Nutrition, Dietetics, and Food Science
Brigham Young University

Graduate Student Handbook
Academic Year: 2015-2016
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</tr>
</tbody>
</table>
WELCOME

Welcome to the Department of Nutrition, Dietetics and Food Science! We look forward to working with you and hope you find your graduate studies in the Department meaningful and productive. This handbook outlines Departmental and University policies, procedures, and expectations for graduate students. These policies and procedures conform to those of the Office of Graduate Studies at BYU as outlined in the Brigham Young University Bulletin, Graduate Catalog (http://www.byu.edu/gradstudies/catalog/) and to the Brigham Young University Graduate Studies Policies and Procedures (http://www.byu.edu/gradstudies/). Please refer to these online resources to better understand your responsibilities and the expectations for you during your graduate studies at BYU.

Michael L. Dunn
Department Chair

Susan Fullmer
Graduate Coordinator

Melanie S. Peine
Graduate Secretary
GENERAL INFORMATION

Principles of Graduate Education at BYU

A few fundamental principles characterize all strong graduate programs and emerge from and complement *The Mission of Brigham Young University* and *The Aims of a BYU Education*. These principles are listed below.

1. *Mastery of the subject matter*. Graduate education facilitates mastery over the content and skills of the discipline at a level appropriate to the degree sought.

2. *Critical thinking*. Graduate education develops and refines critical thinking skills, including a thorough knowledge of the assumptions of the discipline and an understanding of viable alternative assumptions.

3. *Theoretical understanding*. Graduate education provides an understanding of the theoretical bases of the field of study. It grounds application and performance in theory.

4. *Proficiency in research and/or creative activities*. Graduate education develops proficiencies that advance the knowledge and activities of the discipline. These proficiencies include good writing skills, as well as the ability to present original insights and creative expressions.

5. *Spiritual discernment and moral integrity*. Graduate education facilitates the growth of integrity and wisdom and the integration of faith into the pursuit of knowledge within the discipline.

6. *Service orientation*. Graduate education instills responsibility to return the special benefits of graduate training to the larger community.

7. *Wide representation of perspectives*. Graduate education presents an intellectually and culturally rich encounter with the discipline. Study and inquiry are conducted in a context sensitive to ethnic and cultural diversity.

Although the implementation of these principles is primarily the responsibility of departments and colleges, the university Graduate Council and the Dean of Graduate Studies provide guidance and support.
The Mission of Brigham Young University

The mission of Brigham Young University—founded, supported, and guided by The Church of Jesus Christ of Latter-day Saints—is to assist individuals in their quest for perfection and eternal life.

Mission of Graduate Studies

The mission of Graduate Studies at Brigham Young University is to contribute to the mission of Brigham Young University and The Church of Jesus Christ of Latter-day Saints by producing future generations of scholars and practitioners who will pursue truth in humility, expand the frontiers of knowledge, and lift and inspire others around the globe. Through advanced systematic study characterized by depth in knowledge, understanding, inquiry, and discovery, we seek to create a rich learning environment that integrates spiritual knowledge with secular insights.

Mission of the Department of Nutrition, Dietetics and Food Science

The mission of the Brigham Young University Department of Nutrition, Dietetics and Food Science is to educate students and advance truth and knowledge in the disciplines of nutritional science, dietetics, and food science, thus preparing individuals to make meaningful contributions to their respective professions and to be informed and productive citizens of their family, community, and nation.
Admission in the NDFS Graduate Programs

Applications for admission to the graduate program in Food Science or Nutritional Science should be submitted to the BYU Office of Graduate Studies. Applications must be submitted online (http://www.byu.edu/gradstudies/admissions/applications/onlineapp.html). Incomplete applications might not be considered.

Applicants must have at least a 3.2 grade-point average from an accredited university in the United States, or a comprehensive grade-point average of 3.2 from an equivalent university outside of the United States.

Applicants must have taken the Graduate Record Examination (GRE). The department requires a minimum GRE score of 300 for the combined Quantitative and Verbal Reasoning Tests and a 4.0 on the Analytical Writing Test. If a standardized test (GMAT, for example) is used in place of the GRE, then the applicant should score at or above the 57th percentile for that test. GRE test scores are valid for five years.

All applicants whose native language is not English and who have not received a four-year bachelor’s degree from an accredited university in the United States, or the equivalent from a university in an English-speaking country exempt from the English proficiency test requirement, are required to submit official IELTS or TOEFL test scores to be considered for admission. Applicants must receive a total band score of at least 7.0 on the IELTS (with a minimum band score of 6.0 on each module); at least 237 on the computer-based TOEFL test (580 if paperbased); or at least 85 on the TOEFL iBT (with a minimum score of 22 in the Speaking section and a minimum score of 21 in other sections). Completed application forms, TOEFL or IELTS examination results, letters of recommendation, and all other supporting documents must be submitted to the Office of Graduate Studies by the following deadlines:

<table>
<thead>
<tr>
<th>Enrollment for</th>
<th>Application Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>February 1</td>
</tr>
<tr>
<td>Winter Semester</td>
<td>June 30</td>
</tr>
</tbody>
</table>
Current status of applications may be verified on-line. When all forms and supporting materials have been received and the application is complete, the Office of Graduate Studies forwards the application to the Department of Nutrition, Dietetics and Food Science for consideration by the department graduate faculty. Decisions of the graduate faculty regarding admission are communicated to the Office of Graduate Studies, who formally notifies applicants of their acceptance or denial.
Graduate Programs

In the Department of Nutrition, Dietetics and Food Science students may earn a Master of Science degree in Food Science or a Master of Science degree in Nutritional Science. Prerequisite, required, and elective courses for each degree are listed on the following pages. Both programs have a thesis requirement. Thesis projects and supporting course work are chosen by students in consultation with their advisors. Programs are tailored by the student and advisor to emphasize areas of interest to them.

The following pages list the prerequisites and core requirements for each program. Additional courses are selected in consultation with the adviser to support and complement the student’s thesis research. For an M.S. degree, a minimum of 30 credit hours is required. No more than 6 hours of Thesis credits (NDFS 699R) may be used in meeting the graduate credit requirements. At least 21 hours must be taken in 500 or 600 level classes. Up to 10 credit hours of 300, 400, or 500 level courses taken the last semester of the Senior year may be applied to meet graduate requirements if they were not required for the B.S. degree. Classes taken at the 100 or 200 level do not apply toward graduate credit hour requirements. Minors in other departments are arranged with those departments and with consent of the advisor.
Food Science Master’s Degree Program

**Prerequisite:** Incoming students should have an undergraduate degree in food science or closely related field. At BYU, requirements for a B.S. degree in food science include the following:

<table>
<thead>
<tr>
<th>Taught</th>
<th>Hour</th>
<th>Course Number</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>F W Sp</td>
<td>3.0</td>
<td>NDFS 250</td>
<td>Essentials of Food Science</td>
</tr>
<tr>
<td>F W Sp</td>
<td>1.0</td>
<td>NDFS 251</td>
<td>Essentials of Food Science Lab</td>
</tr>
<tr>
<td>W</td>
<td>4.0</td>
<td>NDFS 350</td>
<td>Food Analysis</td>
</tr>
<tr>
<td>W</td>
<td>4.0</td>
<td>NDFS 355</td>
<td>Food Process Engineering</td>
</tr>
<tr>
<td>F</td>
<td>3.0</td>
<td>NDFS 361</td>
<td>Food Microbiology</td>
</tr>
<tr>
<td>F</td>
<td>2.0</td>
<td>NDFS 362</td>
<td>Food Commodity Processing</td>
</tr>
<tr>
<td>F</td>
<td>3.0</td>
<td>NDFS 450</td>
<td>Food Chemistry</td>
</tr>
<tr>
<td>F</td>
<td>3.0</td>
<td>NDFS 462</td>
<td>Food Regulations and QA</td>
</tr>
<tr>
<td>W</td>
<td>1.0</td>
<td>NDFS 464</td>
<td>Food Sensory Evaluation</td>
</tr>
<tr>
<td>W</td>
<td>3.0</td>
<td>NDFS 465</td>
<td>New Food Product Development</td>
</tr>
<tr>
<td>F W Sp</td>
<td>3.0</td>
<td>Stat 121</td>
<td>Principles of Statistics</td>
</tr>
<tr>
<td>F W Sp</td>
<td>3.0</td>
<td>Chem 481</td>
<td>Biochemistry</td>
</tr>
</tbody>
</table>

**Requirements:** The following is the core required course work for an M.S. in Food Science.

<table>
<thead>
<tr>
<th>Taught</th>
<th>Hour</th>
<th>Course Number</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Su (even)</td>
<td>3.0</td>
<td>NDFS 652</td>
<td>Carbohydrates and Their Reactions in Food</td>
</tr>
<tr>
<td>Sp (even)</td>
<td>3.0</td>
<td>NDFS 654</td>
<td>Proteins and Their Reactions in Foods</td>
</tr>
<tr>
<td>Sp (odd)</td>
<td>3.0</td>
<td>NDFS 656</td>
<td>Food Lipids and Their Reactions in Foods</td>
</tr>
<tr>
<td>F W</td>
<td>2.0</td>
<td>NDFS 691R</td>
<td>Seminar (Register for 1 credit during semesters when presentations are made)</td>
</tr>
<tr>
<td>F W Sp Su</td>
<td>6.0</td>
<td>NDFS 699R</td>
<td>Master’s Thesis</td>
</tr>
<tr>
<td>F W Sp</td>
<td>3.0</td>
<td>Stat 511</td>
<td>Stat Meth Research 1</td>
</tr>
</tbody>
</table>

**Elective Recommendations**
The following are examples of electives that may be chosen to support and complement major courses. Elective classes should be selected in consultation with the adviser.

<table>
<thead>
<tr>
<th>Taught</th>
<th>Hour</th>
<th>Course Number</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>F W</td>
<td>3.0</td>
<td>Chem 461</td>
<td>Physical Chemistry (Prereq: Chem 223 or 227, Phscs 121 + 123)</td>
</tr>
<tr>
<td>F W</td>
<td>3.0</td>
<td>Biol 580</td>
<td>Scanning Electron Microscopy</td>
</tr>
</tbody>
</table>
Food Science M.S. Learning Outcomes

Program Purpose: The Food Science Master’s Program develops informed and productive advanced scientists who utilize multiple disciplines to study food, making meaningful contributions to the food industry and helping people throughout the world. Food science addresses the conversion of raw food commodities into nutritious, convenient and economical products readily available to consumers. Graduates of the Food Science Master’s Program are prepared for ample, well-paid employment opportunities in the food industry as well as acceptance into professional schools, including the health professions, business and law, and doctoral programs in food science or related fields.

Expected Learning Outcomes

- Food science fundamentals and area specialization
- Effective literature review and analysis
- Research design and reporting

Evidence of Learning

Direct Measures
1. Theses, published research article and abstract at scientific presentations.
2. Prospectus and seminar presentations on research.
3. Record of performance on an oral coursework examination.

Indirect Measures
1. Post graduate alumni survey.
2. Graduating students exit survey.
3. Job placement data for graduates seeking employment.
4. Acceptance into Ph.D. programs and professional schools.
Nutritional Science Master’s Degree Program

**Prerequisite:** Incoming students should have an undergraduate degree in nutritional science, dietetics, biochemistry, or other closely related field. The following courses are required before beginning graduate level courses. Prerequisite courses do not count towards the 30 credit hours on the study list.

<table>
<thead>
<tr>
<th>Taught</th>
<th>Hour</th>
<th>Course Number</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>2.0</td>
<td>NDFS 424</td>
<td>Nutrition Through the Life Cycle</td>
</tr>
<tr>
<td>F W</td>
<td>4.0</td>
<td>NDFS 435</td>
<td>Nutritional Biochemistry</td>
</tr>
<tr>
<td>F W Sp Su</td>
<td>3.0</td>
<td>Stat 121</td>
<td>Principles of Statistics</td>
</tr>
<tr>
<td>F W Sp</td>
<td>3.0</td>
<td>Chem 481</td>
<td>Biochemistry</td>
</tr>
</tbody>
</table>

**Requirements:** The following is the core required course work for an M.S. in Nutritional Science.

<table>
<thead>
<tr>
<th>Taught</th>
<th>Hour</th>
<th>Course Number</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>3.0</td>
<td>NDFS 601</td>
<td>Advanced Human Nutrition 1</td>
</tr>
<tr>
<td>W</td>
<td>3.0</td>
<td>NDFS 602</td>
<td>Advanced Human Nutrition 2</td>
</tr>
<tr>
<td>F W</td>
<td>2.0</td>
<td>NDFS 691R</td>
<td>Seminar (Register for 1 credit during semesters when presentations are made)</td>
</tr>
<tr>
<td>F W Sp Su</td>
<td>6.0</td>
<td>NDFS 699R</td>
<td>Master’s Thesis</td>
</tr>
<tr>
<td>F W Sp</td>
<td>3.0</td>
<td>Stat 511</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

**Elective Recommendations** (For students who have not completed NDFS 435 or an equivalent, NDFS 435 is required, plus one other elective. For all other graduate students, one elective from the list below is required)

<table>
<thead>
<tr>
<th>Taught</th>
<th>Hour</th>
<th>Course Number</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>F, W</td>
<td>4.0</td>
<td>NDFS 435</td>
<td>Nutritional Biochemistry</td>
</tr>
<tr>
<td>W</td>
<td>2.0</td>
<td>NDFS 424</td>
<td>Nutrition Through the Lifecycle</td>
</tr>
<tr>
<td>F</td>
<td>2.0</td>
<td>NDFS 521 or 522*</td>
<td>Clinical Practice in Dietetics; Food Systems Management Practice in Dietetics</td>
</tr>
<tr>
<td>TBD</td>
<td>1-2</td>
<td>NDFS 631R</td>
<td>Selected topics</td>
</tr>
<tr>
<td>W odd years</td>
<td>2.0</td>
<td>NDFS 632</td>
<td>Diet and Cancer</td>
</tr>
<tr>
<td>W even years</td>
<td>2.0</td>
<td>NDFS 633</td>
<td>Maternal/Child Nutrition and Health</td>
</tr>
<tr>
<td>Sp/Su odd years</td>
<td>2.0</td>
<td>NDFS 634</td>
<td>Nutrition Education</td>
</tr>
<tr>
<td>F even years</td>
<td>2.0</td>
<td>NDFS 635</td>
<td>Advanced Topics in Human Obesity</td>
</tr>
<tr>
<td>W</td>
<td>2.0</td>
<td>NDFS 637*</td>
<td>Advanced Management in Dietetics</td>
</tr>
<tr>
<td>Sp</td>
<td>2.0</td>
<td>NDFS 638*</td>
<td>Advanced Clinical Nutrition</td>
</tr>
</tbody>
</table>

*Denotes courses for dietetic interns only
Nutritional Science M.S. Learning Outcomes

Program purpose: The Nutritional Science Master's Program develops informed and productive nutritional scientists who personally and professionally utilize scientifically proven nutrition principles to make meaningful contributions to the discipline, to families, communities, and nations. The human nutrition discipline includes the rigorous, scientifically based study of the processes by which we assimilate nutrients and dietary nutrient factors that influence health and prevent disease. Graduates of the Nutritional Science MS Program will:

1. Gain acceptance into health or other professional schools or PhD programs in nutritional science or related disciplines, or obtain professional employment.
2. Maintain personal and professional growth through advanced skills acquired for continued acquisition of new scientific knowledge;

Expected Learning Outcomes

- Develop and conduct scientific research using appropriate design and ethical principles.
- Examine evidence for role of diet

Evidence of Learning

Direct Measures

1. Performance in individual courses emphasizing both advanced applied and experimental nutrition
2. Instructor evaluations of course work, including research papers, written exams, oral presentations, quizzes, homework, IRB and IACUC
3. Students’ written and oral presentations on thesis research and in research meetings

Indirect Measures

1. Applications to and acceptance rates to doctoral and professional programs
2. Job placement data for graduates seeking employment
3. Post graduation alumni surveys
**Graduate Faculty—Areas of Interest**

The following are the members of the graduate faculty of the Department of Nutrition, Dietetics, and Food Science who may serve as advisors to graduate students and on graduate committees.

Sarah Bellini, PhD, RDN, Utah State University, 2012

- Office location: S-141 ESC
- Telephone: 422-0015
- Interests: Nutritional Assessment, Nutrition Education

Merrill J. Christensen, Ph.D, Massachusetts Institute of Technology, 1982.

- Office location: S-235 ESC
- Telephone: 422-5255
- Interests: Molecular Mechanisms of Cancer Risk Reduction by Diet

Michael L. Dunn, Ph.D, Cornell University, 1996.

- Office location: S-129 ESC
- Telephone: 422-6670
- Interests: Product Development; Food Preservation and Storage; Food Industry Management

Susan Fullmer, Ph.D, RDN, Brigham Young University, 2004.

- Office location: S-227 ESC
- Telephone: 422-3349
- Interests: Bone Density; Energy Metabolism

Chad R. Hancock, Ph.D, University of Missouri-Columbia, 2005

- Office location: S-231 ESC
- Telephone: 422-7588
- Interests: Molecular Mechanisms of Insulin Resistance; Diet-Induced Adaptations in Skeletal Muscle

Laura K. Jefferies, Ph.D, Utah State University, 2011.

- Office location: S-127 ESC
- Telephone: 422-9082
- Interests: Food Preservation, Sensory Analysis
Jason Kenealey, PhD, University of Wisconsin-Madison 2011

Office location: S-127 ESC
Telephone: 422-6671
Interests: Natural Products; Cell Signaling; Cancer Treatments

Oscar A. Pike, PhD, Purdue University, 1986.

Office location: S-129 ESC
Telephone: 422-6671
Interests: Food Preservation and Storage: Lipids


Office location: S-233 ESC
Telephone: 422-6855
Interests: Community/Public Health Nutrition; Childhood Obesity

Frost M. Steele Ph.D, Purdue University, 1990

Office location: S-131 ESC
Telephone: 422-6784
Interests: Food Microbiology; Food Safety; Food Preservation and Storage

Jeff Tessum, PhD, University of Colorado Health Sciences Center, 2007

Office location: S-243 ESC
Telephone: 422-6671
Interests: Biochemistry; Beta cell proliferation, diabetes

D. Pauline Williams, PhD, RDN, Utah State University 2011

Office location: S-215 ESC
Telephone: 422-4876
Interests: Childhood Obesity

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Graduate Coordinator

The graduate coordinator is Susan Fullmer, PhD, RD, Teaching Professor; (S-227 ESC, 422-3349, email: susan_fullmer@byu.edu). She is responsible for overseeing the graduate programs of the department.

Graduate Secretary

The graduate secretary is Melanie Peine. Her office is S-229 ESC, 422-4296, email: Melanie_peine@byu.edu. The graduate secretary is responsible for maintaining files on graduate students and ensuring students complete the appropriate paperwork at each step of the graduate process. She also records online all paperwork with Graduate Studies. She is an important resource for graduate students with regards to department and university graduate program requirements, policies, and procedures.

NDFS Facilities

Nutritional Sciences research laboratories in the Eyring Science Center at BYU total over 4,200 square feet. Facilities for housing and maintaining small animals are included. Studies in cell culture, in animal models, and in humans are conducted using state of the art instrumentation to examine molecular roles of nutrients, study nutritional physiology, and perform nutritional assessment. Conference rooms, reading rooms, project rooms, and computer rooms are used for the conduct of non-laboratory research in eating behaviors, nutrition education, dietetics management and dietetics education.

Food Science research laboratories total over 10,000 square feet with additional laboratories used for teaching purposes. Facilities include a pilot plant, and laboratories for sensory analysis, food quality assurance, new food product development, food microbiology, and long-term food storage research.

Although each laboratory and instrument is set up primarily for use in the research program of a specific professor, they may be available for general use through consultation with the professor or staff members in charge of that laboratory or instrument. In addition, arrangements may be made with other campus departments for special studies that require
equipment available there. Arrangement for use of other facilities is coordinated through the student’s advisor. A list of which faculty members responsible for each lab is listed in the back of this handbook.

**Study Areas, Keys, Copy Machine**

Graduate students are assigned study areas. The advisors and graduate coordinator assign students to study areas. Please keep study areas clean and organized. The graduate secretary will give access codes to the copy room and graduate reading room. Department copy machines may be used by students to make personal copies. The graduate student is expected to reimburse the department for personal copies. Students are expected to completely clear out and clean their study areas by the time they graduate.

Appropriate keys can be obtained, after approval by the graduate coordinator or advisor, by filling out a key card supplied by the graduate secretary. Keys may be picked up at 285 BRWB. A $10 refundable deposit must be paid for each key.

Students will be asked to provide a current local address, phone number, email address and other contact information to the graduate secretary or graduate coordinator and update it whenever there are changes.
MANAGING YOUR GRADUATE PROGRAM

In general, most Master’s degrees are designed to be completed within two years. Internships or leaves of absence might increase time to completion. University policy requires that all Master’s degrees be completed within five years of the first semester of enrollment or from the first course taken, whichever comes first. Departments and colleges may petition for up to a one year extension by providing reasonable evidence that extenuating circumstances caused an unavoidable delay in the student’s progress toward a degree. Part-time students will likely require more than two years but should demonstrate a continual effort towards completion of their graduate degree.

Graduate Student Orientation

You will receive a general orientation on policies, procedures and expectations at the beginning of your the first semester in the graduate program. Additionally this Handbook, the Graduate Catalog, and Graduate Studies website are resources for you during your graduate studies. Your advisor, the graduate coordinator, and the graduate secretary can help answer questions along the way, but ultimately, it is your responsibility to know and conform to all rules and regulations of Brigham Young University and to the requirements of the Department of Nutrition, Dietetics and Food Science. Graduate students are expected to understand and abide by the BYU Honor Code.

The remainder of this Handbook is a list of key Departmental and University Policies and Procedures to guide NDFS graduate students through their graduate program.
Registration Requirements

Policy

Students must stay current with all registration requirements detailed in the Brigham Young University Graduate Catalog 2015-2016 (http://saas.byu.edu/classSchedule/).

Procedure

• When admitted to a degree program, the student should work continuously and register in that program until all requirements are completed.
• Minimum requirements include:
  o New students must register for at least 2 credit hours in the first semester/term for which they have been admitted, or their acceptance is forfeited.
  o All graduate programs require a minimum of two full-time semesters of graduate tuition. Full time is 8.5 credit hours per semester or 4.5 hours per term.
  o International students must register for at least 9 credits each Fall and Winter Semester.
  o Graduate students should not register for more than 12 hours in a semester or 6 hours in a term.
  o Students must be registered for at least 2 semester hours of approved credit in which they use any university facilities, consult with faculty, or take comprehensive or oral examinations.
  o U.S. students must complete and receive acceptable grades (no D, E, W, NS, or I) in at least 6 semester hours during each academic year. Students who do not fulfill this yearly requirement are dropped from their graduate programs by the University and must apply for readmission if they wish to continue. When a student is dropped from BYU graduate studies for not maintaining minimum registration requirements, he/she has two options to return to the program:
    o Apply to resume graduate studies
      o Complete the graduate studies form “Application to Resume Graduate Study” (Form GS 6)
      o Receive approval from the department
      o Pay a non-refundable processing fee ($600). International students will also need to submit new bank statements or sponsor contract (GS I-2).
• Enroll in at least 2 credit hours the semester they return, and receive acceptable grades within the first semester.
• Submit a Reapplication Honor Code Commitment and Ecclesiastical Endorsement (Form GS 6)
• Students should expect their previous work to be re-evaluated and their degree requirements to reflect current expectations of the program.
• Readmission does not extend the 5 year time limit to graduation for MS degrees

• Reapply to the BYU Graduate Studies and the NDFS department graduate program
  a. Students can reapply to BYU Graduate Studies and the NDFS program
  b. Previously completed graduate courses will not be considered

• Please refer to the Brigham Young University Bulletin, Graduate Catalog (http://www.byu.edu/gradstudies/catalog/) and to the Brigham Young University Graduate Studies Policies and Procedures (http://www.byu.edu/gradstudies/) for all other registration requirements.
Credit Hour Requirements

Policy

Students should meet with their advisor to be sure they are completing all credit hour requirements each semester.

Procedure

- A minimum of 30 credit hours (excluding prerequisite courses) is required for graduation. The graduate committee, in consultation with the student, will set the exact number of credit hours required. Each program will be based on adequacy of undergraduate preparation and area of emphasis.
- At least 21 of the minimum 30 credit hours must be at the 500 level or above. No more than 9 semester hours of BYU undergraduate classes (300 and 400) level may apply toward a master’s degree. Only in rare cases, approved by the graduate coordinator and the student’s graduate committee, can 300 level courses in the NDFS Department be applied toward a graduate degree.
- Six credit hours of thesis (NDFS 699R) are required. No more than six hours of thesis credit may count as part of the 30 hour minimum. However, additional hours of thesis and/or research may be taken to meet yearly registration hour requirements.
- Two credit hours of Graduate Seminar (NDFS 691R) are required. The student should register for one credit hour the semester they present their prospectus and for one credit hour the semester they defend their research project.
- U.S. graduate students are required to register for at least 2 credit hours during a semester or term in which they use any university facilities, consult with faculty, or take comprehensive or oral examinations.
- Non-degree (post-baccalaureate) and Senior credit, individually or combined, cannot exceed 10 semester hours for a graduate degree program. Non-degree credit is that taken after the Baccalaureate degree but before admission to a graduate program. Senior credit is that taken while a senior but beyond that required for the baccalaureate degree.
• Transfer credit may not constitute more than 25 percent of the total hours required in a student’s graduate program. Transfer credit must clearly be graduate level, must be completed with a B grade or better, and must not be home study. Application of any such credit to a graduate degree must be approved by the graduate coordinator and the student’s graduate committee when the study list is approved.

• Graduate students whose graduate (program of study) GPA falls below 3.0 (prerequisite and skill courses are exempted) will not be allowed to graduate and may be dismissed from their graduate programs. No D credit may apply toward a graduate degree.

• Registering for classes not listed on the study list may be done only with the approval of the thesis advisor and graduate coordinator.

• Please refer to the Brigham Young University Bulletin, Graduate Catalog (http://www.byu.edu/gradstudies/catalog/) and to the Brigham Young University Graduate Studies Policies and Procedures (http://www.byu.edu/gradstudies/) for all other credit hour requirements.
Graduate Forms

Policy

Graduate Students must use the appropriate forms throughout the various stages of the graduate program. Students are expected to retrieve, complete and submit the forms in a timely manner. Students should also submit them to the appropriate place as indicated on the form (either the NDFS Graduate Secretary or the Graduate Studies office).

Procedure

The following mandatory forms are Department forms. They are available from the NDFS Graduate Secretary.

- **Form A** Department Scheduling of Coursework Oral Examination of Masters Of Science Graduate Students
- **Form B** Coursework Oral Examination Report Form
- **Form C** Prospectus, Master’s candidate Form

The following mandatory forms are University forms. They are available from the Graduate Studies website: [http://www.byu.edu/gradstudies/forms/forms.php](http://www.byu.edu/gradstudies/forms/forms.php).

- **GS Form E** Ecclesiastical Endorsement
- **GS Form 6 and 6a** Application to Resume Graduate Studies
- **ADV Form 3** Program of Study
- **ADV Form 8a** Requirements for Graduation Application
- **ADV Form 8c** Departmental Scheduling of Final Oral Examination (Master’s and Doctoral)
- **ADV Form 11** Minimum Standards for Submitting Dissertations, Theses, or Selected Projects
- **ADV Form 11a** Sample Preliminary Pages for Submitting Dissertations, Theses, or Selected Projects
- **ADV Form 11b** Preliminary Pages Template-Thesis
- **ADV Form 8d** Approval for Final Dissertation, Thesis, or Selected Project
The following University forms are *occasionally needed* during your university studies. They are available from the Graduate Studies website:

http://www.byu.edu/gradstudies/forms/forms.php

- **ADV Form 3b** Program of Study Change
- **ADV Form 8** Graduation Deadlines for Graduate Students
- **OGS Form 2** Petition for Exception
- **ADV Form 5** Leave of Absence
- **ADV From 8e** Request to Secure Thesis or Dissertation
Graduate Advisor

Policy

Each graduate student will be assigned a graduate faculty member at the beginning of their studies to be their Graduate Advisor and Chair of the student’s graduate committee.

Procedure

- Prior to acceptance to the NDFS department, a potential graduate student should have identified a tentative graduate faculty member to direct their graduate program. Upon acceptance into the program, the student will be formally assigned to a graduate advisor.
- The graduate advisor and student together determine a study list.
- The graduate advisor and student will determine a thesis project which the student will complete under the direction and control of the advisor.
- Students should consult regularly and often with their advisors as they progress through their programs.
- The assignment of a graduate student to an advisor may be changed if the thesis research develops into another area and if another graduate faculty member agrees to serve as the advisor. However, changing to a different thesis advisor should be made only under exceptional circumstances.
- The unanticipated departure of a graduate student to another faculty member may leave the original adviser with no means of completing the project begun by the student. If the project has been supported by external funding, its suspension could jeopardize future collaboration with, and support from the funding source. A student who desires to change advisers and projects must submit a petition (available from the Graduate Coordinator) presenting the reasons and justification for the change. Both the original advisor and the new adviser must sign the petition and be in agreement that the change is in the best interests of all parties involved. In the event of a disagreement regarding the desirability of a change, the Graduate Coordinator will seek to mediate the disagreement, and make a final decision. If any of the involved parties is unsatisfied with the decision of the Graduate Coordinator, they may appeal to the entire department graduate faculty. In such a case, each of the parties involved present their position and rationale before the graduate faculty who, after hearing all
arguments, discuss the case and vote on the final proposed course of action. A majority vote, is sufficient to make the final decision binding. Change of thesis adviser and thesis project requires presentation of a second thesis prospectus seminar.
Graduate Committee

Policy

Each graduate student will choose a graduate committee by the end of the first semester. The committee will guide their research and coursework.

The graduate committee serves the dual purposes of advising the student on his/her thesis research and conducting the student’s course work and final oral examinations.

Procedure

- Graduate committees consist of a minimum of three members for a Master’s program.
- Committee selection should occur during the student’s first semester, and no later than submission of the study list.
- The graduate student should discuss possible candidates for the student’s committee with their advisor. Ultimately, the graduate student selects the committee members.
- All members of a committee must be graduate faculty.
- Graduate faculty members from other departments may serve on committees when the graduate work crosses disciplines.
- On occasion experts in the community or at other Universities might provide needed expertise to a student’s graduate experience. Approval of these potential committee members is decided by the Graduate Studies Office on a case by case basis.
- All committee members, from the time of their appointment to the committee, share in the responsibility for advising and directing the student concerning course work, degree requirements, and research. The individual contribution of the committee members may vary by kind, effort, and intensity. Students are especially encouraged to consult with them during the research design and data analysis.
- All committee members must be present for the prospectus presentation, the course work examination and the thesis defense. University Policy requires committee members be present in the room for the final examination.
• Once the committee members and the list of classes have been chosen (by the end of the first semester) Form 3, Program of Study form should be completed and submitted to the graduate secretary (http://www.byu.edu/gradstudies/forms/forms.php).
• In the event it becomes necessary to change committee members, changes (additions, substitutions) are made on Form 3B.
Study List (Program of Study)

Policy

Students should submit their Program of Study by the end of the first semester.

Procedure

• Students are strongly encouraged to choose rigorous classes which will strengthen their knowledge base and/or assist them in their research. Graduate courses outside of the department are encouraged.

• During the first semester in the program, the student and advisor should prepare an approved Study List (Program of Study, Form 3).

• The form must be signed by the advisor, each member of the graduate committee and the graduate coordinator. After signatures have been obtained, the form is submitted to the department graduate coordinator for approval.

• The study list, once it is properly signed and accepted by the university, is equally binding upon the student and his or her advisor and graduate committee. In general, students should focus upon completion of study list courses early in their graduate experience.

• The study list must be submitted no later than the third week of the second semester. Failure to meet this deadline will render the student ineligible to register for subsequent semesters.

• If it becomes necessary during the course of a graduate program to alter the study list, Form 3B should be used. Classes may be deleted if they are not offered during the course of a student’s graduate program. Failure to perform well in a class is not sufficient reason to delete it from the study list. Addition of new classes to the University curriculum may justify addition of a course if the student, advisor, and graduate committee agree that such addition is in the best interest of the student.
Thesis Prospectus

Policy

Every graduate student in NDFS is required to prepare and present their proposed research project, called a thesis prospectus, in NDFS 691R, Graduate Seminar.

Procedure

The selection of a thesis project is a significant decision the student and advisor make with regard to the student’s degree program. Careful consideration should be given to a project’s feasibility and its potential contribution to the body of knowledge in the form of a peer-reviewed publication in a professional journal. The student should be genuinely enthusiastic about the project selected and highly motivated to complete it.

- At the beginning of a graduate student’s studies, he/she should begin working with their advisor to identify and refine a research project as part of the fulfillment of a master’s degree in the department.
- In general, a thesis prospectus is presented by the second semester of the student’s entrance into the program.
- For students doing research on human subjects, a prospectus should be submitted before the BYU Institutional Review Board (IRB) will approve an application for use of humans as experimental subjects.
- For students doing research on laboratory animals, approval from The Institutional Animal Care and Use Committee (IACUC) must be obtained.
- In preparing the prospectus the student and advisor are encouraged to meet with a representative of the Statistics Department to establish proper experimental design and sample size.
- A well prepared thesis prospectus will describe in detail the project the student will complete for his or her thesis research. The student is encouraged to include the entire committee during the planning phase so that an appropriate project is defined and planned. The following are essential components of a typical prospectus:
o Introduction/Background and Significance
  ▪ Statement of the problem. This is a brief summary of the problem, 1-1 ½ pages.
  ▪ Purpose and/or research objective(s) and/or research question(s) (should be bulleted)
  ▪ Hypothesis for each objective, if appropriate
  ▪ Please refer to “problem statements, purpose, research questions, objectives/aims, hypotheses” at the end of this handbook for examples and definitions of each.

o Review of the Literature
  ▪ A well written, thorough literature review supports your proposed project. It should be thorough enough to justify the study. It will like be based on at least 20-30 references.

o Proposed methods, including a description of the proposed research design and statistical analysis

• Copies of the prospectus are given to each member of the student’s graduate committee prior to the seminar presentation. The thesis prospectus is presented in Graduate Seminar NDFS 691R, to the faculty and other graduate students.

• Students are expected to dress professionally at the thesis prospectus presentation (NDFS 691R).

• Students should prepare an abstract with a bibliography for graduate faculty and graduate students for all NDFS 691R presentations.

• A prospectus should be presented within a minimum of 20 minutes and maximum of 40, leaving time for questions and suggestions from the audience. On occasion, two graduate students might present their thesis prospecti at the same seminar. Students should expect to divide the time equally, 25 minutes total, per student.

• Once approved by the committee, the final version of the prospectus is signed by each committee member and submitted to the graduate coordinator for signature along with Form C. The signed prospectus will be placed in the student’s file in the graduate secretary’s office and becomes the “contract” the student must fulfill to complete the requirement for thesis research. The signed Prospectus should be submitted to the graduate secretary within 2 weeks of presenting the prospectus seminar.
• Significant deviations from the experiments outlined in the approved prospectus, or a change to a new thesis project requires submission of a new prospectus following the procedure outlined above.
Coursework Oral Examination

Policy

All graduate students are required to successfully pass an oral examination in front of their graduate committee.

Procedure

The coursework oral exam in Nutrition, Dietetics and Food Science is an opportunity for the graduate student to demonstrate his/her understanding of either food science or nutritional science. Questions in coursework exams are designed to test both the breadth and depth of the graduate student’s knowledge and comprehension of subject matter. Coursework oral questions typically come from courses completed on the student’s study list. Understanding of core principles from the undergraduate prerequisite coursework will be assumed and may be part of the coursework oral exam.

- The coursework oral examination must be taken at least one semester or term prior to the final thesis defense (the coursework oral examination and thesis defense cannot occur in the same semester). It is scheduled by completing Form A and returning it to the graduate secretary at least one week prior to the date of the examination. The student and his or her advisor are responsible to arrange the time, place and participation of all graduate committee members.
- The graduate committee will serve as the examining committee. All members of the committee must be present for the examination.
- Each member of the graduate committee asks the student questions that relate to coursework the student has taken.
- The student need not have completed all study list classes before taking the coursework oral examination; however, the majority of courses should be completed.
- At the conclusion of the examination the committee may “Pass”, “Pass with Deficiencies to be Corrected”, or “Fail” the student. The student may retake the examination once in the event of failure. A second failure terminates the student’s program. If the committee feels that deficiencies need to be corrected, they specify what the deficiencies are and what the student must do to correct those deficiencies.
• The Course work Oral Examination Report Form (Form B) is completed and kept in the student’s department file. The examination chair (the student’s advisor) indicates when deficiencies are corrected by signing the Examination Report Form. Results of the Coursework Oral Exam will be reported to the University by the Graduate Secretary.

• A typical coursework question may begin with a simple question on a subject that the student should be able to answer at a 100 or 200 level. The depth of the student’s understanding will be explored as the examiner continues to question the student by asking him/her higher level questions on the topic up to the graduate level, including questions from the most recent coursework.

• Another approach to examine the student’s breadth is to ask a diversity of questions on a broad range of topics. The breadth of a student’s comprehension may be assessed by asking the student to apply a concept to other settings not previously discussed in class. Since the goal is to assess the student’s breadth and depth of understanding, eventually the student may be asked questions they can no longer answer. This does not mean that the student has failed the exam, rather it indicates the point at which the student’s understanding of a concept is exhausted.

• Students should dress professionally for their oral exam.
Graduate Seminar, NDFS 691R

Policy

Graduate students in NDFS are expected to participate in weekly Graduate Seminar

Procedure

• NDFS 691R, Graduate Seminar, is held most Fridays at 1:00 pm in S232 ESC during Fall and Winter Semester; and as needed during Spring and Summer Term.

• All graduate students must complete 2 credit hours of NDFS 691R. Students will enroll in one credit hour the semester they present their prospectus, usually the first or second semester of graduate work. The second credit hour will be completed during their final thesis defense which should be during their final semester.

• Students will register for seminar (NDFS 691R) only during the two semesters they make presentations.

• Seminars are scheduled through Dr. Chad Hancock, Graduate Seminar Coordinator.

• All graduate students are expected to attend the weekly department graduate seminars every semester they are enrolled in the graduate program.

• Professional dress is expected of students when they present their prospectus and thesis defense.

• Students in the audience are encouraged to listen attentively to speakers and ask pertinent questions of the speakers during the questioning period, usually at the end of the presentation.

• Questions and comments should be courteous and respectful.

• Graduate students and Faculty should complete an evaluation on graduate student presenters.
Thesis Seminar and Final Thesis Defense

Policy
Graduate students present the findings of their research to the department in a graduate seminar and to their graduate committee in a thesis defense.

Procedure

- Students must be enrolled in a minimum of 2 credit hours the semester they have their final thesis defense. One of the credit hours should be NDFS 691R.

- When the faculty advisor and graduate student are satisfied that an acceptable draft of the thesis is ready, a thesis presentation in Graduate Seminar and Thesis Defense should be scheduled.

- The Graduate Seminar is scheduled with Dr. Chad Hancock, Graduate Seminar Coordinator.

- Form ADV 8c must be completed to formally schedule a Thesis Defense. It is available online or from the graduate secretary. The Graduate Secretary must submit this paperwork online a minimum of 2 weeks in advance of the defense date. Before the defense date can be filed with Graduate Studies, the form must be signed by all committee members and the Graduate Coordinator, then submitted to the Graduate Secretary. Please do not wait until the last day to submit this paperwork.

  Announcements of Thesis Defenses are posted by Graduate Studies to the entire University.

- An unbound copy of the candidate’s thesis must be placed in the department office at least two weeks in advance of the final oral examination and thesis defense so that interested faculty and students may review it before the examination.

- A copy of the thesis should be taken to the Dean of Life Sciences at least two weeks before his/her signature is required. This usually means the Dean should be given a copy of the thesis two weeks prior to the thesis defense.

- The thesis presentation in graduate seminar and the thesis defense should occur on the same day. On occasion, the thesis defense may be held on a date after the seminar, but
generally within days (or few weeks at most) of the seminar presentation. The student first presents the results of his/her thesis research in a department seminar to which department faculty, students, and the public are invited. Anyone may ask questions of the student during the seminar.

- At the thesis defense, members of the graduate committee conduct a rigorous and detailed final examination of the student’s thesis. The public is invited to this examination but they may not ask questions. Generally only the student and committee attend this meeting.

- It is a policy of Graduate Studies that all members of the committee be physically present at the thesis defense.

- At the conclusion of the examination the committee may vote to “Pass,” “Pass with Qualification,” “Recess,” or “Fail” the student. If two or more examiners vote to “Fail”, the examination is failed and the graduate program of the student is terminated. “Recess” is appropriate when the committee feels that the examination should be repeated at a later time. “Pass With Qualification” is appropriate when revisions of written work are necessary or other deficiencies are evident. The decision is reported to the Office of Graduate Studies. Most students who “Pass” are still required to make minor modifications in the thesis and have corrected final copies made before the advisor and graduate committee will approve it for binding. Students must allow a reasonable amount of time after the examination to make required changes.

- Professional dress is expected at the thesis presentation and defense.

- All theses must conform to Brigham Young University Office of Graduate Studies approved format (please see ADV Forms 11, 11a, 11b). These forms can be accessed at: http://www.byu.edu/gradstudies/forms/forms.php?s=advforms.

- The final thesis should be a source for future graduate students or faculty members to have a detailed record of exactly how the research was conducted and a complete record of the research findings. In general, a final thesis should be assembled as follows:
  1. Preliminary pages including thesis abstract (Form 11a, 11b)
  2. Manuscript (formatted per requirements of proposed peer-reviewed journal. Do not include the manuscript abstract in the ETD Submission, just include the University required abstract in the preliminary pages for the entire thesis)
  3. Appendix
a. The approved prospectus modified as appropriate with an updated introduction, review of the literature if necessary, and a complete description of the actual methods used, now written in past tense
b. Other results/data not found in the manuscript
c. Forms, including IRB/IACUC approvals, surveys, etc.
d. Other as necessary
Thesis Submission to the University

Policy

All theses must be submitted to the University electronically (ETD). Theses must be formatted according to University standards. Hardbound copies should be ordered for your Major Advisor and the Department.

Procedure

- When the student receives final ETD approval, they should upload, order, and pay for any personal or department bound copies on a new BYU Print Services website specific for theses. The department will incur the cost of the hardbound copies for the Department and Advisor. Once the ETD status shows “Grad Office Review,” the student will take the ADV Form 8d and title page to Graduate Studies, 105 FPH.

- Students MUST select “Embed All Fonts” or “High Quality Print” when converting to PDF, and use full Adobe for the conversion. Failing to do so results in many errors in a printed copy.

- Blank pages are not allowed in the ETD. However, students may insert blank pages in the PDF they submit for printing and binding, but blank pages should NOT appear in the PDF submitted for the ETD.

- Committee names on the title page, the ADV Form 8d, and ADV08 (in AIM) must match. Students may check committee names on their progress report. Students, department secretaries, and ETD reviewers are each responsible for assuring these names are correct. Students may not turn in their final ADV Form 8d to Graduate Studies if committee names are not correct.

- Department and College reviewers should be extra diligent in checking for the proper format on the title and abstract pages: Mixed case in the title, inverted pyramid style, month and year of graduation, copyright with only “student name © year”. The templates available on the Graduate Studies website (http://gradstudies.byu.edu) provide the proper format.

- Departments who require bound copies should have the secretary enter this as an ‘other requirement’ on ADV08; clear it with the paid date on ADV08 when the student forwards
a copy of the payment and order receipt. If it is not cleared, this could stop the student’s graduation.

- Students are required to buy two hard bound copies of their thesis, one for their advisor, one for the department.

Common ETD Title Page and Abstract Errors

- The title must follow the inverted pyramid style on the title page and the abstract.
- The University Style requires prepositions 5 letters or more to be capitalized in the title.
- When words are hyphenated in the title, both words are capitalized.
- The spacing on the title page should be even from top to bottom (see templates ADV Form 11b and 11d).
- Do not use titles in front of committee member names. For example, do not use Dr. George T. Brown. Use George T. Brown.
- The month the diploma is awarded is the month entered at the bottom of the title page.
- Bookmarks that open automatically are required in all theses and dissertations.
- Fonts must be embedded in all theses and dissertations.
Application for Graduation

Policy

Appropriate paperwork for graduation must be completed and properly filed in a timely manner.

Procedure

- An Application for Graduation (Form 8A) must be completed and submitted, usually by the second week of the semester in which the student intends to graduate.
- Students are required to complete and submit their application for graduation. The graduate secretary should be notified when you have submitted the application.
- Deadlines for the 2015-2016 academic year are listed in the University Class Schedule [https://graduatestudies.byu.edu/sites/default/files/graduatestudies.byu.edu/files/files/forms/adv_form_8_current.pdf](https://graduatestudies.byu.edu/sites/default/files/graduatestudies.byu.edu/files/files/forms/adv_form_8_current.pdf)

- Application to graduation generally occurs in the semester the student defends his/her thesis.

- If students do not meet all of the graduation deadlines (please see website above) students must pay 2 credit hours of tuition (preferably thesis hours) for the following semester. [http://graduatestudies.byu.edu/policies-and-procedures](http://graduatestudies.byu.edu/policies-and-procedures)
Grievances

Policy

When a student feels that his or her work has been unfairly or inadequately evaluated, they have a right to voice their concerns through appropriate channels. The department will follow Brigham Young University’s Graduate Studies “Graduate Academic Grievance Policy” to resolve any grievances.

Procedure

Below is a brief overview of the Graduate Studies grievance policy. A full copy is available online or upon request from the graduate coordinator.

- The grievance must be initiated by the graduate student no later than one year from the last day of the examination period of the semester in which the alleged unfair or inadequate evaluation occurred.
- The graduate student should first address the grievance to the involved faculty member for review and resolution.
- If the graduate student feels that is not possible, or that the matter was not properly resolved, he or she should submit a written request for review to the Department Chair.
- If the matter is not resolved satisfactorily by the Department Chair, the student should submit their grievance in writing to the College Dean.
- The final step if the matter is still unresolved, is to submit a written request for review by the Dean of Graduate Studies who will convene a formal administrative review if necessary.
Termination of Graduate Status

Policy
Students may be terminated from the program under specific circumstances

Procedure
Termination of graduate status may result if a student:

- Fails to satisfactorily complete the conditions of acceptance and continuation (study list submission, minimum GPA, etc.).
- Fails to fulfill the university’s minimum registration requirement of 6 credit hours per year.
- Makes a request to withdraw (with the intent to pursue a degree at another university, for personal reasons, or in response to department recommendation).
- Receives a Marginal or Unsatisfactory rating in a periodic review by the academic department and is unable or unwilling to comply with conditions for continuance outlined by the department.
- Receives more than one rating of Marginal or Unsatisfactory.
- Fails to make what the department or the university deems to be satisfactory progress toward a graduate degree.
- Twice fails the comprehensive course work oral examination.
- Fails the final oral examination (Thesis Defense).
- Violates the university’s standards of conduct or Honor Code.
- Exceeds the five year time limit.
Graduate Student Funding

Policy

It is the policy of NDFS to assist graduate students financially when possible either by providing funding from department funds or external research funds, or making students aware of other financial resources.

Procedure

• When adequate funding is available, students in good standing and registered for at least two credit hours/semester (one credit hour/term) will be eligible for one of two department funding sources, stipends or hourly contract.

• **Departmental Assistantships (Stipends or hourly contracts)**
  o Students are notified if they have received a stipend or hourly contract at the time of acceptance.
  o Stipends may be awarded for a maximum of 6 semesters (2 years).
  o Hourly contracts are usually awarded for a maximum of 6 semesters (2 years)
  o Students must be registered for at least 2 credits when receiving a stipend or hourly contract.
  o Students risk losing a stipend or hourly contract if they receive a “marginal” or “unsatisfactory” performance review and do not improve in a subsequent review.
  o Students receiving full stipends from department funds are expected to work a **minimum of 20 hours a week** in teaching assistant and/or research assistant responsibilities, as outlined by the advisor; however, students usually need to work much more than this to make sufficient progress in their program.
  o Students awarded hourly contract wages are strongly encouraged to work the maximum of 20 hours/week. Research hours and teaching assistant hours are eligible for contract hours. Other activities need to be approved by the advisor. University policy limits contract hours to 20/week.
  o Because of the demands of finishing a master’s program in two years, having jobs outside of the University is strongly discouraged.
  o Vacation time should be coordinated with the advisor.
Students are expected to pay for tuition, health insurance, books, living expenses, etc., when using stipend or contract hour funds.

During spring and summer terms, students should register for at least 1 credit each term to avoid paying FICA tax.

- Funding arrangements for stipend and hourly contract wages are confidential, and are not to be discussed with other graduate students.

- **Scholarships**
  - College and Departmental Grants/Scholarships; February application deadline
  - Institute of Food Technologists (IFT) Scholarships (Food Science): [www.ift.org](http://www.ift.org); February deadline.
  - Academy of Nutrition and Dietetics Foundation: [http://www.eatrightfoundation.org/Foundation/](http://www.eatrightfoundation.org/Foundation/) February deadline; must be a member of AND.

- **Graduate Research Fellowship Award** ([http://www.byu.edu/gradstudies](http://www.byu.edu/gradstudies), go to “Financial Assistance” and then “Fellowships and Grants”)
  - $4,500 for Master’s students.
  - Intended for proposed (not almost completed) research.
  - Master’s students must have started on or before Fall Semester of the current academic year.
  - February deadline; recipients notified before the end of Spring Term.

- **Research Presentation Awards** ([http://www.byu.edu/gss/](http://www.byu.edu/gss/))
  - Funding to assist students in presenting research at meetings.
  - Apply at beginning of Winter Semester if presentation is between January 1st and June 30th.
  - Apply at beginning of Fall Semester if presentation is between July 1st and December 31st.

- **Graduate Mentoring Awards**
  - Submitted by faculty as invited by college deans.
  - To supplement financial support packages.
  - For graduate students who are mentored by faculty and also act as mentors to undergraduates.
If funded, both the faculty mentor as well as the graduate student must submit a 1-page report at the end of the academic year.
• **Mentoring Environmental Grants (MEG)** ([http://orca.byu.edu/](http://orca.byu.edu))
  - Submitted by faculty for a project that involves mentoring.
  - Available through the Office of Research and Creative Activities (ORCA)
  - Grants up to $20,000; October deadline.

**Student Loans**
- **BYU Short-Term Loans**
- **Federal Stafford Loans**
  - Only degree-seeking students making satisfactory academic progress considered.
  - Not available to international students.

• **Additional Sources of Funding**
  - Contact the [Financial Aid and Scholarship Office](http://orca.byu.edu), D-155 ASB, 801-422-4104
Performance Reviews

Policy

Graduate students will have two performance reviews each academic year.

Procedure

- Twice a year (end of Fall and end of Winter) the student’s performance will be reviewed by the advisor.
- Each student will be rated “Satisfactory,” “Marginal,” or “Unsatisfactory” on individual items and on “overall performance” which represents an overall summary of the student’s performance. (Please see the evaluation form below).
- One “unsatisfactory” in any area is a warning.
- Two consecutive “unsatisfactory” in any area may result in forfeiture of graduate funding (department stipend). Two successive “overall unsatisfactory” or an “unsatisfactory” and a “marginal” results in termination from the program and BYU (per University policy).
- Both the professor and graduate student will sign and date the evaluation form at the time of the performance review. Performance reviews are maintained in the student’s graduate file. A copy of the signed evaluation will be given to the student.
- Only the “overall” rating is forwarded to the Office of Graduate Studies. Students receiving “Marginal” and “Unsatisfactory” ratings in any area will be notified in writing regarding the corrective actions the student needs to take and the time frame for meeting those expectations, in order to return to “Satisfactory” status.
- Students cannot have two marginal ratings in consecutive semesters. If a student does not correct a marginal rating in the next semester, the student must receive an unsatisfactory rating the following semester.
The academic performance review can include the following University criteria:

**Satisfactory progress is evidenced by:**

- Degree of excellence demonstrated in course work completed to date;
- Demonstrated progress in planning and implementation of the research project;
- Intellectual inquiry and exploration of issues related to but not formally a part of the student’s academic training, such as departmental, college, and university seminars, etc.;
- Demonstrated potential and commitment to the performance of graduate work; e.g., conscientious management of the graduate program, including establishment of a graduate committee, submission of the study list and thesis prospectus, preparation of a research project or proposal, etc.; and
- Adherence to the BYU code of honor and dress and grooming standards.

**Marginal progress may include the following:**

- Failure to submit program of study form
- Failure to establish a graduate committee
- Registering for thesis hours when little or no work has been done
- Failure to submit an approved thesis prospectus
- Minimal contact with chair or advisory committee members
- Prospectus or thesis draft not approved
- No progress in completion of courses on Program of Study
- Poor performance in clinical/externship/internship
- Poor performance in research

**Unsatisfactory progress may include the following:**

- Grade in a course falling below B-
- Failure to submit program of study form
- Failure to establish a graduate committee
- Registering for thesis hours when little or no work has been done
- Failure to submit an approved thesis prospectus
- Failure of oral course work examination
- Minimal contact with chair or advisory committee members
- Prospectus or thesis draft not approved
- No progress in completion of courses on Program of Study
- Poor performance in clinical/externship/internship
- Concerns about ethical or professional behavior
- Poor performance in research
- Failure to resolve any problems or fulfill any requirements indicated in a previous Marginal or Unsatisfactory review

## Evaluation of Graduate Student Progress
**Nutrition Dietetics and Food Science**

<table>
<thead>
<tr>
<th></th>
<th>Satisfactory</th>
<th>Marginal</th>
<th>Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulfills stipend obligation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Makes meaningful progress towards goals</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Shows initiative</td>
<td></td>
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<tr>
<td>Positive attitude</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Maintains a GPA $\geq 3.0$</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall performance</strong></td>
<td>Filled</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

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Major Advisor: ___________________________ Date: _________

Graduate Student: ___________________________ Date: _________
Laboratory Safety and Etiquette

Policy

All graduate students will become aware of and conform to University and Department laboratory safety and etiquette

Procedure

- Dr. Rickelle Richards chairs the Department Safety Committee. Questions about safety and appropriate laboratory procedures should be directed to your advisor or to Dr. Richards.
- Students will be notified by Dr. Richards at Orientation of which laboratory safety classes he/she must complete. The student should provide a copy of the Lab-Specific Training Record to their advisor when the training is successfully completed.
- All accidents/incidents must be reported to risk management, your advisor, and Dr. Richards.
- Graduate students are guests in the laboratories maintained by their major professors. Chemicals, glassware, and equipment used in graduate research are to be provided by the advisor.
- Please help keep labs organized and orderly by returning equipment to its proper place when you are done using it.
- Students may not use laboratory supplies or equipment located in other laboratories nor move equipment or glassware from one laboratory to another without permission.
- Students should not disturb chemicals or glassware on bench tops that may be in current use by others.
- All faculty, undergraduate, and graduate students are required to maintain clean work spaces on bench tops in all laboratory areas. When experiments are completed, they are expected to clean up the area.
- Specific information on laboratory safety, hazardous chemicals, and hazardous waste disposal is found in the resource section of this Handbook. Students will receive additional safety training specific to their laboratories from their advisors.
• Students using radioactivity must attend the university Radiation Safety course and complete the required examination.

• A notebook or electronic documentation (stored on laboratory computers) containing the Hazard Communication Program (HAZCOM) and the Materials Safety Data Sheets (MSDS) is located in each laboratory. Each student should know the location of this notebook or electronic documents in the laboratory in which they are working, review the notebook or electronic documents thoroughly, and attest to that reading by signature.
## OTHER RESOURCES AND GENERAL INFORMATION

**Graduate Student Checklist**

<table>
<thead>
<tr>
<th>Action item to be completed</th>
<th>Date completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Graduate Committee (Should be completed by the end of the first semester)</td>
<td></td>
</tr>
<tr>
<td>Submit Study list (Form 3) (Should be submitted by the end of the first semester)</td>
<td></td>
</tr>
<tr>
<td>Prospectus Seminar (Must be registered for 1 credit of NDFS 691R) (Should be completed by the end of the 2nd semester)</td>
<td></td>
</tr>
<tr>
<td>Prospectus Filed with Graduate Secretary</td>
<td></td>
</tr>
<tr>
<td>Coursework Exam (Must be completed at least one semester prior to your thesis defense). You must be registered for at least 2 credit hours.</td>
<td></td>
</tr>
<tr>
<td>Thesis Seminar (Must be registered for 1 credit hour NDFS 691R)</td>
<td></td>
</tr>
<tr>
<td>Thesis Defense (Usually scheduled for immediately following the thesis seminar). Must be scheduled with Graduate studies (Complete Form 8c at least 2 weeks in advance, done through the department secretary). You must be registered for 2 credit hours the semester you defend.</td>
<td></td>
</tr>
<tr>
<td>Apply for Graduation at the beginning of the semester you defend your thesis. Complete Form 8a online.</td>
<td></td>
</tr>
<tr>
<td>ETD Submission (Must obtain all the appropriate signatures prior to submission)</td>
<td></td>
</tr>
</tbody>
</table>

The dean would like at least two weeks to read your thesis. If you are defending close to the deadline, please send a *draft* of your thesis over to the dean for him to read. He will sign form 8d at a later date.
Guidelines for use of Department Laboratory and Research Facilities

Laboratory and computer facilities are provided by the University to the Department to achieve teaching and research objectives as approved by the College of Life Sciences. Equipment and supplies are purchased from University and private grants, and the Department is accountable to these agencies for prudent and efficient use of these facilities. Therefore, it seems appropriate to establish guidelines for research, laboratory, and computer protocols in order that all who use these properties will be able to more effectively complete their teaching and research assignments.

Laboratories

1. Use of laboratory space, supplies, and equipment is under the direction of a faculty supervisor or Advisor.

2. Laboratory facilities are for Department approved projects and not for personal use.

3. Do not borrow anything without permission from the person responsible.

4. If it gets dirty, clean it up. Each person is responsible for cleaning up after an experiment is completed (and during the course of an experiment).

4. Put back supplies that are not used.

5. If it gets broken, get it fixed. Do not leave it for the next person. Electronic equipment can be repaired by the Instrument Shop 285 NICB.

6. Obtain proper training before using equipment. To help prevent breakage of expensive equipment learn how to run it before starting. Untrained experimentation is dangerous and costly.

7. Learn and practice safe laboratory procedures. The College of Life Sciences laboratory training must be taken before starting work in a lab (refer to “Laboratory Safety Policies” on pp. 59-60. Advisors will give additional safety training as needed in their individual laboratories. If additional training is given, the signed lab specific training record will be kept by your advisor. Get Material Data Safety Sheets (MSDS) on any new chemical that
is acquired and place it in the binder or save it electronically on a lab computer. Hazard waste disposal must conform to departmental policies.

8. Use proper maintenance procedures and techniques on all equipment. This will help avoid much frustration on the part of the student as well as the part of the faculty member who is in charge.

9. Do not loan equipment out without authority.

10. Lock all doors anytime you leave the laboratory. Be cautious with items that have a high theft risk. The cost of replacement is just too high for carelessness to exist.

11. University regulations do not allow children in laboratories at any time.

12. Bicycles may not be stored in laboratories or the building.

13. Help those around you follow these guidelines.
1. **General Laboratory Safety**

- Faculty responsible for each laboratory will provide instructors, graduate students and others involved in laboratory work with the booklet “Safety in the Academic Chemistry Laboratories” (American Chemical Society, 1985). Know the chemicals you are working with and where the Material Safety Data Sheets (MSDS) are located in the lab.
- Know location of nearest first aid kit, eye wash, shower, and fire extinguisher and how to use them. Review this on an annual basis.
- Doors must be locked behind you as you leave a lab (unless someone else is in the lab).
- Remember to wear appropriate clothing for your lab (i.e. closed-toe shoes, long pants) and personal protective equipment (i.e. lab coats, safety glasses, gloves). Remove personal protective equipment—**including gloves**—before leaving the laboratory. This is for your safety and the safety of others.
- Know what to do in the case of an emergency:
  - University police, fire and ambulance: Dial 911.
  - ESC building marshals are located in C-186 ESC (2-9276)
- If a minor injury occurs, use the first aid kit in your lab or if you feel the injury needs attention or if you get a blister, go to the BYU Health Center (after hours, go to Utah Valley Regional Medical Center). Paid employees must fill out the Online Worker’s Compensation form within 24 hours of the incident ([risk.byu.edu](http://risk.byu.edu) > Workers’ Compensation Injury in “Quick Links” list).

2. **Hazardous Chemicals**

- Faculty responsible for each laboratory will insure that instructors, graduate students and others involved in laboratory work: i.) receive the [College of Life Sciences General Lab Safety Training](http://byu.edu) (refer to the training instructions under Part 5), ii) receive specific training regarding hazardous chemicals as outlined in the HAZCOM program, and iii) know where the HAZCOM booklet and Material Safety Data Sheets (MSDS) are kept. If the lab involves exposure to human blood, faculty will also provide blood borne pathogen training. Lab specific training records are kept on file by the faculty advisor in the HAZCOM binder.
• Insure that all samples, reagents and waste are labeled with substance name, the date and the person responsible. Ensure all chemical labels are intact.

• Insure that the list of chemicals in the HAZCOM booklet is continually updated and the MSDS’s procured.

• A maximum of 10 gallons of solvent is allowed in each laboratory, unless stored in a flammable solvent storage cabinet. No chromic acid will be used.

The list below identifies which faculty member is responsible for HAZCOM safety for the following laboratories in the Eyring Science Center

<table>
<thead>
<tr>
<th>Room</th>
<th>Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-103, 115, 161, 169</td>
<td>Michelle Lloyd</td>
</tr>
<tr>
<td>S-126</td>
<td>Jason Kenealey</td>
</tr>
<tr>
<td>S-128, 161</td>
<td>Michael Dunn</td>
</tr>
<tr>
<td>S-145, 161, 169</td>
<td>Oscar Pike</td>
</tr>
<tr>
<td>S-185</td>
<td>Frost Steele</td>
</tr>
<tr>
<td>S-188</td>
<td>Jiping Zou</td>
</tr>
<tr>
<td>S-253, 261</td>
<td>Merrill Christensen</td>
</tr>
<tr>
<td>S-260, 269, 277</td>
<td>Jeff Tessem</td>
</tr>
<tr>
<td>C-284</td>
<td>Ana Mitchell/Julie Duncan</td>
</tr>
<tr>
<td>S-285</td>
<td>Chad Hancock</td>
</tr>
<tr>
<td>S-288</td>
<td>Susan Fullmer</td>
</tr>
</tbody>
</table>

3. **Hazardous waste disposal**

• Animal wastes, fluids, parts and carcasses are secured in plastic bags and disposed of in the special waste receptacle outside the office, 930 WIDB, for incineration.

• Each instructional and research laboratory has a container for disposal of needles, scalpels, broken glass, and other sharp objects. These objects are not placed directly in regular waste receptacles. Needles are broken prior to disposal. When full, the container is closed and disposed of in the normal waste receptacles.

• Disposal of hazardous chemicals is handled through the Chemistry department’s Chemicals Management Officer, James C. Cecil 105C NICB, ext. 2-6156. A Waste Information Tag must be filled out identifying the contents. Hazardous chemicals, including ethanol, must not be disposed of in drains. Waste chemicals must not accumulate in the laboratory.

• Radioisotope disposal conforms to federal, state, and university policies.
• Solid biohazardous waste only needs to be autoclaved before pickup if it is level 3 waste. Level 1 and 2 waste does not need to be autoclaved before pickup. Environmental Management has asked that you do not use the biohazard autoclave bags for level 1 and 2 waste. Please use standard red biohazard bag that is not marked for autoclave use. These bags can be purchased in the Life Sciences Stockroom.

• Environmental Management will now process liquid biohazardous waste if it is in a solid plastic jar or bucket. The bucket will be destroyed along with the liquid waste and will not be returned to you. For liquid biohazardous waste pickups, mark the plastic container as liquid biohazardous waste. If your liquid waste requires more than heat to deactivate the organism special arrangements can be made.

4. Other Safety Information

• No bikes allowed inside the building (against BYU Policy & Provo City Fire Code)

• If we have a fire drill, take all of your personal belongings with you. The Fire Marshall may not allow you to reenter the building in the case of a fire.

5. Lab Safety Training Instructions

1. The College of Life Science Laboratory Training must be taken prior to working in a research lab. To access the General Lab Safety Training Course go to ytrain.byu.edu and select “Catalogs” - > “Life Sciences” - > “Life Sciences General Lab Safety Training.” Enroll for the course. Click on “Go to Knowledge Center.”

2. You need to complete two items under the “Active and Completed Courses” list: 1) “Life Sciences Safety Training Information Form” and 2) “Life Sciences General Lab Safety Training.” You must complete the “Life Sciences Safety Training Information Form” first, before you can access the “Life Sciences General Lab Safety Training.”

(Note: After you submit the “Life Sciences Safety Training Information Form,” it may not take you directly back to the correct ytrain screen. If this happens, just click on “Home” - > “Current enrollments” and you should see the “Life Sciences General Lab Safety Training” listed.)
3. Talk with your faculty mentor about any specialty lab safety training you need for the specific project you will be working on.

4. After completion of each lab safety training procedure, have your faculty mentor sign and date the “Lab-Specific Training Record.” Once all required safety training is completed, you and your mentor will sign this document certifying your completion and it will go on file with your faculty mentor.

5. You need to complete a refresher safety training course at the beginning of each new academic year (vtrain.byu.edu).
**Problem statements, purpose, research questions, objectives/aims, hypotheses**

There are some basic components of a research study that should be well defined prior to conducting the study to guide the research process. Inclusion of each component helps the researcher(s) think through the research process. These components also help reviewers, funding sources, and statisticians understand your study. Some of these components overlap and so some researchers might not include all of them or they might combine them in a prospectus or proposal. Work with your advisor to determine which elements are most appropriate for your prospectus.

1. **Statement of the problem**
   a. The purpose of research is to solve a problem. The problem could be an unanswered question, a gap in knowledge, or dealing with a controversy (Walliman, 2011).
   b. The problem statement is the foundation of the study and study design (Chatburn, 2011).
   c. It is a brief 1-2 page overview that explains the problem you want to address. The problem statement is sometimes called the “background and significance” portion of a prospectus.
   d. The problem statement is not likely to be refined until the review of the literature is complete and the research questions are identified and well defined.

2. **Purpose of the study**
   a. The research purpose is a statement that identifies why you are doing the research. If the problem statement is well written, the purpose of the study statement will be a logical next sentence after the problem statement. It is often stated simply as, “The purpose of this research is to…..”

3. **Research questions**
   a. Research questions are questions you hope to answer within the purpose of your study. A concise, simple, straightforward statement of the research question focuses the research design process (Monsen, 2008). Good research questions use objective, measurable, operational terms such as identify, compare, differentiate, assess, or describe (Monsen, 2008).
   b. Typically research questions include the following:
      i. Who or what is being studied. Elderly men living alone, obese elementary school children, home stored flour, fatty acid content in rat muscle fibers, antioxidant potential in blueberries, etc.
      ii. What will be measured. Food intake, body weight, antioxidant capacity, selenium intake, etc.
      iii.
4. Research aims and objectives
   a. General aim(s) of a study are first defined and are then subdivided by subheadings
      called objectives (Holmes, 2011).
   b. A research aim is a general overarching statement about the research (Holmes, 2011).
   c. A research objective is a specific explanatory statement about elements within the
      research aim (Holmes, 2011).
   d. Study objectives and research questions are very similar and might be the same.
   e. If there is only one research objective, it will not likely be stated; only the
      research question will be stated.

Example:

The aim of the present study is to examine the food safety and quality of flour that has
been stored in consumers’ homes longer than 10 years.

**Objective 1:** To determine the amount of oxidation in flour stored longer than 10 years
compared to flour that is < 1 year old.

**Objective 2:** To determine the levels of vitamins B₁, B₂, B₃, and iron in flour stored
longer than 10 years compared to flour that is < 1 year old.

**Objective 3:** To determine the consumer acceptability of flour stored longer than 10
years compared to flour that is < 1 year old when baked into bread.

5. Hypotheses
   a. In order for a theory to be tested, it must be expressed as a statement called a
      hypothesis. Hypotheses are statements of, or conjectures about the relationship
      among two or more variables.
   b. Each objective should have a hypothesis.
   c. Hypotheses must be stated in a way they can be put to a test. They should
      identify the variables to be measured and propose their association/relationship
      (either no association/relationship or a directional association/relationship).
   d. Null hypothesis (H₀). Because we can never really prove a hypothesis, it is
      common to state that there will be no difference between variables, this is a Null
      hypothesis. In a null hypothesis, we assume up front that there is no
      difference/relationship until proven otherwise. If a statistical difference is found,
      then the “null” is determined to be false. When applying statistics to your
      hypothesis, the null requires a bi-directional statistical test (two-tailed), as you are
      stating that you don’t know if the relationship will be positive or negative. A
statistician will determine which statistics to apply based on the type of hypothesis that is presented.

e. **Alternate/directional hypothesis (H₁).** Sometimes researchers might prefer to predict *a priori* the nature of the relationship based on previous research, so a directional hypothesis is stated instead of a null. If a directional hypothesis is chosen, a one directional analysis can be performed (one-tailed test), which can have more statistical power. If statistically significant difference is found, then the hypothesis/theory is advanced. However, if there is no significant difference, then it can only be concluded there was no relationship or difference based on the direction predicted. It cannot be concluded that there is no association/relationship or difference between the variables or that an association exists in the opposite direction than predicted. Hence the null is often the default hypothesis.

f. **No hypothesis.** Some research designs such as qualitative research and descriptive studies might not have hypotheses. These study designs often use surveys, focus groups, or interviews. However, these studies should still have clearly stated research objectives or questions.

g. **Well written hypotheses include the following when possible (Monsen, 2008):**
   
i. It is measurable
   ii. Specifies the population/units being studied
   iii. Identifies a time frame
   iv. Specifies the type of relationship being examined
   v. Defines the variables being studied
   vi. States the level of significance that will be applied

**Examples:**

**Objective 1:** To determine the amount of oxidation in flour stored longer than 10 years compared to flour that is < 1 year old.

**Hypothesis 1 (H₀):** There is no difference in the amount of oxidation in flour stored longer than 10 years compared to flour that is < 1 year old when measured using headspace hexanal P <0.05.

**Hypothesis 1 (H₁).** Flour that has been stored longer than 10 years will have greater levels of oxidation compared to flour that is <1 year when measured by headspace hexanal, P <0.05.

**Objective 2:** To determine the levels of vitamins B₁, B₂, and B₃ in flour stored longer than 10 years compared to the amount stated on the food label, measured by HPLC.

**Hypothesis 2 (H₀):** There is no difference in the amount of vitamins B₁, B₂, or B₃, in flour stored longer than 10 years compared to the amount stated on the food label when measured by HPLC, P <0.05.
**Hypothesis 2 (H₁):** There will be a significant loss of vitamins B₁, B₂, or B₃, in flour stored longer than 10 years compared to the amount stated on the food label when measured by HPLC, P < 0.05.

**Objective 3:** To determine the consumer acceptability of flour stored longer than 10 years compared to flour that is < 1 year old when baked into bread.

**Hypothesis 3 (H₀):** There will be no difference in consumer acceptability of baked bread made from flour stored longer than 10 years compared to flour that is < 1 year old when measured by sensory analysis, P < 0.05.

**Hypothesis 3 H₁:** Bread baked from flour that has been stored longer than 10 years compared to flour that is < 1 year old will be significantly less acceptable when measured by sensory analysis, P < 0.05.

**Qualitative Research**

Qualitative research uses systematic techniques to obtain in-depth information about individuals’ perceptions, thoughts, or opinions about complex topics. Methods for collecting data include focus groups, interviews, observation, and media documents (newspaper, Internet, photographs). Health-related qualitative research often uses a health behavior theory as an underlying framework for question development. Because data collected is descriptive in nature, it is inappropriate to state specific hypotheses for anticipated outcomes. Rather, research questions and/or objectives more appropriately outline the focus of the research project. However, it is important to note that results from qualitative research are exploratory and can aid in developing theories that can then be validated through quantitative methods.

Examples:

**Research Questions:**

1. How does the homeless environment impact homeless children’s food choices?) What factors influence shopping behaviors among low-income families over a one-month period of time?

2. What do members of dinner groups see as the benefits and drawbacks of participation?

**Research Objectives:**

1. To determine the impact of the homeless environment on the food choices of homeless children.

2. To evaluate changes in shopping behaviors among low-income families over a one-month period of time.

3. To identify benefits and drawbacks of dinner groups.
References


Chatburn, RL. Handbook for Health Care Research. 2nd ed. Sudbury, MA: Jones and Bartlett; 2011.