《基因工程与功能性食品》课程教学大纲

Course Outline

<table>
<tr><td colspan="6">课程基本信息（Course Information）</td></tr>
<tr><td>课程代码
（Course Code）</td><td>FS016</td><td>*学时
（Credit Hours）</td><td>32</td><td>*学分
（Credits）</td><td>2</td></tr>
<tr><td rowspan="2">*课程名称
（Course Name）</td><td colspan="5">（中文） 基因工程与功能性食品</td></tr>
<tr><td colspan="5">（English）Genetic Engineering and Functional Food</td></tr>
<tr><td>课程性质
(Course Type)</td><td colspan="5">选修课
Elective Courses</td></tr>
<tr><td>授课对象
（Target Audience）</td><td colspan="5">The course is intended for advanced undergraduates and graduate students in food science, nutrition or related fields.</td></tr>
<tr><td>授课语言
(Language of Instruction)</td><td colspan="5">English</td></tr>
<tr><td>*开课院系
（School）</td><td colspan="5">School of Agriculture and Biology</td></tr>
<tr><td>先修课程
（Prerequisite）</td><td colspan="5">Introductory biology</td></tr>
<tr><td>授课教师
（Instructor）</td><td colspan="2">Rui Hai Liu 教授
美国康奈尔大学食品科学系终身教授（兼毒理系教授），博士生导师，国际食品科学院院士，也是中国教育部长江学者讲座教授，美国化学学会会士，美国食品学会会士，美国科学促进学会会士
Susheng Gan 教授</td><td>课程网址
(Course Webpage)</td><td colspan="2"></td></tr>
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	美国康奈尔大学终身教授，博士生导师		
*课程简介（Description）	（中文 300-500 字，含课程性质、主要教学内容、课程教学目标等） 本门课程主要包含两部分主要内容，第一部分主题为“粮食作物的基因工程:缪见和真理”，由甘苏生教授主讲。主要围绕转基因这一具有争议的热点话题展开，内容重点讨论关于转基因用于食品或食品成分的安全性让人担忧的问题；本模块课程将通过案例重点讨论基因工程作物如何转基因，如何提高营养价值，如何在必要时检测食物是否转基因或者是否含有转基因成分。 第二部分主题为“功能性食品概论”本门课程由刘瑞海教授主讲，主要围绕预防疾病和促进健康中的功能性食品、生物活性化合物和膳食补充剂展开。重点内容包括功能性食品和膳食补充剂效用的作用机制和科学证据。同时也将讨论关于生物标记物、安全和效用测试以及关于功能性食品和膳食补充剂的规定。		
*课程简介（Description）	**This course conclude 2 parts:** **“Genetic Engineering of Food Crops: Myths and Truths**”: Genetically modified organism (GMO) has been a hot topic with controversy. One of the major concerns is on the safety when served as our food or food ingredients. This 1-credit modular course will discuss case studies of genetic engineered crops with emphases on how they are genetically engineered, how the nutritional values are improved, and how to detect, if necessary, your food may be genetically engineered or may contain GMO ingredients. **“Introduction to Functional Foods”** covers functional foods, bioactive compounds, and dietary supplements in disease prevention and health promotion. Emphasis areas will include the mechanisms of action and scientific evidence of efficacy of functional foods and dietary supplements. Biomarkers, safety and efficacy testing, and regulations for functional foods and dietary supplements will also be discussed.		
课程教学大纲（Course Syllabus）			
*学习目标 (Learning Outcomes)	**For “Introduction to Functional Foods”:** 1. Apply the scientific principles necessary to evaluate the benefits and risk of functional foods and dietary supplements. （B1, B2） 2. Evaluate the latest information on the rapidly growing field of functional foods and dietary supplements. （B4, C3） 3. Integrate and apply core competencies in Food Chemistry and Nutrition to solve/explain practical product development in functional foods and dietary supplements.（B3,C2） 4. Explain the roles of nutrients and bioactive compounds in functional foods and dietary supplements that impact human health.（B1,B2, B3,C4, D1）		

	5. The students from China (SJTU) and from Cornell University (CALS) will be able to interact and, more importantly, learn from each other intellectually and culturally.(A5, C4,D5) **For "Genetic Engineering of Food Crops":** 1. The students will be able to understand the nature of genetic engineering of crops vs. conventional plant breeding.(B2, B4) 2. The students will be able to evaluate and assess the nutritional and economical values of various improved crops by genetic engineering.(B3,C3) 3. The students will be able to identify and use various techniques to monitor/determine if their food is GMO or contains ingredients derived from GMO.(B2,B3, B5) 4. The students will be able to develop science-based critical thinking of the GMO issues in general and engineered food crops in particular.(C3,C5, D1)

*教学内容

进度安排及要求

(Class Schedule & Requirements)

教学内容 Content	学时 Credit hours	教学方式 method	作业及要求 Assignment & requirement	基本要求 Basic requirement	考查方式 examination
Introduction to functional foods and dietary supplements; Phytochemicals and bioactive compounds	4	Lectures and discussion	Reading of assigned materials and participation in discussion	Reading homework after each lecture	Prelim
Health benefits of fruits, vegetables, and whole grains; Plant oils and nuts	4	Lectures and discussion	Reading of assigned materials and participation in discussion	Reading homework after each lecture	Prelim
Bioactive compounds of beverages; Phytosterols;	4	Lectures and discussion	Reading of assigned materials and participation in discussion	Reading homework after each lecture	Final Exam
Case study and discussion:	4	Lectures and	Reading of assigned	Reading homework	Final exam

		Dietary Approaches to Stop Hypertension (DASH); Micronutrient fortification of food; Regulations of functional foods and dietary supplements		discussion	materials and participation in discussion	after each lecture	
		Introduction and overview of genetic engineering of crops vs. conventional plant breeding: biological and technological principles	4	The format of the lectures will be predominantly PowerPoint presentations. Handouts will be distributed at the beginning of each lecture to minimize your note-taking so that you will be able to concentrate on the lecture. I surely welcome questions during my	Readings after each lectures		The examination: there will be no written exams but a 1-hour long interview with the instructor is expected. The grading will be based on the interview with the instructor, on
		Case studies: 1. Genetic engineering of golden rice (beta-carotene biosynthesis, sources of genes for the 1st and 2nd generations of golden rice, etc.) ; 2 : Genetic engineering of FlavrSavr tomato; 3: Genetic engineering of soybean with heart-healthy fats ; 4: Genetic engineering of biofortified	4		Readings after each lectures		

		cassava		presentations. The format of the discussions will be student-led discussions of some related GMO topics. Discussions corresponding to the above individual lecture topics will be held. For each discussion session, 1-3 related articles will be distributed to the class, and a student will be assigned to lead the discussions.			how effectively you lead the discussion and on how actively you participate in the discussion.
		Case studies: 5: Genetic engineering of nonbrowning apple and potato; 6: Genetic engineering of herbicide resistance in food crops (roundup as an example: genes and gene products, etc); 7: Genetic engineering of insect resistance in food crops (Bt as an example: gene and its product, selective toxicity to insects vs. human beings, etc); 8: Genetic engineering of disease resistance in food crops (papaya as an example: ring spot virus, coat protein gene, etc)	4		Readings after each lectures		
		Methods for detecting GM crops in food: DNA and/or RNA-based techniques; protein-based techniques	4		Readings after each lectures		

*考核方式 (Grading)	（成绩构成） (Grade Constitution): Prelim - 100 point test (40%) Final - 100 point test (60%)
*教材或参考资料(Textbooks & Other Materials)	（必含信息：教材名称，作者，出版社，出版年份，版次，书号） (Required Information: Textbook title, Author, Press, Publication year, Edition, Book number) No textbook required, but handouts and relevant literature will be provided and discussed.
其它（More）	
备注（Notes）	