

Course Map and associated learning objectives in Food Science

The Food Science program is accredited by the Higher Education Review Board (HERB) of the Institute of Food Technologists (IFT). Accreditation is achieved every five years, and applications contain yearly assessment plans to be submitted each August 31st. Assessment is broken down into two main categories, *Core Competencies* and *Success Skills*. A list of Food Science courses is presented below and instruction in each *Core Competency* and *Success Skill* occurs in multiple courses across the curriculum. Assessment includes direct, objective measures of student learning, such as performance on exams, as well as indirect assessment, such as improvement in written communication as measured in comparing written reports across several course levels. Each year, up to three assessments of *Core Competencies* and/ *Success Skills* are undertaken with the goal of assessing the entire program each five years. Data collected from assessments is evaluated by the faculty and any corrective actions are made and documented.

| | | <i>Food chemistry and analysis</i> | <i>Food safety and</i> | <i>Food processing and</i> | <i>Applied food science</i> |
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| Course | Title | Core Competencies | | | |
| NDFS 1010 | Chocolate Science, History and Society | √ | √ | √ | √ |
| NDFS 1250 | Sanitation and Safety | | √ | √ | √ |
| NDFS 4440 | Food Engineering | | | √ | √ |
| NDFS 5020 | Meat Technology and Processing | √ | √ | √ | √ |
| NDFS 5030 | Dairy Technology and Processing | √ | √ | √ | √ |
| NDFS 5100 | Sensory Evaluation | | | | √ |
| NDFS 5110 | Food Microbiology | | √ | √ | √ |
| NDFS 5250 | Internship | | √ | √ | √ |
| NDFS 5500 | Food Analysis | √ | | | √ |
| NDFS 5510 | Food Laws and Regulations | | | | √ |
| NDFS 5560 | Food Chemistry | √ | | | √ |
| NDFS 5920 | Food Product Development | | | | √ |
| PSC 4600 | Cereal Science | √ | | | √ |

| | | <i>Communication skills</i> | <i>Critical Thinking</i> | <i>Professionalism</i> | <i>Interaction skills</i> | <i>Organizational skills</i> | <i>Information acquisition</i> |
|---------------|--|-----------------------------|--------------------------|------------------------|---------------------------|------------------------------|--------------------------------|
| Course | Title | Success Skills | | | | | |
| NDFS 1010 | Chocolate Science, History and Society | √ | | | | | √ |
| NDFS 1250 | Sanitation and Safety | √ | √ | | | | |
| NDFS 4440 | Food Engineering | | √ | √ | √ | √ | √ |
| NDFS 5020 | Meat Technology and Processing | √ | | | √ | √ | √ |
| NDFS 5030 | Dairy Technology and Processing | | | | √ | √ | √ |
| NDFS 5100 | Sensory Evaluation | √ | | | | √ | |

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| NDFS 5110 | Food Microbiology | √ | √ | √ | | √ | √ |
| NDFS 5250 | Internship | √ | √ | √ | √ | √ | √ |
| NDFS 5500 | Food Analysis | √ | | | √ | √ | |
| NDFS 5510 | Food Laws and Regulations | | √ | | | | √ |
| NDFS 5560 | Food Chemistry | √ | | | √ | | √ |
| NDFS 5920 | Food Product Development | √ | √ | | √ | √ | √ |
| PSC 4600 | Cereal Science | √ | | | | √ | |

| Core Competency | Content | By the completing of the food science program, the student should: |
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| Food Chemistry and Analysis | <p>Structure and properties of food components, including water, carbohydrates, proteins, lipids, other nutrients and food additives.</p> <p>Chemistry of changes occurring during processing, storage and utilization.</p> <p>Principles, methods, and techniques of qualitative and quantitative physical, chemical and biological analyses of food and food ingredients.</p> | <ul style="list-style-type: none"> Know the chemistry underlying the properties and reactions of various food components. Have sufficient knowledge of food chemistry to control reactions in foods. Know the major chemical reactions that limit shelf life of foods. Use the laboratory techniques common to basic and applied food chemistry Know the principles behind analytical techniques associated with food. Be able to select the appropriate analytical technique when presented with a practical problem. Demonstrate practical proficiency in a food analysis laboratory. |
| Food safety and microbiology | <p>Pathogenic and spoilage microorganisms in foods</p> <p>Beneficial microorganisms in food systems</p> <p>Influence of the food system on the growth and survival of microorganisms</p> <p>Control of microorganisms</p> | <ul style="list-style-type: none"> Identify the important pathogens and spoilage microorganisms in food and the conditions under which they will grow. Identify the conditions under which the important pathogens are commonly inactivated, killed or made harmless in foods Utilize laboratory techniques to identify microorganisms in foods Know the principles involving food preservation via fermentation processes. Know the role and significance of microbial inactivation, adaptation, and environmental regulators (i.e. aW, pH, temperature) on growth and response of microorganisms in various environments. Identify the conditions, including sanitation practices, under which the important pathogens and spoilage microorganisms are commonly inactivated, killed or made harmless in foods. |
| Food processing and engineering | <p>Characteristics of raw food material</p> <p>Principles of food preservation</p> | <ul style="list-style-type: none"> Know the source and variability of raw food material and their impact on food processing operations. Know the spoilage and deterioration mechanisms in |

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| | <p>including low and high temperature processes, water activity, etc.</p> <p>Engineering principles including mass and energy balances, thermodynamics, fluid flow, and heat and mass transfer.</p> <p>Principles of food processing techniques, such as drying, high pressure, aseptic processing, extrusion, etc.</p> <p>Packaging materials and methods</p> <p>Cleaning and sanitation</p> <p>Water and waste management</p> | <p>foods and methods to control deterioration and spoilage.</p> <ul style="list-style-type: none"> • Know the principles that make a food product safe for consumption. • Know the transport processes and unit operations in food processing as demonstrated both conceptually and in practical laboratory settings. • Be able to use the mass and energy balances for a given food process. • Know the unit operations required to produce a given food product. • Know the principles and current practices of processing techniques and the effects of processing on parameters on product quality. • Know the properties and uses of various packing materials. • Know the basic principles and practices of cleaning and sanitation in food processing operations. • Know the requirements for water utilization and waste management in food and food processing. |
| Applied food science | <p>Integration and application of food science principles (food chemistry, microbiology, engineering/processing, etc.)</p> <p>Computer skills</p> <p>Statistical skills</p> <p>Quality assurance</p> <p>Analytical and effective methods of assessing sensory properties of food utilizing statistical methods</p> <p>Current issues in food science</p> <p>Food laws and regulations</p> | <ul style="list-style-type: none"> • Be able to apply and incorporate the principles of food science in practical, real-world situations and problems. • Know how to use computers to solve food science problems • Be able to apply statistical principles to food science applications. • Be able to apply the principles of food science to control and assure the quality of food products. • Know the basic principles of sensory analysis. • Be aware of current topics of importance to the food industry. • Know government regulations required for the manufacture and sale of food products. |
| Success skills are introduced in lower level courses and practiced in as many upper division courses as possible | <p>Communication skills (i.e. oral and written communication, listening, interviewing, etc.)</p> <p>Critical thinking/problem solving skills (i.e. creativity, common sense, resourcefulness, scientific reasoning, analytical thinking, etc.)</p> | <ul style="list-style-type: none"> • Demonstrate the use and practice of different levels of oral and written communication skills. This includes such skills as writing technical reports, letters and memos; communicating technical information to a non-technical audience; and making formal and informal presentations. • Be able to develop a process for solving and preventing reoccurrences of ill-defined problems; know how to use library and internet resources to search for quality information, and solve a problem; and make thoughtful recommendations. • Apply critical thinking skills to new situations. |

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| | <p>Professionalism skills (i.e. ethics, integrity, respect for diversity)</p> <p>Life-long learning skills</p> <p>Interaction skills (i.e., teamwork, mentoring, leadership, networking, interpersonal skills, etc.)</p> <p>Information acquisition skills (i.e. written and electronic searches, databases, internet, etc.)</p> <p>Organizational skills (i.e. time management, project management, etc.)</p> | <ul style="list-style-type: none"> • Commit to the highest standards of professional integrity and ethical values. • Explain the skills necessary to continually educate oneself. • Work effectively with others • Provide leadership in a variety of situations • Deal with individual and/or group conflict • Independently research scientific and non-scientific information • Competently use library resources • Manage time effectively • Know how to facilitate group projects as well as be a good team member. • Handle multiple tasks and pressures. |
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