

# Department of *Nutrition and Food Sciences*

## *College of Agriculture and College of Family Life*

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**Professors** *Daren P. Cornforth*, food science, meat and muscle chemistry; *Conly L. Hansen*, food science, food engineering; *Deloy G. Hendricks*, nutrition, food storage; *Georgia C. Lauritzen*, nutrition education, dietetics; *Donald J. McMahon*, food science, dairy chemistry and technology; *Ronald G. Munger*, nutrition, epidemiology, and public health; *Ann W. Sorenson*, nutrition; **Adjunct Professors** *Gary M. Chan*, pediatrics; *Michael J. Glass*, microbial detection; **Distinguished Professor Emeritus** *R. Gaurth Hansen*; **Professors Emeritus** *Gary H. Richardson*, *D. K. Salunkhe*, *Bonita W. Wyse*; **Associate Professors** *Charlotte P. Brennand*, food science, food flavor and sensory evaluation; *Jeffery R. Broadbent*, food science, microbial genetics; *Charles E. Carpenter*, food science, muscle biochemistry and physiology, meat processing; *Ilka Nemere*, nutrition, molecular nutrition; *Marie K. Walsh*, food science, dairy chemistry; *Bart C. Weimer*, food science, microbial physiology; **Clinical Associate Professors** *Janet B. Anderson*, dietetics, food science management, food safety; *Noreen B. Schvaneveldt*, dietetics, clinical nutrition; **Adjunct Associate Professor** *Paul A. Savello*, dairy processing and food science, food laws and regulations, milk ultra high temperature and whitening; **Assistant Professors** *Nedra K. Christensen*, nutrition, dietetics; *Deborah R. Gustafson*, nutrition, molecular epidemiology; **Research Assistant Professor** *Heidi J. Wengreen*, nutrition, clinical dietetics, epidemiology; **Clinical Assistant Professors** *Ann M. Mildenhall*, dietetics; *Tamara S. Vitale*, dietetics, community nutrition; **Assistant Professor Emeritus** *Frances G. Taylor*; **Adjunct Assistant Professors** *Bradley J. Haack*, molecular pathogenesis; *Robert Miceli*, molecular assay development, biosensor development, infectious disease, antibody engineering, immune regulation; **Adjunct Clinical Assistant Professor** *W. Daniel Jackson*, pediatrics; **Lecturers** *Virginia C. Bragg*, culinary arts; *Erik T. Burlile*, culinary arts/food service management, chef; *Rebecca S. Cole*, dietetics/food service management; *Grace B. Harvell*, culinary arts; *Stephen L. Larsen*, dairy technology; *John L. Simpson*, culinary arts/food service management, chef

**Degrees offered:** Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), and Doctor of Philosophy (PhD) in Nutrition and Food Sciences; Master of Food Microbiology and Safety (MFMS); Master of Dietetics Administration (MDA)

**Undergraduate emphases:** *BS, BA*—Nutrition Science, Dietetics, Culinary Arts/Food Service Management, Food Science, and Food Technology Management; **Graduate specializations:** *MS, PhD*—Dietetics, Food Biotechnology, Food Chemistry, Food Engineering, Food Microbiology, Food Processing, Human Nutrition, Molecular Biology, and Nutrient Metabolism

## *Undergraduate Programs*

### *Objectives*

The Department of Nutrition and Food Sciences has the following three objectives:

1. To provide students with the scientific/academic background necessary to function well in further academic pursuits or future work environments.
2. To provide students with the critical thinking and problem solving skills necessary to enhance further academic pursuits or future work environments.
3. To provide students with practical application and work experience credentials to provide personal and employment satisfaction.

**Dietetics.** The Dietetics emphases prepare students to become registered dietitians. To become a registered dietitian, a student must complete a bachelor's degree program, complete a supervised internship, and pass a national registration exam. Registered dietitians, who have professional skills in clinical nutrition, community/public health nutrition, and food service management, are in great demand in the job market.

USU offers two programs in dietetics: the **Coordinated Program in Dietetics (CPD)** and the **Didactic Program in Dietetics (DPD)**. The CPD and the DPD are both accredited by the Commission on Accreditation/Approval for Dietetics Education of The American Dietetic Association, 216 West Jackson Blvd, Chicago IL 60606-6995, (312) 899-4876.

**Coordinated Program in Dietetics (CPD).** The CPD program includes coursework *and* supervised internship experience. The graduate is eligible to take the national registration exam

upon completion of the BS degree. Students must complete prerequisites and make application to the CPD by March 15 of the sophomore year. Ten students are accepted annually into the junior-level coursework and clinical work. Students are required to complete 1,000 hours of internship experience during their junior and senior years. Senior students must relocate to Salt Lake City during fall semester, in order to obtain extensive internship experiences in clinical and community settings.

**Didactic Program in Dietetics (DPD).** The DPD program is a four-year academic program meeting all requirements enabling the graduate to apply for a supervised internship following graduation. Internships are located throughout the USA. USU Extension also sponsors an internship in conjunction with Davis County School Food and Nutrition Services.

**Food Science.** Students receive an excellent background in chemistry, engineering, food processing, statistics, sensory evaluation, and microbiology. The Food Science program is approved by the Institute of Food Technologists. Graduates are in demand by industry for positions in research, quality control/assurance, product development, and processing. Government laboratories and regulatory agencies also hire food science graduates. With a food science degree, students can also qualify to enter graduate school.

**Food Technology Management.** The Food Technology Management program gives students a broad background in basic food science and in business administration to be applied to the business-oriented aspects of the food industry. Students also qualify for a Business Production Minor. Graduates are sought by private food industry and public institutions in management positions.

**Culinary Arts/Food Service Management.** This emphasis prepares students in the art and science of culinary arts, and provides the management principles needed to effectively manage a food service operation, including human resource management, financial management, time management, communications, etc. Students are required to obtain a minor in BA Marketing, MHR Management, or MHR Human Resource Management.

**Nutrition Science.** The Nutrition Science emphasis is for students who are interested in studying the molecular and cellular bases of human health and disease. This is a multi-disciplinary program in which students learn to apply techniques from the fields of molecular and cellular biology, physiology, genetics, and biochemistry to issues in nutrition. Students will gain experience in laboratory, clinical, and epidemiological methods, and may have the opportunity to gain laboratory research experience in nutrition studies being conducted by faculty members. The undergraduate Bachelor of Science degree qualifies a student with the Nutrition Science emphasis to find employment in industry or academic laboratories, as well as in government agencies. It can also be used as preparation for medical or graduate school.

**Completion of courses required for the Nutrition Science emphasis or the Dietetics emphasis is suitable preparation for students planning to apply to medical school.**

For more emphasis information about course sequences and requirements for admission, see major requirement sheet, available from the Department of Nutrition and Food Sciences, or visit the departmental home page at:

<http://www.usu.edu/famlife/nfs>.

## **Requirements**

**Departmental Admission Requirements.** Admission requirements for the Department of Nutrition and Food Sciences are the same as those described for the University on pages 48-51. Students in good standing may apply for admission to the department. Students planning to major in Nutrition and Food Sciences should take algebra, chemistry, and biology in high school.

**Graduation Requirements.** Students graduating in the Department of Nutrition and Food Sciences graduate in the College of Agriculture and the College of Family Life. All graduates from the department must have completed one of the six emphasis areas in the department and must meet the following minimum requirements:

1. Grade point average (GPA) must be 2.5 or higher in all courses required for the major.
2. A grade of C or better must be received in all courses required for the major.
3. Courses required for the major may be repeated only once to improve a grade.
4. Courses required for the major may not be taken as *Pass-D-Fail* credits.

**Minor in Food Sciences.** Students with majors outside of the Nutrition and Food Sciences Department may graduate with a minor in Food Sciences by completing NFS 1020, 3110, 4070, 5020 or 5030, and 5510.

## **Bachelor of Science Requirements**

Specific requirements for each emphasis are listed below. Requirements change periodically, and sequence of courses is important. Current course requirements and the order in which they should be taken can be obtained from the Department of Nutrition and Food Sciences.

**Food Science Emphasis.** The following courses are required: Biol 1210, 3300; Chem 1210, 1220, 1230, 1240, 2300, 2330, 3700, 3710; Math 1050, 1060, 1210; NFS 1000, 1020, 1250, 3100, 3110, 3250, 4070, 4440, 4990, 5020, 5030, 5110, 5500, 5510, 5560, 5920; Phyx 2110; PISc 4600; Spch 2600; Stat 3000, 5300.

**Food Technology Management Emphasis.** The following courses are required: Acct 2010; BA 3500, 3700, 4720, 4790, 5730; Biol 1110; Chem 1110, 1120, 1130; Math 1050, 1100; MHR 3110; NFS 1000, 1020, 1240, 1250, 3100, 3110, 3250, 4070, 4990, 5020, 5030, 5110, 5500, 5510, 5560, 5920; Phyx 1200; Spch 2600; Stat 3000, 5300.

**Culinary Arts/Food Service Management.** The following courses are required: Acct 2010; BA 3500; Chem 1010; Econ 1500; FL 1100; HEnv 1750; Math 1030, 1050; MHR 2350, 2990, 3110, 3710; NFS 1000, 1020, 1240, 1250, 2030, 2050, 3000, 3030, 3060, 3110, 3500, 3510, 4250, 4810, 4990; Spch 2600. Students are required to choose a minor in BA Marketing, MHR Management, or MHR Human Resource Management.

**Nutrition Science.** The following courses are required: Biol 1210, 1220, 2000; Chem 1210, 1220, 1230, 1240, 2300, 2330, 3700, 3710; Econ 1500; Engl 1010, 2010; FL 1100; Math 1050, 1060, 1210; NFS 1000, 1020, 2020, 3110, 3250, 4020, 4070, 4540, 4990, 5210, 5220, 5310; Stat 2000; USU 1320, 1330, 1340; 20 elective credits (see Nutrition and Food Sciences Department for list of approved electives).

**Dietetics (Coordinated Program).** The following courses are required: Biol 2000, Chem 1210, 1220, 2300, 3700, 3710; Econ 1500; FL 1100; Math 1050; NFS 1020, 1240, 1250, 2020, 3020, 4020, 4050, 4060, 4070, 4420, 4480, 4540, 4550, 4560, 4570, 4580, 4660, 4710, 4720, 4730, 4740, 4750, 4780, 4990, 5210, 5300, 5750; Stat 1040.

**Dietetics (Didactic Program).** The following courses are required: Acct 2010; BA 3500; Biol 2000; Chem 1210, 1220, 2300, 3700, 3710; Econ 1500; FL 1100; Math 1050; MHR 3110; NFS 1020, 1240, 1250, 2020, 3020, 3510, 4020, 4050, 4060, 4070, 4480, 4540, 4550, 4560, 4710, 4720, 4750, 4900, 4990, 5120, 5200, 5210, 5300; Stat 1040.

### **Financial Support**

The Department of Nutrition and Food Sciences, the College of Agriculture, and the College of Family Life award scholarships in addition to those available through the University Financial Aid Office. Information and application forms may be obtained from the department office. Students may also contact the department for assistance in finding employment that will enhance their academic studies. Many students are employed by the department and by private firms near the University.

## **Graduate Programs**

### **Master of Food Microbiology and Safety (MFMS)**

The MFMS degree is a professional degree designed to provide students with depth training in food safety assurance and the use of management systems such as HACCP. The degree is primarily intended for individuals planning careers in food quality assurance or other food safety-related positions in the food industry.

### **MFMS Admission Requirements**

Students seeking entry into the MFMS program must satisfy the minimum admission requirements of the USU School of Graduate Studies and the NFS Department, and must also achieve a score of 3 (equivalent to the 40th percentile) or higher on the newly administered GRE Written Examination. Applications will be reviewed by the MFMS Advisory Committee, which is responsible for accepting students into the MFMS program and assigning them an advisor. The advisor will then consult with the student to select two additional graduate committee members.

### **MFMS Program of Study**

The MFMS program of study has been tailored for students with undergraduate training in (1) food science or (2) microbiology or biology. Students who lack prerequisite competencies in food science, microbiology, or biology will be required to address

those deficiencies during the MFMS program of study. Course requirements to meet specific deficiencies will be designated by the student's advisory committee and, in accordance with School of Graduate Studies policy, may or may not count toward course requirements for the MFMS program of study.

The MFMS program of study, outlined below, requires a minimum of 32 semester credits, including (1) 10 semester credits of core coursework in food safety assurance, microbiology, and epidemiology; (2) at least 19 semester credits of coursework based on the student's career goals and undergraduate competencies; and (3) the written preparation and oral presentation of a substantive literature review on a food safety topic.

**MFMS Program Requirements (32 credits minimum).** Students must complete all of the following courses (15 credits): NFS 6150, 6170, 6200, 6900 (2 credits), 7800 (2 credits); Biol 6810 or 6890; and PubH 5010. During NFS 6900 (Special Problems), students will prepare a substantive written literature review of a food safety topic. NFS 7800 (Seminar) must be taken during two semesters; during the final seminar, students must make an oral presentation on the food safety topic used for their literature review.

Students with a **BS degree in Food Sciences** must demonstrate competency equivalent to a USU BS degree in Nutrition and Food Sciences with a Food Science emphasis. These students must also select a minimum of 10 credits from the following: ADVS 6400; Biol 5150 (offered biennially), 5300, 5330. The remaining credits should generally be selected from the following, although additional course substitutions may be made with approval of the student's advisory committee: NFS 6020, 6030, 6120, 6140 (offered biennially), 6210, 6500, 6510, 6600 (offered biennially), 6610; ASTE 6260; Chem 6730.

Minimum program prerequisites for students with a **BS in biology, microbiology, or an equivalent degree** include the following (the USU equivalent course is listed in parentheses): biochemistry (Chem 3700), general microbiology (Biol 3300), microbial physiology (Biol 5300), and statistics (Stat 3000). In addition, these students must complete *both* NFS 6110 and 6500, and must take *at least one* of NFS 6020 and 6030. The remaining credits should generally be selected from the following, although additional course substitutions may be made with approval of the student's advisory committee: NFS 6120, 6140 (offered biennially), 6210, 6510, 6600 (offered biennially), 6610; ADVS 6400; ASTE 6260; Biol 5150 (offered biennially); Chem 6730.

### **Master of Dietetics Administration (MDA)**

The MDA degree is a professional degree designed to provide dietitians with in-depth training in management and leadership in food and nutrition program administration. The skills emphasized in the MDA program will enhance career options and pathways for graduates. Nationwide, there is a need for professionally trained managers at local, district, state, and federal levels in food and nutrition programs, including school, university, and hospital food services; public health programs; and clinical management. This program provides expertise in financial management, human resource management, marketing, entrepreneurship, employment laws, and more.

### **MDA Admission Requirements**

Candidates for the MDA program must qualify for one of the following categories: *Option 1:* Must have completed the USU Extension Dietetics Internship; **or** *Option 2:* Must be currently registered as a dietitian with at least two years of work experi-

ence. Students seeking entry must also satisfy: (1) admission requirements of the USU School of Graduate Studies; and (2) admission requirements of the NFS Department.

The MDA Advisory Committee is responsible for reviewing applications, accepting students into the MDA program, and assigning students to an advisor.

### **MDA Program of Study**

**Option 1** is tailored for applicants who have completed the USU Extension Dietetics Internship. Students must complete a minimum of 41 credits and a Plan B thesis. The completed USU Extension Dietetics Internship provides 26 of the 41 credits. Following the internship, 15 additional credits are required including: NFS 6780, 6900 (3 credits), 6970 (2 credits), 7800 (1 credit), and two elective courses to be determined by the MDA candidate and the Advisory Committee.

**Option 2** is tailored to the registered dietitian with at least two years of work experience. A minimum of 30 credits is required for this Plan B option. Students must complete 18 credits from the NFS Department and a minimum of 6 credits each in two of the three related disciplines. These disciplines include overall management, financial management, and human resource management. Coursework will be based on the student's career goals and competencies. The following courses are required: NFS 4750, 5200, 5210, 5510, 6750, 6780, 6900 (3 credits), 6970 (2 credits), and 7800 (1 credit). The remaining courses must be selected from the following: Acct 6010; BA 3400, 6350, 6440, 6520; InsT 6490; MHR 6350, 6370, 6410, 6500, 6510, 6550, 6630, 6760.

### **MS and PhD Admission Requirements**

Candidates for graduate study in the Department of Nutrition and Food Sciences need a background in chemistry, physics, mathematics, bacteriology, and physiology. Prior coursework in food science or nutrition is desirable. If deficient in these areas, a student may be accepted with the understanding that the supervisory committee will require competence equivalent to a BS degree in nutrition and food sciences in the preliminary (MS) or comprehensive (PhD) examination.

Students must meet some departmental requirements in addition to requirements of the School of Graduate Studies. The following minimum Graduate Record Examination scores are required for admission: Verbal, 470; Quantitative, 530; Analytical, 500; and Verbal, Quantitative, and Analytical combined, 1,500.

One year of general chemistry, two semesters of organic chemistry, and math at least equivalent to college algebra must be completed before matriculation. If taken as a graduate student, these courses will not be counted as graduate credit.

Before being accepted to work toward a PhD degree, a student must have obtained an MS degree or have a manuscript reporting original research accepted for publication in a refereed journal.

Before being accepted into the department, potential graduate students must be accepted by a faculty member who is willing to add them to his or her research team.

### **MS and PhD Procedures**

Progress toward an advanced degree is outlined in the School of Graduate Studies section (pages 76-79). Students are responsible to see that all requirements are fulfilled, and should read these procedures *carefully*.

Graduate students in the Department of Nutrition and Food Sciences should complete the following steps:

**1. Choose Major Professor.** Students are accepted into the department with a temporary advisor. Although this person must guarantee, at the time of acceptance, that the student may work in his or her research program, students may choose as their major professor any faculty member who can and is willing to accommodate them.

**2. Establish Supervisory Committee.** Faculty members who may serve on the student's supervisory committee should be considered in consultation with the major professor. A minimum of three members (at least two from the department), including the major professor, must be suggested for the MS program. At least five (three or more from the department and one or more from outside the department) must be suggested for a PhD program.

When the student and major professor have agreed on the committee members, a *Supervisory Committee Assignment* form must be prepared. The department head must approve the committee and may add members. It is the student's responsibility to meet with proposed committee members to make certain they are able and willing to serve. The *Supervisory Committee Assignment* form is then forwarded to the dean of the School of Graduate Studies for final approval.

The committee should be selected and the *Supervisory Committee Assignment* form submitted to the School of Graduate Studies no later than the second semester of an MS program or the third semester of a PhD program.

**3. Select and Define Research Program.** In consultation with the major professor, the student must choose a research area suitable for the MS thesis or PhD dissertation and prepare a Thesis or Dissertation Proposal. The proposal should include the following:

- a. Title
- b. Description of the problem based on the most current literature
- c. Statement of the purpose of the intended research
- d. Research plan
- e. List of the references cited in a form acceptable for publication in a scientific journal in the student's field

**4. Define Course Schedule.** Students must decide, in consultation with their major professor, the courses they will take that will be on their Program of Study. They must fulfill the following minimum requirements for all graduate students in Nutrition and Food Sciences and take other courses to provide the background necessary to conduct their research.

- a. **Biochemistry (Chem 5700, 5710)**—3 credits required for MS; 6 credits required for PhD.
- b. **Statistics (Stat 5100, 5120, 5200, 5600)**—3 credits required for MS; 6 credits required for PhD.
- c. **Graduate-level NFS courses**—PhD students must include 3 credits from NFS 6200, 6210, 6220, 6300, 6310, 6630; and 3 credits from NFS 6020, 6030, 6110, 6560.
- d. **Additional graduate-level courses (from NFS or elsewhere)**—3 credits required for MS; 10 credits required for PhD.
- e. **Graduate Seminar (NFS 7800)**—2 credits required for MS; 4 credits required for PhD.
- f. **Graduate seminars in other departments**—1 credit required for MS; 2 credits required for PhD.

g. **Teaching experience (NFS 6900)**—2 credits required for PhD.

h. **Research (NFS 6970, 7970; assigned at discretion of the major professor)**—6-12 credits required for MS; approximately 30 credits required for PhD.

The PhD program includes 30 Master of Science credits. For more information, see the School of Graduate Studies requirements in this catalog.

**5. Meet with Supervisory Committee.** Before the first meeting of the supervisory committee, the student must complete the *Program of Study* form. A copy of the form and the research proposal should be given to each committee member several days before the meeting. The purpose of this meeting is to:

a. Secure the committee's approval of the Program of Study. Deficiencies in academic background will be discussed and plans made to resolve them.

b. Obtain the committee's approval of the research plan.

c. Discuss regulated aspects of the research (hazardous materials, experimental animals, or human subjects).

d. Allow the committee to determine the topic areas listed on the *Program of Study* form as other requirements of the program. All members of the committee and the department head must sign the *Program of Study* form before it is sent to the School of Graduate Studies.

**6. Begin Research and Continue Courses.** Students must take the approved courses and conduct the research as outlined in the approved research proposal.

**7. Take Oral Preliminary (MS) or Comprehensive (PhD) Examination.** The oral examination tests general knowledge that the student should have at this stage of academic training, as well as the student's ability to synthesize information in relation to nutrition and food science. Material to be included is determined by the committee, but emphasis is on knowledge applicable to the research.

**8. Complete Application for Candidacy Forms.** PhD candidates must submit the *Application for Candidacy* form to the School of Graduate Studies. It must be signed by all members of the committee at the end of the comprehensive examination, and then signed by the department head. This form must be received by the School of Graduate Studies at least three months before the dissertation defense.

**9. Complete Research and Write Thesis or Dissertation.**

**10. Departmental Seminar.** Each student must present a seminar in the department to report the results of his or her research. This must be done before the defense, and is typically given on the day of the defense.

**11. Final Examination (Thesis or Dissertation Defense).** When both the student and the major professor are satisfied that the thesis is editorially correct, copies are given to the members of the committee. This should be done several weeks before the examination. Students must realize that committee members will review the thesis only as their schedules permit. Students should plan adequate time for thesis review and revision before their defense, so as to meet the deadlines. The final examination is scheduled with the School of Graduate Studies. The signed appointment form must be submitted to the School of Graduate Studies at least

five days before the defense, by all committee members, verifying that they have read the thesis or dissertation and it is ready to be defended at the scheduled day and time.

The dean of the School of Graduate Studies will appoint one committee member, usually from outside the department, to serve as chair of the final examination. The School of Graduate Studies will also provide forms to be signed by the committee and returned to the School of Graduate Studies at the end of the defense.

**12. Submit Thesis or Dissertation.** After all changes suggested during the defense have been made, the thesis or dissertation is submitted to the departmental thesis reviewer, who will check to ensure that the thesis is in the correct format. The thesis or dissertation is submitted to the School of Graduate Studies for review by the thesis coordinator only after all corrections suggested by the departmental reviewer have been made.

### ***Registration Requirements for Graduate Students***

Once admitted, students are required to maintain enrollment as follows: at least 3 credits to use University facilities and receive direction (including thesis or dissertation direction) from their major professor; at least 6 credits if on a Graduate Teaching or Research Assistantship (9 credits if employed less than 15 hours per week); at least 9 credits if on a Research Fellowship or unsupported; at least 6 credits if receiving tuition waivers, student loans, or other University-administered financial aid; and no more than 6 credits if employed full time by the University.

### ***Financial Assistance***

Some teaching assistantships and research fellowships and many research assistantships are available to graduate students in the Department of Nutrition and Food Sciences. Teaching assistantships are used to cover the teaching needs of the department. Research fellowships and research assistantships are available through individual faculty members. Most research assistantships are tied to specific research projects.

The Gandhi Scholarship is available, on a competitive basis, to support outstanding students during their graduate education in food science. Each incoming student may select any advisor who fits his or her area of interest in food science. Awards are available for entering master's degree students, as well as for PhD candidates. Applications are due February 1. To obtain an application, visit the Department of Nutrition and Food Sciences website or contact the departmental staff.

### ***Career Opportunities***

There is a continuing shortage of MS and PhD graduates in nutrition and food sciences. Many MS graduates go on to obtain a PhD, but all graduates have a wide choice of career opportunities.

### ***Additional Information***

Additional information and updates may be obtained by writing or telephoning the Department of Nutrition and Food Sciences directly or by checking out the departmental website at: <http://www.usu.edu/famlife/nfs/index.html>.

Graduation requirements described in this catalog are subject to change. Students should check with the Department of Nutrition and Food Sciences concerning possible changes.

## *Nutrition and Food Sciences Courses (NFS)*

**NFS 1000. World of Food and Nutrition.** Weekly seminars present and discuss current issues in food, diet, and health. Presentations about food safety and regulations, food processing, and food technologies, with orientation to programs in the Department of Nutrition and Food Sciences. (1 cr) (F)

**NFS 1020 (BLS). Science and Application of Human Nutrition.** Role of dietary choices in providing nutrients and their relationship to the social, mental, and physical well-being of people. How to evaluate nutritional status. Influences on nutrient needs throughout life. (3 cr) (F,Sp,Su)

**NFS 1050. Food Safety Manager Certification.** Covers food safety information required by the Utah Food Safety Manager Certification Act. Includes role of food handlers in controlling food-borne disease, time-temperature, employee hygiene, sanitation methods, preventing contamination from time of purchase to time of serving, food service facilities/equipment, and HACCP. (0.5 cr) (F,Sp,Su)

**NFS 1240. Culinary Basics.** Develops fundamental skills specific to culinary arts. Investigates principles of ingredients and preparation methods. Practice provided in knife skills and cooking methods. Explores the effects of cooking on food quality. (3 cr) (F,Sp,Su)

**NFS 1250. Sanitation and Safety.** Principles of sanitation and safety applied to food operations. Emphasizes personal hygiene habits and food handling practices that protect the health and safety of employees and consumers. (3 cr) (Sp,Su)

**NFS 2020. Nutrition Throughout the Life Cycle.** Application of nutrition principles to the human life cycle: nutrient functions, needs, sources, and alterations during pregnancy, lactation, growth, development, maturation, and aging. Prerequisite: NFS 1020. (3 cr) (Sp)

**NFS 2030. Catering.** Provides skills and knowledge needed for preparing food. Analysis of the preparation of food and beverages for banquet and catering functions. Prerequisites: NFS 1240 and 1250. (3 cr) (F)

**NFS 2050. Ala Carte.** Provides skills and knowledge necessary to apply principles of basic food preparation and service in a restaurant setting. Prerequisites: NFS 1240, 1250, and 2030. (3 cr) (Sp)

**NFS 3000. Beginning Baking.** Introduction to theories and techniques of baking. Focuses on yeast dough production and basic desserts. Prerequisites: NFS 1240, 2030, 2050. (4 cr) (Sp)

**NFS 3020. Nutrition Related to Fitness and Sport.** Includes information on macro/micronutrient metabolism during exercise, specific problems experienced by athletes or highly active persons, myths, ergogenic aids, and current interests. Prerequisite: NFS 1020. (2 cr) (F)

**NFS 3030. Advanced Baking.** Focuses on pastry, advanced dessert preparation and presentation, and related topics. Prerequisite: NFS 3000. (4 cr) (Sp)

**NFS 3060. Garde-Manger.** Emphasizes cold food preparation, presentation techniques, food displays, and meat fabrication. Prerequisite: NFS 2050. (4 cr) (F)

**NFS 3100 (QI). Sensory Evaluation of Food.** Design and implementation of sensory testing of foods. Emphasizes physiology of senses, testing methods, statistical analysis, and taste panel experience. Prerequisite: Stat 3000. (3 cr) (Sp)

**NFS 3110 (DSC). Food, Technology, and Health.** Impact of food technology on food spoilage, food preservation, food quality, and foodborne diseases. Basic processing operations and regulations ensuring a safe food supply. Prerequisite: NFS 1020. (3 cr) (F)

**NFS 3250. Occupational Experience in Nutrition and Food Sciences.** On-the-job training. (1-3 cr) (F,Sp,Su) ®

**NFS 3500. Beverage Management.** Studies in selection and service of beverages for the food service industry. Issues addressed include equipping, staffing, operating, marketing, and purchasing beverages. Addresses issues of responsible alcohol service. (2 cr) (F)

**NFS 3510. The Business of Feeding.** Covers menu design, procurement, and starting the business. (3 cr) (Sp)

**NFS 4020. Advanced Nutrition.** Structures, properties, and metabolism of protein, lipids, carbohydrates, vitamins, and minerals. Includes digestion, absorption, hormonal control, cellular biochemistry, metabolic interrelationships, excretion, etc. Prerequisites: NFS 1020, Chem 3700, Biol 2000. (3 cr) (F)

**NFS 4030. Advanced Nutrition Applications.** Applications of metabolism of protein, lipids, carbohydrates, vitamins, and minerals. Must be taken concurrently with NFS 4020. (1 cr) (F)

**NFS 4050 (CI). Education and Counseling Methods in Dietetics I.** Principles of education, counseling, and communication as applied to the field of nutrition education and clinical dietetics practice. Prerequisite: Junior level in Coordinated or Didactic Program in Dietetics. (2 cr) (F)

**NFS 4060 (CI). Education and Counseling Methods in Dietetics II.** Continuation of NFS 4050. Prerequisite: NFS 4050. (2 cr) (Sp)

**NFS 4070. Experimental Foods.** Science principles underlying modern food theory and practice. Relation of physical and chemical properties of food components and their systems to food preparation. Prerequisite: Chem 1120 or 2300. (4 cr) (Sp)

**NFS 4250. Culinary Skills and Management Rotation.** Internship experience in various food service settings. Specific locations and durations to be arranged by instructor. Prerequisite: Junior standing. (3-6 cr) (F,Sp,Su)

**NFS 4420. Nutrition Research Methodology.** Development of experimental design, data collection, statistical analysis, interpretation, and presentation of results. Clinical, community, and management data analysis. Interpretation and presentation, including bench marking, cost/benefit analysis, and continuous quality improvement projects. Enrollment limited to seniors within the Nutrition and Food Sciences major. Prerequisites: Stat 1040, Math 1050. (2 cr) (Sp)

**NFS 4440 (QI). Fundamentals of Food Engineering.** Engineering concepts taught in a fundamental sense and applied to food processing. Concepts include: general problem solving techniques, material and energy balances, fluid dynamics, heat transfer, refrigeration, and kinetics of common biological processes used in food preparation. Prerequisite: Phys 2110. (4 cr) (F)

**NFS 4480. Community Nutrition.** Introduction to public health nutrition, food programs, and national nutrition monitoring. (3 cr) (F)

**NFS 4540. Nutrition Assessment.** Introduction to the profession of dietetics, assessment of nutritional status, and provision of nutritional care. Prerequisite: Acceptance into dietetics program or junior standing in nutrition science. (3 cr) (F)

**NFS 4550. Clinical Nutrition I.** Biochemical and physiological abnormalities in disease. Medical treatment of disease. Role of medical nutrition therapy. Prerequisites: Acceptance into Coordinated Program in Dietetics or junior standing in Didactic Program, nutrition science, or public health nutrition; Chem 3700. (2 cr) (F)

**NFS 4560 (CI). Clinical Nutrition II.** Continuation of NFS 4550. Prerequisite: NFS 4550. (4 cr) (Sp)

**NFS 4570. Clinical Nutrition Experience I.** Practical experience in health care facilities. Integration and application of material learned in NFS 4550. To be taken

concurrently with NFS 4550. Prerequisite: Acceptance into Coordinated Program in Dietetics. (1 cr) (F)

**NFS 4580. Clinical Nutrition Experience II.** Continuation of NFS 4570. To be taken concurrently with NFS 4560. Prerequisite: NFS 4570. (2 cr) (Sp)

**NFS 4660 (CI). Medical Dietetics.** In-depth study of nutrition relationships in disease development and treatment with clinical experience in medical facilities in Salt Lake City. Prerequisites: NFS 4540, 4550, 4560, 4570, 4580. (12 cr) (F)

**NFS 4710. Quantity Food Preparation.** Principles of food preparation applied to large quantity production, menu planning, food selection, storage, and equipment. Prerequisite: NFS 4070 or consent of instructor. (2 cr) (F)

**NFS 4720. Food Service Organization and Management.** Principles of organization, management theory, financial controls, human and labor relations, employee training, layout, and sanitation. Prerequisite: NFS 4710 or senior-level standing in CA/FSM Program. (2 cr) (Sp)

**NFS 4730. Quantity Food Preparation Lab.** Practical experience in quantity food preparation. Integration and application of NFS 4710. To be taken concurrently with NFS 4710. Prerequisites: NFS 1240 and acceptance into Coordinated Program in Dietetics. (2 cr) (F)

**NFS 4740. Food Service Organization and Management Lab.** Practical experience in food service management. Integration and application of NFS 4720. To be taken concurrently with NFS 4720. Prerequisite: Acceptance into Coordinated Program in Dietetics. (2 cr) (Sp)

**NFS 4750. Management of Dietetics.** Principles of management in dietetics and current practice issues. Prerequisite: NFS 4660. (3 cr) (Sp)

**NFS 4780 (CI). Maternal and Child Nutrition.** Normal and clinical nutritional requirements in pregnancy, lactation, and pediatrics. To be taken in Salt Lake City in conjunction with NFS 4660. (3-4 cr) (F)

**NFS 4810. History and Practices in World Cuisines.** Preparation of foods from around the world, incorporating historical and current food trends. Prerequisites: NFS 3030 and 3060. (4 cr) (Sp)

**NFS 4900. Special Problems.** Individual problems and research problems for upper-division students in Nutrition and Food Sciences. (1-4 cr) (F,Sp,Su)

**NFS 4990. Nutrition and Food Sciences Seminar.** Senior student paper and presentation on current topics in nutrition and food sciences. Prerequisite: Senior in NFS. (1 cr) (Sp)

**NFS 5020 (d6020).<sup>1</sup> Meat Technology and Processing.** Emphasizes understanding the conversion of muscle to meat, fabrication of carcasses into primal and retail cuts, and principles underlying manufacture of processed meats. (4 cr) (F)

**NFS 5030 (d6030). Dairy Technology and Processing.** Processing milk into fluid milk products, cheeses, ice cream, yogurt, concentrated milks, and powders. Identity standards of regulated dairy products. Physical, chemical, and biochemical changes that occur during manufacture and storage. Microbiological, chemical, and physical deterioration and control. (4 cr) (F)

**NFS 5110 (CI) (d6110). Food Microbiology.** Microorganisms in food spoilage, poisoning, preservation, and sanitation. Prerequisite: Biol 3300. (4 cr) (Sp)

**NFS 5120 (QI) (d6120). Biologic Markers of Diet and Disease Risk Lab.** Measurement and interpretation of biologic markers of nutritional status and disease risk. Markers measured in a variety of human tissues. Prerequisites: NFS 1020, Biol 2000, Chem 3700, Math 1210, and Stat 2000. (2 cr) (Sp)

**NFS 5160. Methods in Biotechnology: Cell Culture.** Techniques and fundamental knowledge for culturing mammalian and insect cells. Students will learn maintenance, growing, genetic engineering of cells, cytotoxicity, hybridoma creation, cloning, etc. Extensive laboratory experience is provided. Also taught as ADVS 5160, Biol 5160, Chem 5160, and PSB 5160. (3 cr) (Sp)

**NFS 5200 (d6200). Nutritional Epidemiology.** Introduction to epidemiologic methods and their application to the study of nutrition, human health, and disease. Useful for students with career interests in nutrition, food sciences, dietetics, human health sciences, veterinary sciences, biology, public health, anthropology, social work, and public policy. Prerequisites: Stat 1040, NFS 1020. (2 cr) (Sp)

**NFS 5210 (d6210). Public Health Nutrition.** Effects of diet on development and prevention of disease. Conditions of public health significance, including birth defects, coronary heart disease, hypertension, stroke, Alzheimer's disease and other causes of dementia, cancer, osteoporosis, diabetes, and international health problems. Discussion of health concerns of minority populations, cross-cultural studies, government policy, and establishment of dietary recommendations. Prerequisites: Stat 1040, NFS 1020. (2 cr) (Sp)

**NFS 5220 (d6220). Endocrine Aspects of Nutrition.** Provides physiological background into hormones involved in nutrient regulation, as well as mechanisms of hormone action at the cellular and molecular levels. Includes action of steroids in the nucleus and membrane-based signal transduction pathways. Course includes lectures and literature reviews/presentations. Prerequisites: Chem 3700 and NFS 4020, or consent of instructor. (2 cr) (F)

**NFS 5240. Methods in Biotechnology: Protein Purification Techniques.** Reviews basic methods of protein purification, including scaled-up use of 100L fermenter, large-scale centrifugation, diafiltration, chromatography, and use of BioCAD. Prerequisite: Chem 3700. Also taught as ADVS 5240, Biol 5240, Chem 5240, and PSB 5240. (3 cr) (Sp)

**NFS 5250. Occupational Experiences in Nutrition and Food Sciences.** On-the-job training. (1-3 cr) (F,Sp,Su) ®

**NFS 5260. Methods in Biotechnology: Molecular Cloning.** Laboratory-oriented course designed to teach molecular biology techniques such as DNA cloning, genetic probes, polymerase chain reaction, and DNA sequencing. Prerequisite: Chem 3700 or 5710; or Biol 3200; or permission of instructor. Also taught as ADVS 5260, Biol 5260, Chem 5260, and PSB 5260. (3 cr)

**NFS 5300 (d6300). Advanced Micronutrient Nutrition.** Evolution of micronutrient and application in human health and disease. Prerequisite: NFS 4020. (3 cr) (Sp)

**NFS 5310 (d6310). Molecular Methods in Nutrition Science.** Theory of modern techniques used to study macromolecules and ions. Prerequisite: Chem 3700. (2 cr) (Sp)

**\*\*NFS 5400. Nutrition Update: Present Knowledge.** Enriches and updates knowledge of nutrition, as well as implications for well-being of people, through presentation of recent advances in nutrition accomplished by worldwide research efforts of scientists from academia, government, and industry. Available only through Continuing Education Independent Study Division. (2 cr) ©

**NFS 5500 (QI) (d6500). Food Analysis.** Application and theory of physical, chemical, and instrumental techniques for determination of composition and quality of food. Prerequisite: NFS 5560/6560. (4 cr) (Sp)

**NFS 5510 (d6510). Food Laws and Regulations.** Provides background of federal/state laws and regulations and case law history affecting food production, processing, packaging, marketing, and distribution of food products. (2 cr) (Sp)

**NFS 5560 (d6560). Food Chemistry.** Chemical structure, properties, and reactions and interactions of the important chemical constituents of food. Prerequisites: Chem 3700 and 3710. (4 cr) (F)

**NFS 5610 (d6610). Food and Bioprocess Engineering.** Standardization and compounding of biomaterials and food products; preservation processing using heat, refrigeration, concentration, and dehydration. Basic unit operations in the bioprocessing industry. Prerequisite: BIE 3200. Also taught as BIE 5610/6610. (3 cr) (F)

**\*\*NFS 5630 (d6630). Nutrition in Aging.** Theories of aging and nutrition, as affected by physiologic and metabolic changes. Nutritional requirements and assessment of elderly persons. Implications for nutritional programs, policies, research, and education. Prerequisites: NFS 1020, 2020, Chem 3700. (2 cr) (Sp)

**NFS 5750 (d6750). Advanced Dietetics Practicum.** Advanced dietetics practicum in clinical nutrition, community nutrition, food service management, or research. Prerequisite: NFS 4660 or RD. (1-6 cr) (F,Sp,Su)

**NFS 5760. Senior Practicum in Culinary Arts/Food Service Management.** Practical experience in food service settings, integrating and applying material learned in lectures and laboratories. (2 cr) (F,Sp) ©

**NFS 5920 (CI). Food Product Development.** Capstone course that incorporates and unifies the principles of food chemistry, microbiology, engineering, processing, nutrition, sensory analysis, and statistics. Prerequisite: Senior standing. (3 cr) (F)

**NFS 6020 (d5020). Meat Technology and Processing.** Emphasizes understanding the conversion of muscle to meat, fabrication of carcasses into primal and retail cuts, and principles underlying manufacture of processed meats. (4 cr) (F)

**NFS 6030 (d5030). Dairy Technology and Processing.** Processing milk into fluid milk products, cheeses, ice cream, yogurt, concentrated milks, and powders. Identity standards of regulated dairy products. Physical, chemical, and biochemical changes that occur during manufacture and storage. Microbiological, chemical, and physical deterioration and control. (4 cr) (F)

**NFS 6050. Community Public Health Internship I.** Supervised school nutrition education internship in elementary and secondary public schools developing child nutrition programs. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (3 cr) (F,Sp,Su)

**NFS 6060. Community Public Health Internship II.** Supervised public health nutrition internship with state and district supplemental food program for women, infants, and children. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (3 cr) (F,Sp,Su)

**NFS 6100. Sensory Evaluation of Foods.** Methods and practice in the sensory evaluation of foods. Testing facilities/environment, statistical design, testing method selection, and data interpretation. Prerequisite: Stat 3000 or permission of instructor. (3 cr) (Sp)

**NFS 6110 (d5110). Food Microbiology.** Microorganisms in food spoilage, poisoning, preservation, and sanitation. Prerequisite: Biol 3300. (4 cr) (Sp)

**NFS 6120 (d5120). Biologic Markers of Diet and Disease Risk Lab.** Measurement and interpretation of biologic markers of nutritional status and disease risk. Markers measured in a variety of human tissues. Prerequisites: NFS 1020, Biol 2000, Chem 3700, Math 1210, and Stat 2000. (2 cr) (Sp)

**NFS 6140. Biotechnology of Lactic Starter Cultures.** Examination of genetics and microbiology of lactic starter cultures, emphasizing application of biotechnology in strain improvement and design. Prerequisites: Biol 3300, Chem 5700. (2 cr) (Sp)

**NFS 6150. Microbiology of Minimally Processed Foods.** Examines the microbiology of raw foods, rapid microbial detection procedures, and current methods for improving safety and shelf-life in minimally processed foods. Prerequisite: Biol 3300 or equivalent. (3 cr) (F)

**\*NFS 6170. Principles of Food Safety Assurance.** Explores prerequisite programs for HACCP, HACCP implementation, and food safety considerations in new product development. Prerequisite: Biol 3300 or equivalent. (2 cr) (F)

**NFS 6200 (d5200). Nutritional Epidemiology.** Introduction to epidemiologic methods and their application to the study of nutrition, human health, and disease. Useful for students with career interests in nutrition, food sciences, dietetics, human health sciences, veterinary sciences, biology, public health, anthropology, social work, and public policy. Prerequisites: Stat 1040, NFS 1020. (2 cr) (Sp)

**NFS 6210 (d5210). Public Health Nutrition.** Effects of diet on development and prevention of disease. Conditions of public health significance, including birth defects, coronary heart disease, hypertension, stroke, Alzheimer's disease and other causes of dementia, cancer, osteoporosis, diabetes, and international health problems. Discussion of health concerns of minority populations, cross-cultural studies, government policy, and establishment of dietary recommendations. Prerequisites: Stat 1040, NFS 1020. (2 cr) (Sp)

**NFS 6220 (d5220). Endocrine Aspects of Nutrition.** Provides physiological background into hormones involved in nutrient regulation, as well as mechanisms of hormone action at the cellular and molecular levels. Includes action of steroids in the nucleus and membrane-based signal transduction pathways. Course includes lectures and literature reviews/presentations. Prerequisites: Chem 3700 and NFS 4020, or consent of instructor. (2 cr) (F)

**NFS 6250. Clinical Nutrition Internship I.** Supervised clinical nutrition experience including medical, geriatric, long-term care, and oncology. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (4 cr) (F,Sp,Su)

**NFS 6260. Clinical Nutrition Internship II.** Supervised clinical nutrition experience including nutrition support, renal, pediatrics, intensive care units, outpatient care, and clinical staff experience. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (4 cr) (F,Sp,Su)

**NFS 6300 (d5300). Advanced Micronutrient Nutrition.** Evolution of micronutrient and application in human health and disease. Prerequisite: NFS 4020. (3 cr) (Sp)

**NFS 6310 (d5310). Molecular Methods in Nutrition Science.** Theory of modern techniques used to study macromolecules and ions. Prerequisite: Chem 3700. (2 cr) (Sp)

**NFS 6350. Food Service Systems Management Internship I.** Supervised school food service internship at Davis School District nutrition services central facility. Includes purchasing, inventory control, food service, and food production. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (6 cr) (F,Sp,Su)

**NFS 6360. Food Service Systems Management Internship II.** Supervised school food service internship at Davis School District nutrition services central facility. Includes administration and food service staff supervision experience. Prerequisite: Acceptance into USU Extension Dietetic Internship Program. (6 cr) (F,Sp,Su)

**NFS 6450. Meat Science.** Structure of muscle tissue, chemistry of contraction and relaxation, factors affecting meat tenderness, and postmortem changes and their effect on meat quality. Prerequisite: Chem 3700. (3 cr) (Su)

**NFS 6500 (d5500). Food Analysis.** Application and theory of physical, chemical, and instrumental techniques for determination of composition and quality of food. Prerequisite: NFS 6560/5560. (4 cr) (Sp)

**NFS 6510 (d5510). Food Laws and Regulations.** Provides background of federal/state laws and regulations and case law history affecting food production, processing, packaging, marketing, and distribution of food products. (2 cr) (Sp)

**NFS 6560 (d5560). Food Chemistry.** Chemical structure, properties, and reactions and interactions of the important chemical constituents of food. Prerequisites: Chem 3700 and 3710. (4 cr) (F)

**\*NFS 6600. Food Proteins and Enzymes.** Protein structure, folding, and purification; enzyme classification and nomenclature; reaction kinetics; and immobilization technology as applicable to food science. (3 cr) (F)

**NFS 6610 (d5610). Food and Bioprocess Engineering.** Standardization and compounding of biomaterials and food products; preservation processing using heat, refrigeration, concentration, and dehydration. Basic unit operations in the bioprocessing industry. Prerequisite: BIE 3200. Also taught as BIE 6610/5610. (3 cr) (F)

**\*\*NFS 6630 (d5630). Nutrition in Aging.** Theories of aging and nutrition, as affected by physiologic and metabolic changes. Nutritional requirements and assessment of elderly persons. Implications for nutritional programs, policies, research, and education. Prerequisites: NFS 1020, 2020, Chem 3700. (2 cr) (Sp)

**NFS 6750 (d5750). Advanced Dietetics Practicum.** Advanced dietetics practicum in clinical nutrition, community nutrition, food service management, or research. Prerequisite: NFS 4660 or RD. (1-6 cr) (F,Sp,Su)

**NFS 6760. Special Topics in Food Science.** Selected topics in food science, based on individual faculty interests. (1-3 cr) (F,Sp,Su)

**NFS 6770 (d7770). Special Topics in Nutrition.** Study of selected topics in nutrition, including reports on current advances and presentation of nutrition support topics (case studies) developed through research. (2 cr) (F,Sp)

**NFS 6780. Advanced Institutional Food Service Management.** Principles of management applied to institutional food services and advanced professional certification curriculum. To enroll, student must be an MS candidate in dietetics or be eligible to take the national SFNS (School Food and Nutrition Service) exam. (3 cr) (Sp)

**NFS 6900. Special Problems.** Individual problems and research problems for upper-division students in Nutrition and Food Sciences. (1-4 cr) (F,Sp,Su)

**NFS 6970. Thesis Research.** For students working on MS research. (1-12 cr) (F,Sp,Su) ®

**NFS 6990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

**\*\*NFS 7700. Dairy Chemistry.** Chemical structure, properties, biosynthesis, and reactions of the main constituents in milk. Application of this knowledge in the development and processing of foods. (2 cr) (F)

**NFS 7770 (d6770). Special Topics in Nutrition.** Study of selected topics in nutrition, including reports on current advances and presentation of nutrition support topics (case studies) developed through research. (2 cr) (F,Sp)

**NFS 7800. Seminar.** Reports and discussion on research and current literature. (1 cr) (F,Sp) ®

**NFS 7970. Dissertation Research.** For students working on PhD research. (1-12 cr) (F,Sp,Su) ®

**NFS 7990. Continuing Graduate Advisement.** (1-12 cr) (F,Sp,Su) ®

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<sup>1</sup>Parenthetical numbers preceded by *d* indicate a *dual* listing.

® Repeatable for credit. Check with major department for limitations on number of credits that can be counted for graduation.

© This course is also offered by correspondence through Continuing Education Independent and Distance Education.

\*Taught 2002-2003.

\*\*Taught 2003-2004.