

《食品生物技术》课程教学大纲

课程基本信息 (Course Information)					
*课程代码 (Course Code)	FS313	*学时 (Credit Hours)	32	*学分 (Credits)	2
*课程名称 (Course Name)	(中文) 食品生物技术				
	(英文) Food Biotechnology				
课程性质 (Course Type)	专业选修课 elective course				
授课对象 (Audience)	食品科学与工程专业本科生 undergraduate				
授课语言 (Language of Instruction)	中英双语 Bilingual Chinese and English				
*开课院系 (School)	农业与生物学院 School of Agriculture and Biology				
先修课程 (Prerequisite)	生物化学 biochemistry				
授课教师 (Instructor)	孙向军 Sun Xiangjun		课程网址 (Course Webpage)		
*课程简介 (Description)	<p>食品生物技术 (food biotechnology) 是研究生物技术在食品原料生产、食品加工、食品保藏、食品营养及食品安全领域应用的一个学科。主要内容包括：通过基因工程和细胞工程技术改善食品原料的品质以及提高产量；通过基因工程、发酵工程、酶工程、蛋白质工程等技术实现食品加工工艺高效化，提升食品原料的附加值，提高农产品的利用率，以及提高食品的营养价值和保健功能；利用基因工程、酶工程和发酵工程等技术减少食品在加工、贮藏过程中的损失及品质变化，提高食品质量管理的效率和保证食品质量和安全性。通过课程学习，使学生系统掌握现代生物学技术与食品科学及食品工业相关的知识体系，正确认识生物技术对食品加工和食品营养与安全学科的重要性和发展潜力，培养分析和解决食品生物技术领域问题的能力。</p>				
*课程简介 (Description)	<p>Food Biotechnology has been assembled with the hope of being an authoritative, comprehensive, conceptually sound, and highly informative compilation of recent advances in various important areas of food processing, food preservation, food nutrition and food safety. The primary coverage: genetic engineering and cell engineering to improve the quality of food material and increase quantity of production; genetic engineering, enzyme engineering and fermentation technology to ameliorate production efficiency, and increase the added value as well as utility ratio of food material; enzyme engineering, enzyme engineering and fermentation technology to reduce changes in food quality during food processing and preservation, accelerate the efficiency of food quality management and guarantee food safety. In summary, the topics herein deal with bioconversion of food raw materials to processed products, improvement of food quality, food safety, designing</p>				

	<p>of ingredients for functional foods, biochemical advances in traditional fermentation, and, most importantly, they provide an international perspective to the whole field. The course brings together diverse areas of food biotechnology with a strong focus on biochemistry and molecular biology, making students systemly known the knowledge of modern biotechnology and food science.</p>					
课程教学大纲 (course syllabus)						
*学习目标(Learning Outcomes)	<p>1. 完整掌握现代生物学基础知识和食品科学的知识体系，正确认识食品生物技术对于食品加工和食品营养与安全学科的重要性和潜在的发展能力(A5. 2) 2. 发现、分析和解决问题的能力 (B2, C7)</p> <p>1. Master the basic of modern biologies and their application in food processing and food nutrition and safety (A5.2) 2. Ability to analyze and solve problems (B2, C7)</p>					
*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
	<p>绪论: 食品生物技术涵义及研究内容；食品生物技术的历史、现状与展望； 分子生物学的形成与发展。 Research contents of Food Biotechnology; The history, current situation and prospect of Food Biotechnology;</p>	1		<p>重点掌握食品生物技术的研究内容及其在食品科学与工程领域中的地位 Research contents of Food Biotechnology; The role of food biotechnology in food science and technology</p>		
	<p>基因工程技术: 工具酶及目的基因制备；基因载体及基因重组；转化、增殖和表达； 基因工程在食品工业中的应用 The Genetic Engineering Technique: Processes of DNA cloning; Tool</p>	8		<p>重点掌握基因重组的技术方法，以及基因工程技术在食品中的应用 The recombinant DNA technology; The application of recombinant DNA</p>		

	<p>Enzyme; Vector; Transform; expression; The role of genetic engineering technique in food science</p>			<p>technology in Food Science</p>		
	<p>生物技术在功能性食品中的应用: 大米中维生素 A 的富集; 食品中铁、锌的富集; 植物次级代谢产物生物合成; 改善食品中油脂组成; 改善食品中蛋白质组成及性质; 抑制食品中抗营养成分。 Biotechnology for the production of plant-based functional foods: Genetically Modified rice; Modification of macronutrients; Biofortification with phytochemicals; Reduction of antinutrients</p>	<p>7</p>		<p>重点掌握采用生物技术富集食品中营养成分、减少抗营养成分的方法 The use of biotechnology in nutrient accumulation of foods; Reduction of antinutrients</p>		
	<p>代谢工程技术生产食品添加剂: 代谢途径的分析及调控; 氨基酸生物合成途径的调控 Metabolic Engineering of Bacteria for Food Ingredients:</p>	<p>4</p>		<p>重点掌握代谢途径调控的基本原理, 了解氨基酸合成途径的调控方法。 Mechanism of Modification of Metabolic Pathways;</p>		

	Modification of Metabolic Pathways; Metabolic engineering of metabolic pathways to increase amino acid synthesis.			Metabolic engineering of metabolic pathways to increase amino acid synthesis		
	发酵工程: 生物反应器的种类及结构; 发酵技术及发酵食品 Fermentation Technology: Bioreactor Configurations; Fermentation Systems in Practice	4		重点掌握发酵食品生产相关技术; 掌握发酵技术分类及特点; 了解生物反应器结构 Fermentation In Food Biotechnology; Types of Fermentation; Bioreactor		
	大豆蛋白的分子设计及改性: 大豆蛋白组成、分子结构; 蛋白质工程改善大豆蛋白营养性质; Molecular Design of Soybean Proteins for Enhanced Food Quality: Improvement of Nutritional Quality by Protein Engineering;	4		重点掌握蛋白质分子设计的原理及技术, 掌握大豆蛋白的分子设计方法。 Improvement of Nutritional Quality by Protein Engineering		
	酶技术在淀粉生物加工中的应用: 淀粉酶; 淀粉糖生产技术 Bioprocessing of	4		重点掌握淀粉酶的分类及特性, 掌握淀粉糖生产技术 Enzymes Involved In		

	Starch Using Enzyme Technology: Starch; Enzymes Involved In Starch Degradation			Starch Degradation		
*考核方式 (Grading)	平时成绩: 30% ; 期末成绩: 70% usual performance: 30%; final grade: 70%					
*教材或参考资料 (Textbooks & Other Materials)	<p>1. 教材名称:《Biotechnology in Functional Foods and Nutraceuticals》, 主编: Debasis Bagchi, Fancis C. Lau, & Dilip K. Ghosh., 出版社: Taylor and Francis, 出版年月: 2010. 1, 第 2 版, ISBN: 978-1-4200-8712-3, 使用 5 届, 外文教材, 非国家级规划教材, 高等院校教材</p> <p>2. 教材名称:《Food Biotechnology》, 主编: Kalidas Shetty, Gopinadhan Paliyath, Anthony Pometto, & Robert E. Levin, 出版社: Taylor and Francis, 出版年月: 2006. 1, 第 2 版, ISBN: 978-0-8247-5329-0, 使用 5 届, 外文教材, 高等院校教材</p> <p>3. 教材名称:《食品生物技术导论》, 主编: 罗云波, 出版社: 中国农业大学出版社, 出版年月: 2011. 8, 第 2 版, ISBN: 978-7-5655-0293-4, 使用 5 届, 非外文教材, 国家级规划教材</p>					
其它 (More)						
备注 (Notes)						

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。