《基因工程与功能性食品》课程教学大纲（2021 版）

<table>
<tr><th colspan="6">课程基本信息（Course Information）</th></tr>
<tr><td>课程代码（Course Code）</td><td>FOST3417</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">基因工程与功能性食品</td></tr>
<tr><td colspan="5">Genetic Engineering and Functional Food</td></tr>
<tr><td>课程类型 (Course Type)</td><td colspan="5">选修课/Elective Course</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, biological sciences, toxicology, plant science, and horticulture, or related fields.</td></tr>
<tr><td>授课语言 (Language of Instruction)</td><td colspan="5">英语/English</td></tr>
<tr><td>*开课院系 (School)</td><td colspan="5">农业与生物学院/School of Agriculture and Biology</td></tr>
<tr><td>先修课程 (Prerequisite)</td><td>Introductory biology</td><td colspan="2">后续课程 (post)</td><td colspan="2">无</td></tr>
<tr><td>*课程负责人 (Instructor)</td><td>Susheng Gan 教授
美国康奈尔大学终身教授，博士生导师</td><td colspan="2">课程网址 (Course Webpage)</td><td colspan="2"></td></tr>
<tr><td>*课程简介（中文）(Description)</td><td colspan="5">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。</td></tr>
<tr><td>*课程简介（英文）(Description)</td><td colspan="5">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</td></tr>
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	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.

课程目标与内容（Course objectives and contents）

*课程目标 (Course Object)	**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） **For "Genetic Engineering of Food Crops":** 5. The students will be able to understand the nature of genetic engineering of crops vs. conventional plant breeding.(B2, B4) 6. The students will be able to evaluate and assess the nutritional and economical values of various improved crops by genetic engineering.(B3,C3) 7. 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) 8. 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)

*教学内容进度安排及对应课程目标（Class	章节	教学内容（要点）	学时	教学形式	作业及考核要求	课程思政融入点	对应课程目标

Schedule & Requirements & Course Objectives)	1	Introduction to functional foods and dietary supplements;	2	Lectures and discussion	Reading of assigned materials and participation in discussion	指导学生脚踏实地，勤奋努力，培养及增强学生的专业意识	课程目标 1
	2	Phytochemicals and bioactive compounds	3	Lectures and discussion	Reading of assigned materials and participation in discussion	培养学生对生物质能基础知识的专业兴趣,增强专业意识	课程目标 1,2
	3	Health benefits of fruits, vegetables, and whole grains; Plant oils and nuts	3	Lectures and discussion	Reading of assigned materials and participation in discussion		课程目标 1,2,3
	4	Bioactive compounds of beverages; Phytosterols;	2	Lectures and discussion	Reading of assigned materials and participation in discussion	通过对饮料中的生物活性物质的学习激起学生对推陈出新的浓厚兴趣,培养学生的探索精神	课 程 目标 3
	5	Case study and discussion: Dietary Approaches to Stop Hypertension (DASH);	3	Lectures and discussion	Reading of assigned materials and participation in	通过案例学习,培养学生解决社会实际问题的能力	课 程 目标 3,4

					discussion		
	6	Micronutrient fortification of food; Regulations of functional foods and dietary supplements	3	Lectures and discussion	Reading of assigned materials and participation in discussion		课程目标 3,4
	7	Introduction and overview of genetic engineering of crops vs. conventional plant breeding: biological and technological principles	2	Lectures and discussion	Reading of assigned materials and participation in discussion	培养学生对生物质能基础知识的专业兴趣,增强专业意识	课程目标 5
	8	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	Lectures and discussion	Reading of assigned materials and participation in discussion	指导学生脚踏实地,勤奋努力,培养及增强学生的专业意识	课程目标 5
	9	Case study: 3: Genetic engineering of soybean with heart-healthy fats ; 4: Genetic engineering of biofortified cassava	3	Lectures and discussion	Reading of assigned materials and participation in discussion		课程目标 5,6
	10	Case studies: 5: Genetic engineering of nonbrowning apple and potato; 6: Genetic engineering of herbicide resistance in	2	Lectures and discussion	Reading of assigned materials and participat	培养学生树立自然辩证观点,牢固树立正确的世界观、	课程目标 5，6

		food crops (roundup as an example: genes and gene products, etc)			ion in discussion	人生观 和价值观	
	11	Case study: 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)	3	Lectures and discussion	Reading of assigned materials and participation in discussion		课 程 目标 7,8
	12	Methods for detecting GM crops in food: DNA and/or RNA-based techniques; protein-based techniques	3	Lectures and discussion	Reading of assigned materials and participation in discussion	拓宽学生的国际化视野,具有对多元文化的包容心态,胸怀天下,以增进全人类福祉为己任	课 程 目标 7,8
	注 1：建议按照教学周周学时编排。 注 2：相应章节的课程思政融入点根据实际情况填写。						
*考核方式 (Grading)	Attendance (40%) Final presentation (60%)						
*教材或参考资料 (Textbooks & Other Materials)	参考资料： The text, *'Energy Systems Engineering'*, Francis Vanek, Louis Albright and Largus Angenent, McGraw Hill, NY, 2016, ISBN 978-0-07-1787789-9 will be a major reference. However, students **will not be required** to purchase the book because specific course handouts will be provided to students from current and relevant sources and from refereed publications						
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。