课程大纲
COURSE SYLLABUS

1.	**课程代码/名称** **Course Code/Title**	**天然产物/药物生物合成、功能与应用 （Natural Product/Drug Biosynthesis, Function and Application）**
2.	**课程性质** **Compulsory/Elective**	选修课 Elective
3.	**课程学分/学时** **Course Credit/Hours**	3 学分/48 学时 3 points/48 hours
4.	**授课语言** **Teaching Language**	中英 Chinese and English
5.	**授课教师** **Instructor(s)**	黄安诚 Ancheng Huang
6.	**先修要求** **Pre-requisites**	生物化学，生物学原理， Biochemistry， General Biology
7.	**教学目标** **Course Objectives**	
	该课程将系统构建研究生在天然产物（特别是植物天然产物）的生物合成、功能和应用方面的理论知识体系，培养研究生多角度看问题、多学科综合思维能力和模式。同时提升研究生独立思考、创新思维和团队协作能力以及紧跟国际前沿研究热点的习惯和能力。 Natural products play important roles in growth and adaptation of organism, serving as defence compounds and signalling molecules and have found numerous applications in fragrance, flavour, pharmaceutical, cosmetic and agrochemical sectors. This course will provide a systematic review on the biosynthesis, function and applications of different classes of natural products, building a knowledge framework on secondary metabolism and natural small molecules for graduate students and stimulating their interests in fundamental and translational multidisciplinary research in natural products, functional food, medicines and human health. The course will also foster graduate students' ability in creative and independent thinking and teamwork.	
8.	**教学方法** **主讲教师以 PPT 讲授+学生分组讨论、模拟会议、制作海报和演讲的方式授课。** **Teaching Methods** **The lecturer will be preparing PPT slides and other teaching materials for the course. Students will be asked to team up in groups to come up with a research theme which they can work on. We will hold a simulated conference to which students can submit abstracts. Excellent abstracts will be selected for keynote presentations. Students will have opportunities to present posters and deliver oral presentations.**	
9.	**教学内容** **Course Contents**	
	Section 1	**The Chemical Composition of Plants, Microbes, Insects and Animals (植物、微生物、昆虫和动物的化学组成) (10 学时)** **1.1 Introduction to the Different Classes of Plant Natural Products (不同类型植物天然产物的介绍)** 1.2 **Natural Products from Seaweeds (海藻天然产物)** 1.3 **Natural Products from Bacteria (细菌天然产物)** 1.4 **Natural Products from Fungi (真菌天然产物)** 1.5 **Natural Products from Insects (昆虫天然产物)** 1.6 **Natural Products from Animals (动物源天然产物)**

Section 2	**Analysis of Natural Products (天然产物的分析) (6 学时)** **2.1 Use of Secondary Metabolite Variation in Crop Improvement (利用次生产物不同改善作物)** **2.2 Approaches to the Analysis of Natural Products (天然产物分析方法)** **2.3 Opportunities and Challenges for Ethnobiology/Ethnobotany at the start of the 21st Century (21 世纪初民族生物学/植物学的机遇与挑战)**
Section 3	**Secondary Metabolite Biosynthesis (次生代谢产物生物合成) (10 学时)** **3.1 Introduction to the Different Classes of Biosynthetic Enzymes (不同类型生物合成酶的介绍)** **3.2 Methods for Molecular Identification of Biosynthetic Enzymes in Plants (植物中鉴定生物合成酶的方法)** **3.3 Methods for Natural Product Discovery and Identification of Biosynthetic Enzymes (天然产物发现的方法)** **3.4 Regulation of Secondary Metabolism by Jasmonate Hormones (茉莉酸激素调节次生代谢)** **3.5 Metabolite Channeling and Multi-enzyme Complexes (代谢物通道和多酶复合物)** **3.6 Glycosylation of Secondary Metabolites and Xenobiotics (次生代谢物和活性化合物的糖苷化)** **3.7 Handling Dangerous Molecules: Transport and Compartmentation of Plant Natural Products (危险分子的处理：植物天然产物的转运和区室化)** **3.8 Participation of Phytochemicals in Plant Development and Growth (植物化合物对植物生长与发育的贡献)**
Section 4	**Biological Activity (生物活性) (10 学时)** **4.1 Biological Activity of Defence-Related Plant Secondary Metabolites (防御相关植物次生代谢物的生物活性)** **4.2 The Role of Natural Products in Plant-Microbe Interactions (天然产物在植物与微生物互作中的作用)** **4.3 Role of Natural Products in Nature: Plant–Insect Interactions (天然产物在植物与昆虫互作中的作用)** **4.4 Oligosaccharide Signalling Molecules (多糖信号分子)** **4.5 Biological Activity of Allelochemicals (化感分子的生物活性)** **4.6 Health Benefits of Dietary Plant Natural Products (食用植物天然产物的健康效用)** **4.7 Floral Scents and Fruit Aromas Inspired by Nature (自然启示的花香和果香)** **4.8 Natural Product-derived Drugs (来源于天然产物药物)**
Section 5	**New Trends (新趋势) (8 学时)** **5.1 Bioengineering in Plants (植物生物工程)** **5.2 Bioengineering in Microbes (微生物生物工程)** **5.3 Genome Wide Approaches in Natural Product Research (天然产物研究中的基因组泛方法)** **5.4 Metabolomics and the Detection of Unintended Effects in Genetically Modified Crops (基因改造作物的代谢组学和副效应的检测)** **5.5 Recent Advances in Traditional Medicines and Dietary Supplements (中药及营养补充剂的进展)** **5.6 Plant-Derived Natural Products as Leads for Drug Discovery (植物源天然产物作为药物发现的先导化合物)** **5.7 Speciality Non-food Crops (特色非食品作物)**
Section 6	
Section 7	

	Section 8	
	Section 9	
	Section 10	
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10.	**课程考核** **Course Assessment**
	请再此注明：①考查/考试；②分数构成。 课程考核形式为考查；分数构成：考勤（20 分）、海报（20 分）、口头报告（30 分）、主题报告（30 分）。 Final course assessment will be in the form of overall evaluation without exam. The final grade consists of attendance (20%), poster (20%), oral presentation (30%) and project report (30%).
11.	**教材及其它参考资料** **Textbook and Supplementary Readings**
	Plant-derived Natural Products: Synthesis, Function and Application