li> <li>ii. Recombinational DNA Repair and Homologous Recombination</li> <li>iii. Site-specific recombination and transposition</li> <li>iv. Tools for genome editing</li> </ul>

	<ul style="list-style-type: none"> <li>v. DNA-dependent RNA synthesis</li> <li>vi. mRNA processing</li> <li>vii. mRNA transport</li> </ul>
<b>Section 4</b>	<ul style="list-style-type: none"> <li>i. The genetic code</li> <li>ii. Protein synthesis</li> <li>iii. Regulation the flow of information</li> <li>iv. The transcriptional regulation of gene expression in eukaryotic organisms</li> <li>v. The posttranslational regulation of gene expression in eukaryotic organisms</li> <li>vi. Gene Regulation in Development and Evolution</li> </ul>
<b>Section 5</b>	Genomes, Transcriptomes, Proteomics, and systems biology
<b>Section 6</b>	The future of molecular biology and Genomics
<b>10.</b>	<b>课程考核 Course Assessment</b>
	Attendance (10 points), Presentation (60 points), Report (30 points),
<b>11.</b>	<b>教材及其它参考资料 Textbook and Supplementary Readings</b>
	Online text book – Arabidopsis Book, free download.