PennState
College of
Agricultural Sciences

Department of Food Science

Graduate Handbook

2024-2025

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Department of Food Science Graduate Program Leadership

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Director of Graduate Studies ..... Dr. Helene Hopfer

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- Chair ..... Dr. Joshua Lambert
- Member ..... Dr. Darrell Cockburn
- Member ..... Dr. Catherine Cutter
- Member ..... Dr. Edward Dudley
- Member ..... Dr. Misha Kwasniewski
- Member ..... Dr. Yi Zhang
- Member ..... Dr. Gregory Ziegler
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- Grad Student Representative to GPC (PhD Program) ..... Ezekiel Warren

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Introduction

Welcome to the Department of Food Science!

We are excited to welcome you to your graduate school journey! This **Graduate Program Handbook** presents information important to students enrolled in the M.S. and Ph.D. programs in the Department of Food Science. Read this handbook carefully and repeatedly – it has a lot of information that becomes relevant at different stages throughout your graduate degree.

All graduate students must fulfill the general requirements stipulated by The Graduate School of The Pennsylvania State University for admission and the awarding of a M.S. or Ph.D. degree. In addition, each graduate major has specific coursework requirements, thesis research criteria, and established policies that must also be fulfilled. Procedures and rules have the goal of assuring uniform and high standards of performance – it is **your** responsibility to become familiar with and abide by them!

A successful graduate education goes beyond satisfactory completion of coursework and thesis requirements. You will develop professional skills that will aid you in your future career – take full advantage of all opportunities provided to you. Informal and frequent contact with the entire faculty and other graduate students is highly recommended – often these conversations will help you in your journey. Becoming a contributing member of our profession requires active involvement, and there are several opportunities for every graduate student to get actively involved with the Department, College, and the University during your time here at Penn State. You are encouraged to participate in Department, College, University and professional society committees (i.e., the Food Science Club, Graduate Students' Association, Institute of Food Technologists, etc.) to round out your graduate degree experience.

This handbook is intended to serve as a navigation guide through your graduate program. Your graduate advisor, committee, and I are here to guide your progress, but the ultimate responsibility for the program resides with you. You have been awarded a great opportunity – make sure you make the most of it! Please let me know if you have any suggestions for this handbook.

I wish you much success as you embark on your graduate degree program.

Helene Hopfer
Director of Graduate Studies

Department Expectations of Graduate Students

M.S. Students

A student in the M.S. degree program will be knowledgeable about the field of food science in general. This knowledge will be acquired primarily through satisfactory completion of required coursework and attendance at departmental seminars. Additionally, our students will develop the ability to learn independently by determining, finding, and using necessary resources. Our students will also develop the ability to make decisions and judgments based on their knowledge. Furthermore, the student will be capable of addressing a research problem through a series of sustained, logical experiments and bring their research work to a satisfactory conclusion in the form of a M.S. thesis. Finally, it is expected that the thesis research will be of publishable quality and, as a minimum, will be communicated through at least one oral presentation or poster session at a scientific meeting.

The learning outcomes for the M.S. degree in the Department of Food Science are:

1. **Know**. Graduates will develop a deep conceptual understanding of food chemistry, microbiology, engineering, and nutrition.
2. **Critical thinking**. Graduates will be able to solve practical problems in the food science field.
3. **Research**. Graduates will demonstrate the ability to design scientific approaches to solve practical problems and to select appropriate methods of data analysis.
4. **Communicate**. Graduates will be able to accurately report the results of research data in the field of food science through written and oral presentations.
5. **Professional practice**. Graduates will conduct themselves in an ethical and professional manner.

Ph.D. Students

In addition to the expectations described above for our M.S. students, a student in the Ph.D. degree program will develop the ability to determine and conceptualize a research problem, design the scientific approaches and experiments to address it and bring their research work to a satisfactory conclusion in the form of a Ph.D. dissertation. Finally, it is expected that the dissertation research will be of publishable quality and, as a minimum, will be communicated through an oral presentation or poster session at a regional or national scientific meeting and through at least one publication in a peer-reviewed journal.

The learning outcomes for the Ph.D. degree in the Department of Food Science are:

1. **Know**. Graduates will develop a deep conceptual understanding of food chemistry, microbiology, engineering, and nutrition.
2. **Critical thinking**. Graduates will be able to apply their knowledge to independently identify and define original research problems.
3. **Research**. Graduates will demonstrate the ability to design scientific approaches to solve unanswered questions and to select appropriate methods of data analysis.
4. **Communicate**. Graduates will be able to accurately report the results of research data in the field of food science through written and oral presentations.
5. **Professional practice**. Graduates will conduct themselves in an ethical and professional manner.

Requirements for a Degree in Food Science

General Degree Requirements

General Coursework Requirements

Students receiving a M.S. or Ph.D. in Food Science must have satisfactorily completed (Grade C or above) FDSC 500A, FDSC 500B, FDSC 500C, FDSC 500D, and FDSC 501.

It is the responsibility of international graduate students to take the Penn State American English Oral Communicative Proficiency Test (AEOCPT) prior to their first semester in the program. The Graduate Program Coordinator will register international students for this exam and notify students of their test date/time in advance of arrival. To view details and additional information, please visit About AEOCPT.
Exemptions: Citizens of countries listed on this Graduate School webpage are exempt from the AEOCPT. Degrees from countries on the list, including the US, do not exempt students from the AEOCPT.

Teaching Experience

All Food Science graduate students have an academic requirement of obtaining teaching experience for their graduate degree. Non-Food Science graduate students advised by Food Science faculty are expected to serve as Teaching Assistants (TAs) in the Department as if they were Food Science graduate students.

Graduate students in their first year are expected to register for FDSC 602, Supervised Experience in College Teaching, in preparation for a Teaching Assistant (TA) assignment beginning in year two. From the second year on, a graduate student can expect to TA once per year. Therefore, M.S. students completing the degree in two years would TA once during their degree program and a Ph.D. student completing the degree in three years would TA twice during their program.

During each Spring semester the Graduate Program Coordinator informs the Director of Graduate Studies (DGS) of the students eligible for a TA assignment. The Graduate Program Coordinator solicits student preferences for courses to TA, and the DGS solicits faculty preferences for students to assist as TA. The DGS then makes tentative assignments based on the following priorities:

- Required courses with lab sections take precedence.
- Both student and faculty preferences and the obligation to provide a quality experience to the undergraduates. For this reason, qualifications (research area) and past TA experience are important and considered.
- Anticipated graduation date to avoid a TA assignment in the last semester. If the Graduate Program Coordinator is made aware of graduate date, effort is made to avoid course conflicts.
- Preference that graduate students do not TA for their research advisor(s).

It is recommended that TAs visit the University Bulletins Undergraduate Food Science Courses to become familiar with the Food Science undergraduate courses. For additional information on courses (beyond that available in the Bulletin, e.g. a course syllabus), contact the course instructor or ask a fellow student that has assisted with the course in the past.

The DGS discusses the tentative assignments with the Department Head to arrive at the final TA assignments for the coming academic year. The final assignment is typically communicated in late spring.

Assistantships/Time Limitations

Department Assistantship appointments are normally ½ time (20 hours/week, plus 9-12 credits) and made on an annual basis. Renewal of the assistantship is contingent on satisfactory academic progress. Please discuss with your advisor(s) what this entails.

Grade-Point Average

A minimum grade-point average of 3.0 for work done at the University is required for graduation. See policy GCAC-404 Satisfactory Scholarship.

Annual Review

Each spring there will be a formal review of all students to ascertain progress through the program. The ***Annual Graduate Student Evaluation Form*** will be sent to the student using Adobe Sign for completion and processing. Once a student completes, signs, and submits the form, it will then automatically go to the advisor(s) for completion. The form then goes back to the student for acknowledgement of their advisor(s) evaluation, and finally the form is submitted automatically to the DGS for review and approval. This process is generated through the Graduate Program Coordinator.

Thesis Research Seminar

All Food Science graduate students are required to present a seminar on their completed research before their final defense. The presentation is to be 30-45 minutes in length with an abstract and bibliography made available to the audience. This presentation is viewed as a professional obligation to the Department and is considered a general Food Science graduate degree requirement. The seminar should be scheduled preferably during the weekly Department Seminar Series, if possible. Weekly seminars through the Department Seminar Series are planned one semester in advance and organized through the Seminar Committee. Department seminars have a set weekly schedule of Thursday at 4 p.m. during the fall and spring semesters. ***The scheduling of a thesis research seminar is administered by the student's advisor in conjunction with their thesis committee, the Seminar Committee, and the Graduate Program Coordinator. Provide the Graduate Program Coordinator with the title and abstract of the seminar at least two weeks prior to the scheduled seminar. If not a part of the Department Seminar Series, the student should notify the Graduate Program Coordinator once the seminar date is determined and no later than 45 days prior to the date of the seminar so that a room can be reserved.*** The thesis research seminar will be evaluated by members of the Graduate Faculty in Food Science using the rubric detailed in the ***Defense Seminar Review Form***. The student and advisor should ask three faculty who are not on the student's committee to serve as evaluators. One evaluator may be a post-doc. The completed evaluations will be given to the Graduate Program Coordinator who will share the completed evaluations with the student. This evaluation is part of the ongoing assessment of the Graduate Program in Food Science by the Graduate Program Committee (GPC) and is not part of the thesis defense.

Electronic Submission of Dissertation and Thesis (eTD)

Electronic submission of the final dissertation (eTD) is a requirement for all graduate doctoral students at Penn State. Master's students must also submit the final thesis as an electronic document. Both should be submitted for formatting review and final submission by the Thesis, Dissertation, Performance and Oral Presentation Deadlines Calendar as per GSAD-510 - Thesis Submission. For information on formatting requirements and the submission process see the Thesis and Dissertation Handbook. Visit the eTD website to review previously uploaded Theses and Dissertations.

Dual-Title Degree Programs

For general information on Dual-Title Degree Programs, review Policy GCAC-208.

Clinical and Translational Science

The Department of Food Science participates in the Clinical and Translational Science Dual Title program. Visit the CTS Dual Title Handbook to review the requirements of the program. ***A CTS graduate faculty member must be included on the doctoral committee and must participate in all doctoral milestones (qualifying exam, comprehensive exam, defense).***

International Agriculture and Development

The Department of Food Science participates in the International Agriculture and Development (INTAD) Dual Title program. Visit INTAD Degree Requirements for more information. ***An INTAD graduate faculty member must be included on the master's or doctoral committee and participate in all milestones (qualifying exam, comprehensive exam, defense).***

Microbiome Sciences – *Coming Soon!*

The Department of Food Science plans to participate in the Microbiome Sciences Dual Title program. This program is not completely through the approval process at the release of this handbook. It is anticipated that approval will be completed for implementation in Spring 2025. ***A Microbiome Sciences graduate faculty member will need to be either the chair or else appointed as co-chair of the doctoral committee and participate in the oral comprehensive exam and final thesis defense. Note that the topic of the thesis must contain a substantial microbiome component.***

Penn State Graduate School Policies

The Department of Food Science adheres to The Graduate School Policies. Below are several policies more frequently referenced (in numeric order). For a complete list of Graduate School policies, visit Penn State Graduate School Policies.

Transfer Credit: GCAC-309 Not applicable for Ph.D. Program.

Credit Load: GCAC-501

Credit Load for International Students: GSAD-502

Continuity of Registration and Resume Study: GCAC-514

Registration Requirements When Course Work Has Been Completed: GCAC-515

Residency Requirement: GCAC-601

Time Limitation – Research Doctorate: GCAC-610

Time Limitation – Research Master's: GCAC-632

Student Conduct and Performance Policies:
Conduct: GCAC-801
Student Affairs: The Student Code of Conduct
Procedures for Resolution of Problems: GCAC-802

Termination of the Degree Program of a Graduate Student for Unsatisfactory Scholarship GCAC-803

Termination of Assistantships Due to Inadequate Performance: GCAC-804

Graduate Assistants: GSAD-901

Graduate Student Leave of Absence: GSAD-906

Graduate Enrollment Services: Student Forms

M.S. Degree Requirements

The graduate school requirements for the M.S. degree are described in detail in the Graduate Bulletin. Additional general and specific requirements determined by the Food Science Faculty are provided on the M.S. Requirements Worksheet.

Master's Thesis Committee

Any approved member of the Penn State Food Science Graduate Faculty may advise a master's student. In addition, the Department of Food Science requires a Master's Thesis Committee of at least three members, to include one additional member of the Food Science Graduate Faculty other than the advisor. If a minor has been selected, a faculty member representing the minor field must be appointed to the committee. Master's students, in consultation with their advisor, shall establish a thesis committee by the end of their second semester in the graduate program. All graduate students shall have a minimum of one formal thesis committee meeting annually. This meeting will be reported as part of the ***Annual Graduate Student Evaluation*** and will be a factor in determining if adequate progress to degree is being made. ***Please complete the Master's Committee Appointment Signature Form to appoint or revise the Master's Thesis Committee. Provide this form to the Graduate Program Coordinator once the committee is formed.***

Thesis Research Seminar

Upon completion of thesis research and prior to the Final Thesis Defense, each student will present a seminar to the Department. The thesis seminar must be scheduled so that the student's committee can attend. ***The scheduling of a thesis research seminar is administered by the student's advisor in conjunction with their thesis committee, the Seminar Committee, and the Graduate Program Coordinator. Provide the Graduate Program Coordinator with the title and abstract of the seminar at least two weeks prior to the scheduled seminar. If not a part of the Department Seminar Series, the student should notify the Graduate Program Coordinator once the seminar date is determined and no later than 45 days prior to the date of the seminar so that a room can be reserved. Refer to Thesis Research Seminar, provided herein, for further details and information.***

Thesis Defense

A copy of the student's thesis must be given to each committee member two weeks prior to the scheduled Thesis Defense, and a majority of the committee members must agree to proceed with the defense one week prior to the scheduled Thesis Defense. The thesis must be in the format acceptable for submission to the Graduate School. ***Confirm the date/time/room with the Graduate Program Coordinator no later than 45 days prior to defense.*** See The Graduate School's Thesis and Dissertation Information here.

The M.S. Requirements Worksheet will be used as a guideline to ascertain if all requirements for the M.S. degree have been fulfilled and must be completed and submitted to the Graduate Program Coordinator BEFORE the Thesis Defense can be scheduled. It is the responsibility of the student to ensure that all appropriate requirements for a degree have been met.

Electronic Submission of the Thesis (eTD)

Master's students must submit the thesis for formatting review and the final thesis as an electronic document according to the dates provided by The Graduate School's Thesis, Dissertation, Performance and Oral Presentation Deadlines Calendar as per GSAD-510 - Thesis Submission. For information on formatting requirements and the submission process see the Thesis and Dissertation Handbook. Visit the eTD website to review previously uploaded Theses and Dissertations.

Graduation

Students must notify the University of Intent to Graduate and apply for graduation via LionPATH according to the deadlines provided by the Registrar's Academic Calendar for the appropriate academic semester (typically a period of approximately 6 weeks at the beginning of the semester graduating).

Exit and Checkout

Students are required to schedule an exit interview with the Department Head via the Department Head's Administrative Assistant. It is preferred that the exit interview be in person prior to departure from campus. Please plan accordingly to schedule the exit interview at least one week in advance. An example of the Exit Interview Questions are included herein for reference.

Students should also complete the tasks on the ***Graduate Student Graduation Checkout Sheet*** prior to departure from campus.

Continuing onto Ph.D. Program after the M.S. Degree

Students may consider continuing onto the Ph.D. program upon completion of their M.S. degree. To activate their application for the Ph.D. program a student must submit the *Resume Study/Change of Graduate Degree or Major application* in the online GRADS application system including an updated Statement of Purpose and a letter of recommendation from the student's advisor. **Click Change of Major/Degree and submit an application to apply.** ***Successful completion of the M.S. degree does not guarantee admission to the Ph.D. program.***

M.S. Graduate Program Checklist

Year 1

_____ Obtain ID card, set up access/email account, complete pre-registration activities, obtain keys, attend orientation

_____ **International Students Only** - Take AEOCPT Exam prior to 1st semester. Graduate Program Coordinator will register international students. AEOCPT Information. Citizens from countries listed here are exempt.

_____ Complete EHS - Initial Laboratory & Research Safety Training - University Park

_____ Schedule FDSC 500 A, B, C, D, FDSC 501, and FDSC 602

_____ Schedule other 400 and 500 level courses in consultation with advisor(s)

_____ Schedule FDSC 600: Thesis Research (Request enrollment through Graduate Program Coordinator)

_____ Appoint thesis committee (Submit Master's Committee Appointment Form to Graduate Program Coordinator)

_____ Annual Evaluation

_____ Schedule thesis committee meeting(s) in consultation with advisor(s)

_____ Develop a coursework plan in consultation with thesis committee

_____ Develop thesis proposal and present to thesis committee

_____ Complete SARI (FDSC 501 satisfies the SARI requirement)

Year 2

_____ Schedule other 400 and 500 level courses per coursework plan

_____ Schedule FDSC 600: Thesis Research (Request enrollment through Graduate Program Coordinator)

_____ Schedule thesis committee meeting(s) in consultation with advisor(s)

_____ Serve as TA

_____ Write thesis & manuscript(s)

_____ Activate "Intent to Graduate" the semester intending to graduate (via LionPATH by deadline)

_____ Submit Thesis for format review with Graduate School Thesis Office by deadline

_____ Schedule Thesis Seminar with Seminar Committee/Graduate Program Coordinator (provide Graduate Program Coordinator with seminar title & abstract along with names of evaluators at least two weeks in advance)

_____ Schedule Thesis Defense & submit MS Requirements Worksheet to Graduate Program Coordinator (inform Graduate Program Coordinator of date & time no later than one month prior to defense)

_____ Submit thesis online for Committee, Department Head, & Graduate School approval. It is recommended to check with the department head's administrative assistant and confirm the department head's availability prior to submitting thesis.

_____ Schedule Exit Interview with Department Head via their administrative assistant

_____ Annual Evaluation

_____ Complete Graduation Checkout List

_____ Return keys, PCard, and equipment. Complete PCard travel & expense reports, vacate office

M.S. Requirements Worksheet

This 2-page form should be used to show how M.S. Requirements were met. These 2 pages must be submitted to the Graduate Program Coordinator at 207 Erickson Food Science Building, ***before*** *Thesis Defense can be scheduled.*

Name: _____ **Date:** _____

Requirements listed below are in addition to the Graduate Council policies listed under GCAC-631-Degree Requirements - Research Master's.

A minimum of 30 credits at the 400, 500, 600 or 800 level is required, with at least 18 credits in the 500 and 600 series, combined. There are **30** credits required in the following core courses:

Required Courses	**Required Credits**	**List 400/500 Courses Completed**	**Semester Completed**	**Credits Completed**
FDSC 500A: Fundamentals of Food Science - Microbiology	1			
FDSC 500B: Fundamentals of Food Science - Engineering	1			
FDSC 500C: Fundamentals of Food Science - Chemistry	1			
FDSC 500D: Fundamentals of Food Science - Nutrition	1			
FDSC 501: Research Methods in Food Science	2			
6 credits of other 500-level FDSC courses (3 credits of the requirement can be satisfied by 400-level Food Science courses with permission of the advisor.)	6			
6 credits of 400- or 500-level courses – must include Statistics (STAT 500 or equivalent)	6			
Remaining Credits The remaining 6 credits may be chosen from the list of Suggested Non-Food Science Courses maintained herein.	6			
Culminating Experience				
FDSC 600: Thesis Research	6			
Total Credits	**30**			
FDSC 602: Supervised Experience in College Teaching	1			

In addition, M.S. students are required to complete 1 credit of FDSC 602: Supervised Experience in College Teaching prior to the TA experience; however, this 1 credit cannot be counted towards the minimum 30 credits required.

The M.S. degree also requires the formation of a master's committee, the writing of a satisfactory thesis accepted by the master's committee, the head of the graduate program, and The Graduate School, and the passing of a final oral examination.

Please provide the following information:

- Date of MS Thesis Defense:

- Publications resulting from thesis work (please list complete citation for articles published and also list titles and authorship of manuscripts planned or in preparation).

- Presentations at scientific meetings based on thesis work (please list title and authorship on presentations, both oral and poster sessions, at regional or national scientific meetings).

- Awards (please list awards received at professional meetings and all scholarships and fellowships awarded during graduate studies at Penn State).

- If known, please provide title and location of employment after graduation.

Student Signature	Date
Advisor Signature	Date
Advisor Signature	Date

M.S. Requirements Worksheet - Page 2 of 2

Master's Committee Appointment and Signature Form

Please complete and submit this form to Graduate Program Coordinator.

Student Name: _____

Advisor: _____

Co-Advisor: _____

Committee Chair

_____	_____	_____
Name	Signature	Date

Committee Members

_____	_____	_____
Name	Signature	Date
_____	_____	_____
Name	Signature	Date
_____	_____	_____ (Optional)
Name	Signature	Date

Ph.D. Degree Requirements

The graduate school requirements for the Ph.D. degree are described in detail in the Graduate Bulletin. Additional general and specific requirements determined by the Food Science Faculty are presented here PhD Requirements with an MS and PhD Requirements without an MS.

The Doctor of Philosophy degree is the highest mark of achievement of the University for creative scholarship and research. Doctoral study develops the student's capacity to make significant contributions to knowledge. Except in special cases, a M.S. degree in Food Science is earned before pursuing a Ph.D. degree.

English Competency

GCAC-605 English Competence – Research Doctorate requires that every graduate program have a formal mechanism for assessing and improving English language competence of both domestic and international students. The AEOCPT, TOEFL and/or IELTS tests do not adequately assess the level of English competence expected of a doctoral degree student and for conferral of a doctoral degree from Penn State. Therefore, all Ph.D. students must be assessed for English Competency as defined herein and according to GCAC-605.

In the Department of Food Science, the English Competency is assessed using a written and an oral component. The Department defines the written component as the ability to relate scientific information in clear and easy-to-understand language using correct English grammar, syntax, spelling, and punctuation, and the oral component as the ability to listen, comprehend, and convey scientific and general information in an understandable manner.

The Department of Food Science will assess English Competency simultaneously during each student's Qualifying Examination (QE). Final assessment of English Competency will be provided in the written results of the QE. The following English Competency guidelines coincide with the Qualifying Examination section in its entirety, described herein.

1. Two weeks prior to the QE, the QE Committee will provide the student with a research paper of broad relevance to food science to review.
2. Students are required to write a 1-page critique of the reviewed research paper in full sentences (no bullet points). A favorable assessment will satisfy the written portion of the English Competency requirement. Results of assessment will be provided in the written results of the QE.
3. Students should provide their presentation slides and 1-page critique to the QE Committee two days before their scheduled QE, as also indicated herein under the QE requirements.
4. Students will be required to orally present a 30-minute critique of the research paper. The student's oral English Competency will be assessed during this presentation. A favorable assessment will satisfy the oral portion of the English Competency requirement. Results of assessment will be provided in the written results of the QE.

Improvement of English Competency and Remedial Steps

A Ph.D. student must satisfactorily complete both the written and oral components of the English Competency assessment. In case of unsatisfactory performance in one or more parts, a recommendation to take appropriate remedial course(s) will be made at the time of reporting the outcome of the QE. Those students whose writing is assessed below acceptable standards will be required to take one or more appropriate technical writing courses. Those students whose scientific communication and/or English Competency is assessed below acceptable standards will be required to take ESL 115G, 117G or 118G or other appropriate courses. Remedial steps will be conveyed in the written results of the QE. English competence shall be formally attested to by the student's doctoral committee and communicated to the Graduate Program Coordinator before the doctoral student's Comprehensive Examination is scheduled.

Qualifying Examination

The Qualifying Examination (QE) will be administered consistent with policy GCAC-604 Qualifying Examination. ***Students must take the QE within 3 semesters (not counting summer semesters) of entry into the doctoral program.***

Purpose

The primary purpose of the QE is to provide an early assessment of whether the student has the potential to develop the knowledge, skills, and attributes the program has defined in its formal Learning Objectives, including evidence of critical thinking skills, necessary for a successful researcher in the disciplinary field.

Eligibility

To be eligible to take the QE, the student must:

- Have a M.S. degree or have completed at least 18 credits of graduate coursework beyond a Baccalaureate degree, prior to taking the QE.
- Have a grade-point average of 3.00 or greater for work done at the University while a graduate student.
- Have no incomplete or deferred grades.
- Be in good academic standing as a registered full-time graduate student for the semester (excluding summer semester) in which the QE is taken.

Criteria for Evaluation

Below is a description of the specific evaluation criteria as developed by the Graduate Faculty in Food Science and administered by the Qualifying Examination Committee (QEC) under the direction of the Department Head, who is also Head of the Food Science Graduate Program.

Before taking the QE, students should have knowledge of the following areas with an emphasis on principles/concepts rather than details:

1. The scientific method, including hypothesis development, basic experimental design, and methods of data analysis.
2. Scientific ethics and academic integrity.
3. How to effectively communicate scientific research information to a wide variety of audiences.
4. Principles of chemistry and biochemistry of foods, including food ingredients and food systems from raw materials to during and after processing.
5. Principles of food microbiology, including beneficial and detrimental aspects of microorganisms in foods, as well as methods used for detection, enumeration, and control of microorganisms important in foods.
6. Principles of nutrition with emphasis on aspects of human physiology and metabolism, nutrient intake and utilization, nutrition surveillance and dietary recommendations, and the impact of food intake patterns on health.
7. Principles of food engineering, including fluid flow and heat transfer, as applied to unit operations in food processing and manufacture.

Qualifying Examination Committee Composition

The Ph.D. Qualifying Examination Committee (QEC) will be composed of four Food Science faculty members representing the diversity of disciplines within Food Science. Members will be appointed by the Department Head for a period of four years and will become Chair of the QEC in their fourth year. All QEC members will have equal rights and voting privileges. When a member of the QEC has a conflict of interest (e.g. advisor of the Ph.D. student being evaluated) that member will be responsible for finding a substitute within the Food Science Faculty in the field they represent and notifying the QEC and the student of the change. In the event the Chair of the QEC has a conflict of interest, the next senior member of the QEC will act as Chair.

Scheduling

Students must take the QE within 3 semesters (not counting summer semesters) of entry into the doctoral program. The QE will be administered during December and May, preferably when classes are NOT in session. Approximately two months before conducting the QE, the Chair of the QEC or the Graduate Program Coordinator will ask all Food Science graduate students of their intent to take the QE. Approximately one month prior to the QE, the Chair of the QEC will meet collectively with the students scheduled to take the QE to explain the procedures and expectations for the exam and clarify the protocol and evaluation criteria.

Evaluation

The QE will consist of a written and an oral examination. The QE is used to evaluate a student's potential for Ph.D. research, including the student's ability to think critically, analyze research problems, and communicate means to approach and examine these problems. In general, as administered in the Food Science Graduate Program, this examination is designed to assess three things: 1) the student's ability to engage in critical thinking within the field of food science, 2) the student's knowledge in broad areas of the field, with an emphasis on understanding central principles and concepts rather than specific factual detail, and 3) the student's oral and written English Competency as identified herein and as required by GCAC-605.

TWO WEEKS BEFORE THE SCHEDULED QE:

1. ***Students provide the QEC with the following:***
   - ☐ A copy of the master's thesis and any relevant published work.
   - ☐ Transcripts of undergraduate and graduate course work.
   - ☐ Statement of purpose for Ph.D. studies (professional goals, major research interests and plan for completing Ph.D.).
   - ☐ A list of courses taken and to be taken at Penn State.
2. ***QEC provides students with a research paper of broad relevance to food science.*** This paper will be selected by the QEC. An ideal research paper will describe food science research and be published in a core food science journal (e.g. *Journal of Food Science, Journal of Agricultural & Food Chemistry, Food Microbiology, Journal of Food Engineering, American Journal of Clinical Nutrition*). The research paper should be broadly comprehensible to all members of the QEC and should have some flaws that the student can identify and critique.

Written Component: The student is required to write a 1-page critique on the reviewed research paper in full sentences (no bullet points). The student shall provide the 1-page critique to the QEC two days before their scheduled QE. Upon favorable assessment, this written component will simultaneously satisfy the written portion of the English Competency requirement, as described herein.

Oral Component: The QE will begin with the student presenting a **30**-minute critique of the research paper. Students may use visuals aids and notes, but a written draft that could be read from will not be permitted. After the presentation, the QEC will have the opportunity to ask questions regarding information presented in the paper, primarily to evaluate overall understanding of the work and how it is related to other areas in food science. The aim of these questions is to determine the student's ability to show a clear understanding of the data presented and to demonstrate competency in explaining research data to a scientific group in a logical and precise manner. It is expected that the student will have a thorough understanding of all aspects of the research paper including background literature and all methodology used. The student shall provide a copy of the presentation to the QEC two days before their scheduled QE. Upon favorable assessment, this oral component will simultaneously satisfy the oral portion of the English Competency requirement, as described herein.

The student shall provide the 1-page critique and a copy of the presentation slides to the QEC members *two days before* their scheduled QE.

Decision of the Qualifying Examination Committee and Communication of Results

The primary outcome of the examination is either pass, fail with an opportunity for a re-examination, or fail. To pass, the student must receive at least 3 out of 4 positive votes from the QEC. If the decision is to fail the student (less than 3 of 4 positive votes from the QEC) the QEC will then vote to determine whether the student may retake the QE. At least 3 out of 4 positive votes are required to allow a retake and the QE must then be taken at the next available opportunity. Students will only be given one opportunity to retake the QE. The result of the QE (pass, fail with the opportunity to retake, or fail with no opportunity to retake) will be communicated to each student immediately after their QE. Within a week after all the qualifying examinations are finished, each student taking the QE, their advisor(s), all members of the QEC, the Department Head and the Director of Graduate Studies will be notified in writing as to the outcome of the QE and English Competency assessment, whether the QEC perceived any specific deficiencies and what coursework and/or other work are recommended to remedy the perceived deficiencies.

Specifically, the QEC will assess the following student abilities with the goal of determining the student's potential to successfully conduct independent research and complete a doctoral degree in Food Science:

1. *Structure of a Study:* Ability to identify the hypothesis, objectives, and major experiments in a peer-reviewed scientific publication.
2. *Strengths & Weaknesses:* Ability to identify the strengths and weaknesses related to the hypothesis, experimental approaches, and data interpretation.
3. *Significance & Implications:* Ability to place a particular study into the broader context of the scientific literature in terms of its significance to food and related science (the extent to which it advances the field, answers important long-standing questions, raises new questions), and industry and public health stakeholders (is the topic important to industry, public health, is it translatable beyond the laboratory).
4. *Future Studies:* Ability to outline experiments to extend or improve the studies reported in a particular peer-reviewed publication.
5. *Speculating/Hypothesizing:* Ability to answer questions rooted in, but peripheral to, a particular peer-reviewed scientific study. The answers should demonstrate critical thinking, a broad knowledge of food science and related disciplines, and the ability to formulate an answer with incomplete information/expertise, and intellectual honesty (i.e. student is aware and forthcoming about what they know and what they do not know and are willing to share that information with the committee).
6. *Scientific Communication:* Ability to summarize and effectively communicate study design, key findings, implications, and strengths and weaknesses of a particular study.
7. *English Competency:* Ability to relate scientific information in clear and easy-to-understand language using correct English grammar, syntax, spelling, and punctuation, and the oral component as the ability to listen, comprehend, and convey scientific and general information in an understandable manner as required by GCAC-605 English Competence - Research Doctorate.

The QEC will evaluate each student in terms of each of the above abilities and score them as Outstanding, Very Good, Acceptable, Marginal or Not Acceptable. For the student to pass, 4 of the first 5, and 6 and 7 must rate Acceptable or greater.

Ability	Ability Description	Outstanding	Very Good	Acceptable	Marginal	Not Acceptable
1	Structure of a study					
2	Strengths & weaknesses					
3	Significance & implications					
4	Future Studies					
5	Speculating/Hypothesizing					
6	Scientific Communication					
7	English Competency					
	Written					
	Oral					
	Remedial steps, if necessary:					

Formation of Doctoral Committee

GCAC-602 Ph.D. Committee Formation, Composition, and Review Ph.D. students, in consultation with their advisor, **shall establish a thesis committee within 1 month of completing the QE**. ***Please complete the Doctoral Committee Appointment Signature Form to appoint and/or revise the Doctoral Committee and provide to the Graduate Program Coordinator for processing.*** **This must be completed prior to scheduling the Oral Comprehensive Examination. All graduate students shall have a minimum of 1 formal thesis committee meeting annually**. This meeting will be reported as part of the ***Annual Graduate Student Evaluation*** and will be a factor in determining if adequate progress to degree is being made.

Oral Comprehensive Examination

GCAC-606 Comprehensive Examination The student coordinates scheduling of their comprehensive exam with their advisor and doctoral committee. Once a date for the exam has been confirmed, the student must notify the Graduate Program Coordinator of the date, time, and location of the exam. The Graduate Program Coordinator must then enter the request in LionPath for Department Head and Graduate School approval. The comprehensive exam is officially scheduled and announced by the Office of Graduate Enrollment Services. ***Confirm and coordinate the date/time/room with the Graduate Program Coordinator at least 3 weeks in advance for processing and room reservation request. At this time, students must also provide the Graduate Program Coordinator with a PDF of their transcript and their completed Ph.D. Requirements Checklist (as applicable, w/MS or w/out MS).***

The Ph.D. Comprehensive Exam is a thorough test of the student's knowledge and intellectual capability. The student is expected to demonstrate a mastery of food science and be able to utilize that knowledge to interpret research and creatively solve problems. **It should be noted by all students admitted into the Ph.D. program that, according to The Graduate School, the graduate student has no official status as a doctoral student until the Oral Comprehensive Examination has been passed.**

The examination shall consist of both a written and an oral component. The written component will consist of ideally, a research proposal but may be a different written piece of work (e.g., manuscript), determined in consultation with the committee and student, not to exceed 20 pages in length. The format and topic of the written proposal will be determined by the thesis advisor(s), in consultation with the committee and the student. The proposal will be distributed to each member of the student's committee at least two weeks prior to the oral component of the examination.

The comprehensive examination is held in-person. The student, advisor, and all regular Ph.D. committee members (major field, outside field, outside unit, minor field) must be physically present for the examination. Special committee members are encouraged to be physically present but may participate remotely.

If a fully in-person examination is not possible due to extenuating circumstances, the Graduate Program Head may approve, at their discretion, the remote participation of the student and/or members of the committee. If the Graduate Program Head does not approve the request for remote participation, either the student or advisor may appeal to the Associate Dean for Research and Graduate Education of the College of Agricultural Sciences.

The oral examination should be comprehensive in nature and not merely focus on the student's thesis research (questions are not limited to the narrow subject matter under investigation). A favorable vote of at least two-thirds of the members of the committee is required to pass. Based on the student's performance, the committee may recommend to the Dean of the Graduate School one of the following actions:

1. That the student be passed,
2. That the student be re-examined later,
3. That the student be failed and dropped from the Ph.D. program.

Students who pass their comprehensive exam can register for FDSC 601 (Ph.D. dissertation full time) for zero credits. Tuition is not charged for this course but there is a Ph.D. Dissertation Fee. ***Students need to submit an email request to the Graduate Program Coordinator to be enrolled in FDSC 601.***

Thesis Seminar

Upon completion of thesis research and prior to the Final Oral Examination/Defense, each student will present a seminar to the Department. The thesis seminar must be scheduled so that the student's committee can attend. ***The scheduling of a thesis research seminar is administered by the student's advisor in conjunction with their thesis doctoral committee, the Seminar Committee, and the Graduate Program Coordinator. Provide the Graduate Program Coordinator with the title and abstract of the seminar at least two weeks prior to the scheduled seminar. If not a part of the Department Seminar Series, the student should notify the Graduate Program Coordinator once the seminar date is determined and no later than 45 days prior to the date of the seminar so that a room can be reserved. Refer to Thesis Research Seminar, provided herein, for further details and information.***

Thesis Defense

A copy of the student's thesis must be given to each member of their doctoral committee two weeks prior to the scheduled Thesis Defense and a majority of the committee members must agree to proceed with the defense one week prior to the scheduled Thesis Defense. The thesis must be in the format acceptable for submission to the Graduate School. ***Confirm the date/time/room with the Graduate Program Coordinator no later than 45 days prior to defense.*** *See The Graduate School's Thesis and Dissertation Information here.*

Final Oral Examination/Defense

GCAC-608 Final Oral Examination The student coordinates scheduling of their final oral examination with their advisor and doctoral committee. Once a date for their exam has been confirmed, the student must notify the Graduate Program Coordinator of the date, time, and location of the exam. The Graduate Program Coordinator must then enter the request in LionPath for Department Head and Graduate School approval. The final oral examination is officially scheduled and announced by the Office of Graduate Enrollment Services. ***Confirm and coordinate the date/time/room with the Graduate Program Coordinator at least 3 weeks in advance for processing and room reservation request.***

The final oral examination (dissertation defense) is held in-person. The student, advisor, and all regular Ph.D. committee members (major field, outside field, outside unit, minor field) must be physically present for the examination. Special committee members are encouraged to be physically present but may participate remotely.

If a fully in-person examination is not possible due to extenuating circumstances, the Graduate Program Head may approve, at their discretion, the remote participation of the student and/or members of the committee. If the Graduate Program Head does not approve the request for remote participation, either the student or advisor may appeal to the Associate Dean for Research and Graduate Education of the College of Agricultural Sciences.

The Ph.D. Requirements Worksheet will be used as a guideline to ascertain if all requirements for the Ph.D. degree have been fulfilled and must be completed and submitted to the Graduate Program Coordinator BEFORE the Final Oral Examination/Defense can be scheduled. It is the responsibility of the student to ensure that all appropriate requirements for a degree have been met.

Electronic Submission of the Thesis (eTD)

Electronic submission of the final dissertation (eTD) is a requirement for all doctoral students at Penn State. ***The dissertation should be submitted for formatting review and for final submission for approve by the dates provided by*** The Graduate School's Thesis, Dissertation, Performance and Oral Presentation Deadlines Calendar as per GSAD-510 - Thesis Submission. For information on formatting requirements and the submission process see the Thesis and Dissertation Handbook. Visit the eTD website to review previously uploaded Theses and Dissertations.

Graduation

Students must notify the University of Intent to Graduate and apply for graduation via LionPATH according to the deadlines provided by the Registrar's Academic Calendar for the appropriate academic semester (typically a period of approximately 6 weeks at the beginning of the semester graduating).

Exit and Checkout

Students are required to schedule an exit interview with the Department Head via the Department Head's Administrative Assistant. It is preferred that the exit interview be in person prior to departure from campus. Please plan accordingly to schedule the exit interview at least one week in advance. An example of the Exit Interview Questions are included herein for reference.

Students should also complete the tasks on the ***Graduate Student Graduation Checkout Sheet*** prior to departure from campus.

Ph.D. Graduate Program Checklist

Year 1

_____ Obtain ID card, set up access/email account, complete pre-registration activities, obtain keys, attend orientation

_____ **International Students Only** - Take AEOCPT Exam prior to 1st semester; Graduate Program Coordinator will register international students) AEOCPT Information

_____ Complete Initial Laboratory and Research Safety Training - University Park

_____ Schedule FDSC 500 A, B, C, D, FDSC 501, and FDSC 602

_____ Schedule other 400 and 500 level courses in consultation with advisor(s)

_____ Schedule FDSC 600: Thesis Research if entering PhD without MS degree or if additional credits are needed to maintain full time status (Request enrollment through Graduate Program Coordinator)

_____ Develop a coursework plan in consultation with advisor(s)

_____ Schedule and take Qualifying Exam/English Competency with Qualifying Exam Committee within 3 semesters of entry into the doctoral program (not including summer)

_____ Complete SARI

_____ Annual Evaluation

_____ Upon passing of QE, appoint Doctoral Committee. Complete Doctoral Committee Appointment Form and submit form to the Graduate Program Coordinator for processing. Must be submitted before Oral Comp Exam can be scheduled.

Year 2

_____ Schedule other courses per coursework plan

_____ Schedule FDSC 600: Thesis Research if entering PhD without MS degree or if additional credits are needed to maintain full time status (Request enrollment through Graduate Program Coordinator)

_____ Serve as TA

_____ Schedule doctoral committee meeting(s), as necessary, in consultation with advisor(s)

_____ Develop thesis proposal and present to committee

_____ Schedule Oral Comprehensive Exam with committee. Must inform Graduate Program Coordinator at least 3 weeks in advance for processing

_____ Annual Evaluation

Year 3

_____ Schedule FDSC 601 Dissertation (full time) if passed Oral Comp (Request enrollment through Graduate Program Coordinator)

_____ Schedule doctoral committee meeting(s), as necessary, in consultation with advisor(s)

_____ Serve as TA

_____ Write thesis & manuscript(s)

_____ Activate "Intent to Graduate" the semester intending to graduate (via LionPATH by deadline)

_____ Submit applicable PhD Requirements Worksheet to Graduate Program Coordinator

_____ Schedule Thesis Seminar with Seminar Committee/Graduate Program Coordinator (provide Graduate Program Coordinator with seminar title & abstract along with names of evaluators at least two weeks in advance). Notify Graduate Program Coordinator of seminar date no later than 45 days prior to seminar date

_____ Schedule Thesis Defense. Notify Graduate Program Coordinator of date & time no later than 45 days prior to defense date

_____ Submit thesis online for Committee, Department Head, & Graduate School approval. It is recommended to check with the department head's administrative assistant and confirm the department head's availability prior to submitting thesis.

_____ Schedule Exit Interview with Department Head via their administrative assistant

_____ Annual Evaluation

_____ Complete Graduation Checkout List

_____ Return keys, PCard, and equipment. Complete PCard travel & expense reports, vacate office

Ph.D. Requirements for Students with an M.S. Degree

*This 2-page form should be used to show how Ph.D. Requirements were met for students with an M.S. Degree. These 2 pages must be submitted to the Graduate Program Coordinator at 207 Erickson Food Science Building, **before** the Final Oral Exam/Defense can be scheduled.*

Name: _____ **Date:** _____

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies.

Required Courses	Required Credits	List 400/500 Courses Completed	Semester Completed	Credits Completed
FDSC 500A: Fundamentals of Food Science – Microbiology*	1			
FDSC 500B: Fundamentals of Food Science – Engineering*	1			
FDSC 500C: Fundamentals of Food Science – Chemistry*	1			
FDSC 500D: Fundamentals of Food Science – Nutrition*	1			
FDSC 501: Research Methods in Food Science*	2			
6 credits of other 500-level FDSC courses (3 credits of the requirement can be satisfied by 400-level Food Science courses with permission of the advisor.)	6			
Students must have satisfactorily completed at least one 400 or 500-level course in statistics (i.e., STAT 500 Applied Statistics or equivalent), during their undergraduate or graduate program	6			
Total Credits	**12**			
FDSC 602: Supervised Experience in College Teaching*	1			

* Not needed if student received credit for these courses during master's degree program at Penn State.

In addition, Ph.D. students are required to complete 1 credit of FDSC 602: Supervised Experience in College Teaching prior to the TA experience; however, this 1 credit cannot be counted towards the minimum credits required for the degree.

All doctoral students must pass a qualifying examination, English competency assessment, a comprehensive written and oral examination, and a final oral examination (the dissertation defense). To earn the Ph.D. degree, doctoral students must also write a dissertation that is accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School. International students who plan to be teaching assistants must also take the American English Oral Communicative Proficiency Test (AEOCPT) prior to beginning their degree program.

Please also provide the following information:

- Date of Qualifying Exam

- Date of Oral Comprehensive Exam

- Date of Final Oral Exam/Dissertation Defense

- Publications resulting from thesis work (please list complete citation for articles published and also list titles and authorship of manuscripts planned or in preparation).

- Presentations at scientific meetings based on thesis work (please list title and authorship on presentations, both oral and poster sessions, at regional or national scientific meetings).

- Awards (please list all scholarships and fellowships awarded during graduate studies at Penn State).

- Please provide title and location of employment after graduation.

Student Signature	Date
Advisor Signature	Date
Advisor Signature	Date

Doctoral Committee Appointment Form Worksheet

Please complete and submit this form to the Graduate Program Coordinator who will use the provided information to complete the Research Doctoral Committee Form, obtain signatures and submit it to The Graduate School for processing.

***Student Name:** _____

***Advisor**: _____

***Co-Advisor:** _____

***Committee Chair:** _____

Co-Chair: _____

***Dissertation Advisor:** _____

Co-Advisor: _____

***Major Program Members**

Name: _____ _____

Name: _____ _____

***Outside Field/Unit Member(s)**

Name: _____ **Program/Dept:** _____

Name: _____ **Program/Dept:** _____

Minor Field Member(s)

Name: _____ **Program/Dept:** _____

Name: _____ **Program/Dept:** _____

Special Member: A person who is not a member of PSU Graduate Faculty (and may not be affiliated with Penn State), but who is otherwise qualified and has particular expertise in the student's research area **(CV & statement explaining how this member's work will be beneficial to the student's research are required).**

Name: _____ **Program/Dept:** _____

Email: _____

**Required Field*

Entry into the Ph.D. Program without First Obtaining a M.S. Degree

General Policy Statement

Although most applicants to the Ph.D. program have already obtained a master's degree in food science or a related program, the master's degree is not a prerequisite for entrance into the doctorate program. The Graduate Program Committee (GPC) will consider requests from exceptionally qualified students who have received or anticipate receiving a B.S. degree, and from students currently enrolled in the Food Science M.S. program who wish to transfer into the Ph.D. program without first completing the M.S. requirements. Final approval of all applications will be made by the Department Head upon recommendation of the GPC.

New applicants with only a B.S. degree or equivalent who are not accepted into the Ph.D. program may apply for entrance into the M.S. program. Accepted students who subsequently fail the Qualifying Examination with no opportunity for retake or who fail the exam twice, may transfer to the M.S. program. In this case, credits earned while enrolled in the Ph.D. program may apply to course requirements for the M.S. degree.

Current M.S. students who are not approved for transfer into the Ph.D. program may continue their M.S. studies without penalty. Accepted transfer students who subsequently fail the Qualifying Examination with no opportunity for retake or who fail the exam twice, may return to the M.S. program. In this case, credits earned while enrolled in the Ph.D. program may apply to course requirements for the M.S. degree.

Application Procedures

New applicants who wish to enter the Ph.D. program with only a B.S. degree or equivalent must submit the following via the GRADS online application system:

- All information, test scores, and fees currently required for M.S. to Ph.D. applicants
- A section within the personal statement that describes his/her justification for bypassing the M.S. degree

Current M.S. students who wish to transfer into the Ph.D. program without first completing all M.S. requirements must complete the ***Resume Study/Change of Graduate Degree or Major application*** in the online GRADS application system and submit the following:

- Their original complete M.S. application file
- A letter written by the student that describes his/her justification for bypassing the M.S. degree
- A letter from the student's advisor
  The student's advisor must provide a letter to the Graduate Program Committee recommending transfer. This letter would generally be submitted within two semesters after admission of the student into the M.S. program. A second letter of recommendation must also be provided by another faculty member from Penn State supporting the student's transfer into the Ph.D. program. This letter must be submitted to the GPC at the same time that the advisor's letter is submitted. It is suggested that this second letter be provided by a faculty member who has had the student in at least one graduate level course (400 level or above).

Recommendations

It is strongly advised that applicants be informed of the procedural requirements and evaluation criteria necessary for passing the Qualifying Examination. GCAC-604 Qualifying Examination - Research Doctorate. These include taking the exam at the next available opportunity after official entry or transfer into the Ph.D. program (summer sessions do not count towards this requirement) and after having earned at least 18 credits in graduate courses beyond the baccalaureate.

Note that according to the Penn State Graduate School, "the student has no official status as a doctoral student and no assurance of acceptance as a doctoral student until the Oral Comprehensive Examination has been passed."

Ph.D. Requirements for Students without an M.S. Degree

*This 2-page form should be used to show how Ph.D. Requirements were met for students **without** an M.S. Degree. These 2 pages must be submitted to the Graduate Program Coordinator at 207 Erickson Food Science Building, **before** the Final Oral Exam/Defense can be scheduled.*

Name: _____ **Date:** _____

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies.

Except in special cases, an M.S. in Food Science is earned before pursuing a Ph.D. degree. Although most applicants to the Ph.D. program have already obtained a master's degree in food science or a related program, the M.S. degree is not a prerequisite for entrance into the doctoral program. For students entering the Ph.D. program **without** having earned an M.S. degree in Food Science or related field, 12 additional credits are required:

Required Courses	**Required Credits**	**List 400/500 Courses Completed**	**Semester Completed**	**Credits Completed**
FDSC 500A: Fundamentals of Food Science - Microbiology	1			
FDSC 500B: Fundamentals of Food Science - Engineering	1			
FDSC 500C: Fundamentals of Food Science - Chemistry	1			
FDSC 500D: Fundamentals of Food Science - Nutrition	1			
FDSC 501: Research Methods in Food Science	2			
6 credits of other 500-level FDSC courses (3 credits of the requirement can be satisfied by 400-level Food Science courses with permission of the advisor.)	6			
Students must have satisfactorily completed at least one 400 or 500-level course in statistics (i.e., STAT 500 Applied Statistics or equivalent), during their undergraduate or graduate program				
Additional Credits				
FDSC 600: Thesis Research	6			
Additional 400- or 500-level FDSC Courses	6			
Total Credits	**24**			
FDSC 602: Supervised Experience in College Teaching	1			

In addition, Ph.D. students are required to complete 1 credit of FDSC 602: Supervised Experience in College Teaching prior to the TA experience; however, this 1 credit cannot be counted towards the minimum credits required for the degree.

All doctoral students must pass a qualifying examination, English competency, a comprehensive written and oral examination, and a final oral examination (the dissertation defense). To earn the Ph.D. degree, doctoral students must also write a dissertation that is accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School. International students who plan to be teaching assistants must also take the American English Oral Communicative Proficiency Test (AEOCPT) prior to beginning their degree program.

Please also provide the following information:

- Date of Qualifying Exam

- Date of Oral Comprehensive Exam

- Date of Final Oral Exam/Dissertation Defense

- Publications resulting from thesis work (please list complete citation for articles published and also list titles and authorship of manuscripts planned or in preparation).

- Presentations at scientific meetings based on thesis work (please list title and authorship on presentations, both oral and poster sessions, at regional or national scientific meetings).

- Awards (please list all scholarships and fellowships awarded during graduate studies at Penn State).

- Please provide title and location of employment after graduation.

Student Signature Date

Advisor Signature Date

Advisor Signature Date

Fellowships and Scholarships

Each year the Department awards a significant amount of supplemental funding in the form of fellowships and scholarships to graduate students in Food Science. In the past, only a few have taken advantage of this by applying via the College of Agricultural Sciences Scholarships and Financial Aid website. All students in the College are encouraged to apply for scholarships. **Students must complete the College of Agricultural Sciences Scholarship Application. For those scholarships requiring documented financial need, the Free Application for Federal Student Aid (FAFSA) must be completed annually to be considered.**

Fellowships

PMCA Graduate Fellowship
PMCA and the Pennsylvania State University seek students interested in conducting confectionery research while earning a graduate degree in food science at The Pennsylvania State University. Preferably the students will have some experience in confectionery manufacture. Individuals that have earned an undergraduate degree, have some confectionery experience and are interested in furthering their education should complete the formal application for admission (available here) and per the instructions provided.

Skip and Marilyn Rosskam Graduate Fellowship in Food Science
Consideration for this fellowship is given to full-time graduate students exhibiting academic excellence who have been admitted to The Graduate School at the University as students for a graduate degree offered in the Department of Food Science in the College of Agricultural Sciences, or successor department/academic unit. Each fellowship shall be awarded for one academic year and may be renewed for subsequent years providing the recipient continues to meet the conditions of eligibility.

Scholarships

Donald V. Josephson and Stuart Patton Mentorship Award in Dairy and Food Science
This award is for graduate students and faculty members and will be awarded by the Head, Department of Animal Science and the Head, Department of Food Science on an alternating basis. Consideration for this award shall be given to all graduate students enrolled in the College of Agricultural Sciences and studying Dairy or Food Science.

Earl and Veronica Casida Graduate Fellowship in Microbial Food Safety
Consideration for this fellowship shall be given to all full-time graduate students exhibiting academic excellence who have been admitted as students for a graduate degree in the Department of Food Science with a focus on microbial food safety. Endowed by Earl and Veronica Casida.

Edith and William B. Rosskam, II Memorial Scholarship in Food Science
Consideration for this scholarship shall be given to full-time graduate students enrolled or planning to enroll in a degree offered by the Department of Food Science, or successor department, in the College of Agricultural Sciences, or successor academic unit, who have achieved superior academic records or who manifest promise of outstanding academic success. Financial need may be a consideration but is not a requirement for eligibility of this scholarship.

Frank S. and Nina Cobb Grant-in-Aid
Consideration shall be given to all students currently enrolled or planning to enroll in the Department of Food Science who have achieved positive academic records or show promise of academic success and have

documented financial need. Endowed by Frank S. and Nina Cobb. **DOCUMENTED FINANCIAL NEED REQUIRED**

Fred and Florence Jacobson Food Science Graduate Scholarships

Consideration shall be given to all full-time graduate students enrolled or planning to enroll in the Food Science major who are active participants in the Food Science Club, demonstrate superior academic achievement, and have documented financial need. Preference shall be given to students studying chocolate and confectionery. Endowed by Fred and Florence Jacobson. **DOCUMENTED FINANCIAL NEED REQUIRED**

Ira W. Minter Memorial Award

Consideration for this award shall be given to all full-time graduate students currently enrolled in the Department of Food Science who have demonstrated exemplary progress in the previous academic year. Preference shall be given to students whose studies relate to chocolate and confectionery science and technology.

Janet G. and Frank J. Dudek Graduate Scholarship in Food Science

Consideration for this scholarship shall be given to all full-time graduate students enrolled or planning to enroll in the Department of Food Science, College of Agricultural Sciences, who have achieved superior academic records or who manifest promise of academic success.

John and Jane Ziegler Graduate Award in Sensory Science

Consideration for this award shall be given to all students for a graduate degree in a program offered in the College of Agricultural Sciences, or successor academic unit, who have demonstrated excellence in scholarly achievement to research or creative accomplishment in the discipline of sensory science.

Professor Arun Kilara Memorial Graduate Student Award in Food Science

Consideration for this award shall be given to a graduate student pursuing a degree within the Department of Food Science who has demonstrated excellence in outreach teaching or who has assisted with dairy foods-related courses through outreach teaching events offered by the Department of Food Science in the College of Agricultural Sciences.

Robert D. and Jeanne L. McCarthy Graduate Teaching Award and Graduate Scholarship

Consideration for this teaching award shall be given to all full-time graduate students who are currently enrolled in a degree program offered by the Department of Food Science, or successor department, and who have achieved superior teaching success. Consideration for the graduate scholarship shall be given to all full-time graduate students who are enrolled in a degree program by the Department of Food Science, or successor department, who have achieved superior academic records. For the scholarship, financial need may be a consideration but is not a requirement for eligibility.

Graduate Student Travel Award

The Department Graduate Student Travel Award guidelines are as follows:

- Travel awards are limited to $500 for domestic or international travel.
- Travel awards can be given once during their career for MS and twice for Ph.D.
- Travel awards can be given in addition to other support (i.e., on top of a travel award from the College, University, and/or external travel grant).
- The total amount of the award should not exceed the total cost of attending the meeting (including registration, travel, lodging, meal per diem, etc.).
- Students who receive a travel award may be asked to present their talk or poster at a department-sponsored research event (e.g., seminar, internal poster session, etc.).
- Travel award recipients are required to write a Thank You Note to the endowment donor(s) who generously provided the funds for travel.
- Travel award recipients must submit their expense report within 14 days of returning from travel otherwise the award is forfeited.
- The following application must be completed and submitted at least 30 days prior to travel.

  Department of Food Science Travel Award Application is available here!

  If awarded, students will receive email notification of the award with instructions.

Course Information

500 Level Food Science Courses by Semester

Even Years (2024, 2026, 2028)

Fall Semester		
Course	**Instructor**	**Credits**
FDSC 500A Fundamentals of FDSC-Micro	Dudley	1
FDSC 500B Fundamentals of FDSC-Eng	Anantheswaran	1
FDSC 516 Consumer Insights	Kirkmeyer	3
FDSC 521 Food Defense (online)	Wee	3
FDSC 534 Readings in Ingestive Behavior	Hayes	1

Spring Semester		
Course	**Instructor**	**Credits**
FDSC 500C Fundamentals of FDSC- Chem	Cockburn	1
FDSC 500D Fundamentals of FDSC-Nutr	Keller	1
FDSC 501 Research Methods in FDSC	Lambert	2
FDSC 515 Sensometrics (online)	Hopfer	3
FDSC 516 Consumer Insights	Kirkmeyer	3
FDSC 525 Culture Based Analysis of Microorganisms	Cockburn	3
FDSC 534 Readings in Ingestive Behavior	Hayes	1

Odd Years (2025, 2027, 2029)

Fall Semester		
Course	**Instructor**	**Credits**
FDSC 500A Fundamentals of FDSC-Micro	Dudley	1
FDSC 500B Fundamentals of FDSC-Eng	Anantheswaran	1
FDSC 516 Consumer Insights	Kirkmeyer	3
FDSC 521 Food Defense (online)	Wee	3
FDSC 534 Readings in Ingestive Behavior	Hayes	1

Spring Semester		
Course	**Instructor**	**Credits**
FDSC 500C Fundamentals of FDSC- Chem	Cockburn	1
FDSC 500D Fundamentals of FDSC-Nutr	Keller	1
FDSC 501 Research Methods in FDSC	Lambert	2
FDSC 511 Food Enzymes	Cockburn	3
FDSC 514 Food Physical Chemistry	Coupland	3
FDSC 515 Sensometrics (online)	Hopfer	3
FDSC 526 Microbial Physiology of Foodborne Organisms	Dudley	3
FDSC 534 Readings in Ingestive Behavior	Hayes	1

Food Science 400-500 Course Descriptions

Course offerings listed below are subject to change depending on program offerings, teaching availability, and enrollment.

400. FOOD CHEMISTRY AND ANALYSIS I (3) **Coupland**

The focus of this course is food macro-components (water, proteins, lipids, carbohydrates), as well as food structure (phase behavior, dispersions). **Enforced Prerequisite at Enrollment:** FDSC 200 or FDSC 201, or CHEM 202. **Enforced Concurrent at Enrollment:** BMB 211 and BMB 212.

403. SENSORY DATA COLLECTION & ANALYSYS (3) *(Online)* **Hayes**

Sensory evaluation of food, methods of test analysis, panel selection and training, taste sensation theory, consumer testing methods. **Prerequisite: Enforced Concurrent at Enrollment:** STAT 250 or STAT 240 or STAT 200 and Junior standing.

404. SENSORY EVALUATION OF FOODS (3) **Hayes**

Sensory evaluation of food, methods of test analysis, panel selection and training, taste sensation theory, consumer testing methods. **Prerequisite:** STAT 250 and Junior standing.

405. FOOD ENGINEERING PRINCIPLES (3) **Anantheswaran**

Engineering principles of importance to food manufacturing, including units, dimensions, mass and energy balance, fluid flow, rheology, heat transfer, and psychrometrics. **Enforced Prerequisite at Enrollment:** MATH 110 and PHYS 250. **Enforced Concurrent at Enrollment:** FDSC 200 and FDSC 201.

406W. PHYSIOLOGY OF NUTRITION (3) **Lambert & Keller**

Physiological mechanisms involved in thirst and appetite, digestion, absorption, utilization of nutrients, respiration, and body temperature regulation. **Enforced Prerequisite at Enrollment:** BMB 211. **Enforced Concurrent at Enrollment:** FDSC 200 or FDSC 201.

407. FOOD TOXINS (2) **Lambert**

Focus on natural and synthetic toxins that are relevant to the food system including those produced by food plants; those introduced by contamination of foods by microbes, non-food plants, or environmental/agricultural chemicals. An overview of basic principle of toxicology and the approaches used to study the potential toxicity of a compound. **Enforced Prerequisite at Enrollment:** BMB 211 and 7th semester standing or higher in food science or related majors.

408. FOOD MICROBIOLOGY (3) **Dudley**

Focus on the application of microbiological principles to foods and food ingredients. Significance of microorganisms in food commodities, microbial spoilage, food-borne infections, and intoxications; methods of preservation, processing, and control. **Enforced Prerequisite at Enrollment:** MICRB 201. **Enforced Concurrent at Enrollment:** FDSC 200 and FDSC 201.

409. LABORATORY IN FOOD MICROBIOLOGY (2) **Kovac**

Methods of isolation and detection of spoilage and pathogenic microorganisms in foods; effects of processing and preservation on survival of food microorganisms. **Enforced Prerequisite at Enrollment:** MICRB 202.
Enforced Concurrent at Enrollment: FDSC 200 and FDSC 201 and FDSC 408.

410. FOOD CHEMISTRY AND ANALYSIS II (3) **Hopfer**

Focus on food micro-components (enzymes, allergens, secondary metabolites, contaminants, etc.), as well as the major chemical reactions occurring in foods (lipid oxidation, thermal reactions). **Enforced Prerequisite at Enrollment:** FDSC 200 and FDSC 201 and BMB 212 and FDSC 400.

411. MANAGING FOOD QUALITY (3) **Ziegler**

Statistical tools for the control and improvement of food quality. **Enforced Prerequisite at Enrollment:** FDSC 200 and FDSC 201 and FDSC 408 and STAT 250.

413. SCIENCE AND TECHNOLOGY OF PLANT FOODS (3) **Elias**

Physical and chemical behavior of plant-based raw materials and ingredients, with emphasis on parameters influencing finished product quality. **Enforced Prerequisite at Enrollment:** FDSC 200 and FDSC 201 and at least 2 of the following 400-level courses: FDSC 400 or FDSC 405 or FDSC 408 or FDSC 410.

414. SCIENCE AND TECHNOLOGY OF DAIRY FOODS (3) **Harte**

Physical and chemical behavior of dairy-based raw materials and ingredients, with emphasis on parameters influencing finished product specifications. **Enforced Prerequisite at Enrollment:** FDSC 200FDSC 200 and FDSC 201. And FDSC 201 and at least 2 of the following 400-level courses: FDSC 400FDSC 400 or FDSC 405FDSC 405 or FDSC 408FDSC 408 or FDSC 410FDSC 410.

415. SCIENCE AND TECHNOLOGY OF MUSCLE FOODS (3) **Watson**

Physical and chemical behavior of muscle food commodities, with emphasis on muscle-based ingredients in formulated foods. **Prerequisites:** FDSC 400 or FDSC 405 or FDSC 408 or FDSC 410.

417. FOOD LAWS AND REGULATIONS (3) **Wee**

Study of the laws, regulations, and policies that govern food regulation in the United States as they affect the work of food scientists and food companies. The emphasis is on federal laws and in particular regulation by the U.S. Food and Drug Administration, but also includes an overview of food regulation by other agencies. **Enforced Prerequisite at Enrollment:** FDSC 200 and FDSC 201 and 6 credits from the following 400-level courses: FDSC 400, FDSC 404, FDSC 405, FDSC 408 FDSC 409, FDSC 410, FDSC 411, FDSC 413, FDSC 414, FDSC 415. Recommended Preparation: 7th semester standing.

422. COMMUNICATING RESEARCH IN AGRICULTURAL SCIENCES (1) **Wee**

This course provides opportunities to develop effective communication skills within the context of scientific research. Students participating in independent studies with faculty mentors will use their independent research projects as the subject of a series of exercises that will enhance their abilities to share scientific ideals and findings with a variety of audiences including grant writing, poster presentations, and both technical and non-technical oral presentations about research topics. This course will prepare students for graduate school and, importantly, provide students with a set of skills that would be applicable to any career.

444. ARGUING ABOUT FOOD (3) **Coupland**

The first part of the course will focus on some foundational ideas useful to all controversies. A background in toxicology (or, if most of the projects are around the healthfulness as opposed to the risks of food, nutrition), epistemology in science, critiques of sciences, science as a social construct, ethics. The second part of the course will use current controversies to examine the ways different values combine with empirical scientific facts to create arguments about foods. Students are not taught to "win" arguments but rather examine how they are structured and why they are appealing to different people. Students will use concepts from social science and philosophy (ethics, epistemology) to critique the strong normative opinions of guest speakers and readings by generating multiple different arguments reflecting the different perspectives. **Prerequisite:** FDSC 200

450. NEW PRODUCT DESIGN (3) **Azzara/Anantheswaran/Wee**

This course provides upper-level undergraduate students in the Food Science major with a formal learning experience in new product design (NPD). **Enforced Prerequisite at Enrollment:** FDSC 200 and FDSC 201 and 6 credits from the following 400-level courses: FDSC 400, FDSC 404, FDSC 405, FDSC 408 FDSC 409, FDSC 410, FDSC 411, FDSC 413, FDSC 414, FDSC 415, FDSC 417.

460. INTERNATIONAL FOOD PRODUCTION (1-3) **TBD**

This course is designed to give students an appreciation of how food is produced and processed abroad. A major point of emphasis for the course is comparing and contrasting food production norms in the U.S. and the host country or region. **Enforced Prerequisite at Enrollment:** FDSC 200

497. SPECIAL TOPICS (1-9)

Formal courses given infrequently to explore, in depth, a comparatively narrow subject which may be topical or of special interest. Several different topics may be taught in one year or semester. A specific title may be used in each instance and will be entered on the student's transcript.

500A. FUNDAMENTALS OF FOOD SCIENCE – MICROBIOLOGY (1) *(Fall Only)* **Dudley**
Overview of the field of Food Science with the focus on microbiology.

500B. FUNDAMENTALS OF FOOD SCIENCE - ENGINEERING (1) *(Fall Only)* **Anantheswaran**
Overview of the field of Food Science with the focus on Food Engineering.

500C. FUNDAMENTALS OF FOOD SCIENCE – CHEMISTRY (1) *(Spring Only)* **Cockburn**
Overview of the field of Food Science with the focus on chemistry.

500D. FUNDAMENTALS OF FOOD SCIENCE - NUTRITION (1) *(Spring Only)* **Keller**
Overview of the applications of nutrition in the field of Food Science.

501. RESEARCH METHODS IN FOOD SCIENCE (2) *(Spring Only)* **Lambert**
Planning and conducting research in food science including: problem definition, experimental design, collecting and recording data, and effective communication.

511. ENZYMES IN FOOD (3) *(Spring – Odd Years Only)* **Cockburn**
In this course students will learn about the use and manipulation of enzymes in the food industry during processing and fermentation as well as those enzymes naturally present in food and present in spoilage organisms and food borne pathogens. **Recommended Preparation:** introductory biochemistry course

514. FOOD PHYSICAL CHEMISTRY (3) *(Spring – Odd Years Only)* **Coupland**
Physical principles underlying food structure and quality. **Prerequisite**: FDSC 400 or FDSC 500C

515. SENSOMETRICS (3) *(Spring Only)* **Hopfer**
Allows students to develop the necessary data analysis skills needed for analyzing and interpreting sensory and consumer data. **Prerequisite**: STAT 500 or BBH 505. **Recommendation Preparation:** STAT 484, STAT 485, FDSC 404.

516. CONSUMER INSIGHTS (3) **Kirkmeyer**
Allows students to develop and apply consumer insights to product development; key qualitative, quantitative, and hybrid approaches; recognize, identify, and apply key consumer biases, and examine trade-offs in research and consumer behavior.

521. FOOD DEFENSE: PREVENTION PLANNING FOR FOOD PROCESSORS (3) **Wee**
Course prepares current and aspiring professionals to learn, recognize and apply measures to prevent intentional contamination of the food supply. Cross-listed with AGBIO 521.

525. CULTURE BASED ANALYSIS OF MICROORGANISMS (3) *(Spring – Even Years Only)* **Cockburn**
Students will synthesize knowledge and analytical work through learning about topics related to microbial culture and apply learnings to new systems. Students will design microbial culture experiments, based on materials from lectures, labs, and their own research. **Recommended Preparation:** introductory microbiology course

526. MICROBIAL PHYSIOLOGY OF FOODBORNE ORGANISMS (3) *(Spring – Odd Years Only)* **Dudley**
A current literature-based course investigating the mechanisms by which foodborne bacteria (beneficial and pathogenic) grow, survive, and react to environments encountered in foods and during food processing.

534. (NUTRN 534) READINGS IN INGESTIVE BEHAVIOR (1) **Hayes**
Students lead discussion of original research in the field of ingestive behavior with a focus on food intake in particular. Cross-listed with NUTR 534.

596. INDIVIDUAL STUDIES (1-9)
Creative projects, including nonthesis research that are supervised on an individual basis and fall outside the scope of formal courses. A specific title may be used in each instance and will be entered on the student's transcript. Multiple offerings may be accommodated by the use of suffixes a, b, etc. ***The student must have a GPA greater than or equal to 3.0 in order to register for FDSC 596 and should submit a FDSC 596 Form to the Graduate Program Coordinator.***

597. SPECIAL TOPICS (1-6)

Formal courses given on a special interest subject which may be offered infrequently; several different topics may be taught in one year or semester. A specific title may be used in each instance and will be entered on the student's transcript.

600. THESIS RESEARCH (on campus) (1-15) *FDSC 600 cannot be taken for a letter grade*. ***Contact Graduate Program Coordinator for registration.***

A master's student is not required to register for the final semester to graduate or to make minor revisions to the thesis and/or to take a final examination for the degree, unless required to do so by the program. However, international students should be registered each semester to meet F-1 Visa requirement, including the semester they defend.

601. Ph.D. DISSERTATION (Full-Time) (0 credits) - *Contact Graduate Program Coordinator for registration*

Registration requirements for FDSC 601:

International Students

1. Ph.D. students who have passed their qualifying exam must be continually registered until the semester that they defend their thesis.
2. Students who need to be registered after they have passed their comprehensive exam, should register for FDSC 601.
3. To remain in the U.S. on a legal status after the defense, the student should apply for OPT/CPT. Students are urged to contact DISSA for appropriate guidance.
4. International students must retain their health insurance to retain their F-1 Visa status. If they would like to purchase insurance elsewhere, they must work with the Student Insurance Office to get approval.

Domestic Students

1. Ph.D. students who have passed their qualifying exam must be continually registered until the semester that they defend their thesis.
2. Students who have passed their Comprehensive Exam should register for FDSC 601.
3. Students should be formally registered during the semester (including summer) they intend to defend their thesis.

602. SUPERVISED EXPERIENCE IN COLLEGE TEACHING (1)

Supervised experience in the development of instructional materials, graded experience in the organization and conduct of lectures/laboratories at the undergraduate level, and the evaluation and counseling of students. Preparation for performing TA duties.

General Policy - Enrollment in this course is limited to graduate students in their first year. Registration is limited to one credit per semester. Credit for this course shall be counted as a part of the normal credit load for all students (including those on assistantships). However, credit for this course shall not be counted when calculating the grade-point average or in fulfilling any specific credit requirement for the M.S. and/or Ph.D. degree.

Teaching Assistant Selection - The Head of the Department, in consultation with the Director of Graduate Studies and the faculty, is responsible for annual assignment of TAs. Students are asked to indicate their preferences for assignment and encouraged to provide information about their interests, background, and any previous instructional experience. Instructors of the various courses are also asked for their preferences for TAs. After the selection process, the TAs are informed of the assignment in a notification letter.

Course Requirements - Enrollment in FDSC 602 implies additional educational activity by the student. Duties carried out in the normal course of TA assignments are not sufficient to fulfill FDSC 602 requirements.

Grade - The grade for this course will be assigned by the instructor for FDSC 602.

610. THESIS RESEARCH (Off Campus) (1-15)

611. Ph.D. DISSERTATION (Part Time) (0 credits)

Suggested Non-Food Science Courses That May Be Used to Fulfill Graduate Degree Requirements

The courses listed below are suggestions and subject to change depending on program offerings and availability. Choice of courses is a decision based on input from advisor, committee members and the interests of the students.

A. ENGINEERING

ABE 513	Applied Finite Element, Finite Difference and Boundary Element Methods
ABE 559	Biological and Agricultural Systems Simulation
ABE 568	Food Safety Engineering
CHE 446	Transport Phenomena
CHE 544	General Transport Phenomena
CHE 546	Transport Phenomena II
ME 411	Heat-Exchanger Design
ME 420	Compressible Flow I
ME 421	Viscous Flow Analysis and Computation
ME 512	Heat Transfer--Conduction
ME 513	Heat Transfer--Convection
EMCH 560	Finite Element Analysis

B. BIOCHEMISTRY/CHEMISTRY/BIOINFORMATICS

BMB 400	Molecular Biology of the Gene
BMB 401	General Biochemistry
BMB 402	General Biochemistry
BMB 443W	Laboratory in Protein Purification and Enzymology
BMB 464	Molecular Medicine
BMB 465	Protein Structure and Function
BME 540	Biophysical Chemistry
BGEN 551	Genomic
BMMB 525	Analytical Separations
CHEM 410	Inorganic Chemistry
CHEM 452	Physical Chemistry – Quantum Chemistry
CHEM 525	Analytical Separations
CHEM 526	Spectroscopic Analysis

C. MICROBIOLOGY

MICRB 412	Medical Microbiology
MICRB 416	Microbial Biotechnology
MICRB 421W	Laboratory of General and Applied Microbiology
MICRB 422	Medical Microbiology Laboratory
MICRB 450	Bacterial Genetics
PPEM 440	Introduction to Microbiome Analysis
PPEM 456	Applied Microbial Ecology

D. NUTRITION

NUTR 445	Energy and Macronutrient Metabolism
NUTR 446	Micronutrient Metabolism
NUTR 451	Nutritional Throughout the Life Cycle
NUTR 452	Nutritional Aspects of Disease
NUTR 453	Medical Nutrition Therapy
NUTR 511	Maternal and Child Nutrition

NUTR 513	Atherosclerosis and Nutrition
NUTR 515	Mathematical Modeling in Nutrition

E. STATISTICS

AG 400	Biometry/Statistics in the Life Sciences
BBH 505	Behavioral Health Research Strategies
STAT 460	Intermediate Applied Statistics
STAT 462	Applied Regression Analysis
STAT 480	Introduction to SAS
STAT 484	Topics in R Statistical Language
STAT 485	Intermediate Topics in R Statistical Language
STAT 500	Applied Statistics
STAT 501	Regression Methods
STAT 502	Analysis of Variance and Design of Experiments
STAT 503	Design of Experiments

F. OTHERS

AGBM 460	Managing the Food System
HORT 412W	Post-harvest Physiology
MATSE 441	Polymeric Materials I
MATSE 501	Thermodynamics of Materials

Additional Forms

FDSC 596 Form

Contract for Food Science Independent Studies Courses

Instructions for scheduling an Independent Studies Course: Complete this form in consultation with the supervising course instructor. Submit completed form, including student and professor's signature, to the Graduate Program Coordinator.

Student's Name: _____

PSU ID Number: _____

Instructor's Name: _____

Semester & Year of Registration: _____

Course Number & Title: _____

Number of Credits: _____

_____ _____

Student's Signature Date Instructor's Signature Date

Comments:

Annual Graduate Student Evaluation Form

Graduate Student: *Please fill in the items below. This form will then go to the student's advisor(s) for evaluation after which it will be returned for the student's signature and then forwarded to the Director of Graduate Studies.*

Name of Student: _____ Advisor: _____

ID #: _____ Co-Advisor: _____

Sem/year started the FDSC program: _____ Degree Working Toward: MS PHD

Ethics Training	**Yes**	**No**	**If no, provide expected date of completion**
Did you take & pass FDSC 501?			
If required, have you completed an IRB/IACUC protocol and was it approved?			**Protocol #**

Thesis Committee/Qualifying Exam	**Semester/year**		**Result**
List the date that you took or plan to take the PhD qualifying exam if applicable.			
Has a thesis committee been established?	**Yes**	**No**	**Date of most recent meeting:**
List members (or anticipated members):			
Have you completed coursework?	**Yes**	**No**	

Comprehensive Exam/Thesis Defense	**Semester/year**	**Result**
List the date that you took or plan to take the comprehensive exam, if applicable.		
Anticipated date of thesis defense		

GPA (3.0 minimum) **Current GPA:** _____
TA requirement (please list course(s) and the semester for which you have served as TA):

List any publications/presentations made as a graduate student at Penn State:
For publications: Authors. Year. Title. Journal. Volume(issue) pages. Contribution to the work.
For presentation: Authors. Title. Meeting title. Meeting Location. Meeting Dates. Poster/Oral. Local/regional/national/international. Peer reviewed/invited?

_____
Student Signature Date

(Annual Evaluation Form Page 1 of 3)

Faculty advisor(s): ***Please evaluate the progress that the graduate student has made over the past year of study in the following areas.***

	Exceeds Expectations	Meets Expectations	Below Expectations
Academic Progress			
Ability to Work Independently			
Ability to Work in a Team			
Ability to Plan and Conduct Research			
Motivation and Effort			
Oral Communication Skills			
Written Communication Skills			

In summary, are you satisfied with this student's progress over the past year? Yes _____ No _____

If not, please explain:

Additional Comments/Remediation Plan:

_____ _____

Advisor Date Co-Advisor Date

_____

Graduate Student:

I agree _____; disagree _____ with this evaluation. If not in agreement, the student may explain:

_____

Student Signature Date

(Annual Evaluation Form Page 2 of 3)

DGS Comments:

DGS Signature Date

(Annual Evaluation Form Page 3 of 3)

Defense Seminar Review Form

Presenter: _____ Date: _____ Evaluator: _____

The ability to clearly and succinctly present scientific findings in a seminar format is a skill all graduate students must master. Towards the end of their degree program, both M.S. and Ph.D students in Food Science are required to give a public seminar on their research project. During these, three faculty members not on the student's committee will be asked to provide feedback using the form below. One evaluator may be a post-doc. These evaluations will have no impact on the student's completion but will be used as part of the Graduate Program Committee (GPC) assessment as to whether student presentation skills are improving over the course of their degree programs. These forms will be returned to the student.

1) Knowledge of field: The student demonstrated a command of literature in their field.
2) Background: Ability to build scientific story leading to statement of hypothesis.
3) Statement of hypothesis: Student clearly describes hypotheses to be tested. Alternatively, a clear statement of objectives was provided.
4) Critical analysis: Ability to support hypothesis and communicate alternatives; ability to describe experimental design and connect experiments into a complete story
5) Presentation skills: Maintains eye contact, speaks in a clear and understandable manner. Keeps appropriate pace and stays within time limits.
6) Quality of slides: Good mix of text and figures, free of spelling errors, animations used work properly, size of text is appropriate.
7) Communicate strengths and weaknesses: Ability to identify strengths and weaknesses in own arguments, and to propose alternate experiments.
8) Questions: Ability to answer questions clearly in an understandable manner.

At the end of the Spring semester, the GPC will evaluate all forms completed for seminars given during the academic year and decide whether action is needed.

Ability	Description	Outstanding	Very Good	Acceptable	Marginal	Not acceptable
1	Knowledge of field					
2	Background					
3	Hypothesis/objectives					
4	Critical analysis					
5	Presentation skills					
6	Quality of slides					
7	Strengths and weaknesses					
8	Questions					

(optional): additional comments:

Exit Interview Questions with Department Head

All questions, except for open-ended and simple yes/no, are measured on a 7-point Likert Scale, probing for degree of agreement.

Do you have a job or postdoc offer? ☐ Yes ☐ No

If so, where did the offer(s) come from, and did you accept?

What type of position(s) are you looking for (academia, government, industry, etc.)?

Academia
Government
Industry
Other

If Other, please specify:

Rate how much you agree with the following statements:

1. In my job search process, I received sufficient support from the department and/or my mentor.
   Agree
2. For MS graduates: My MS degree prepared me to independently design and conduct experiments that answer practical research questions.
   Agree
3. For PhD graduates: My PhD degree prepared me to identify knowledge gaps and design experiments to solve unanswered questions.
   Agree
4. I am confident in my abilities to select appropriate methods of data analysis.
   Agree
5. There were skills that I did not acquire during my training.
   Agree

OPEN-ENDED follow-up: *If applicable, elaborate which skills you did not acquire during your degree*

6. *I had access to appropriate facilities to conduct research.*

   Agree

   OPEN-ENDED follow-up: *If applicable, elaborate which facilities you did not have access to*

7. *I had sufficient opportunities to present research in a national and/or international forum.*

   Agree

   OPEN-ENDED follow-up: *If applicable, what opportunities would you like to have had?*

8. *I had sufficient opportunities to present research at group meetings and the Thursday seminar series.*

   Agree

9. *I feel confident to accurately present research findings in both written and oral formats.*

   Agree

10. *The graduate-level coursework provided breadth and depth in my graduate training.*

    Agree

11. *The 500A-D series adequately oriented me to the discipline of food science.*

    Agree

12. *I feel adequately prepared to enter a professional work place.*

    Agree

    OPEN-ENDED follow-up: *If applicable, elaborate how you were not adequately prepared (example)*

13. *The atmosphere of the department (e.g., collegiality, collaborative nature, diversity) was beneficial to my professional development.*

    Agree

14. *I had an appropriate level of administrative support from the front office.*

    Agree

OPEN-ENDED: *What is your impression of your relationship with your mentor?*

OPEN-ENDED: *What is your impression of your relationship with other graduate students?*

OPEN-ENDED: *Is there anything you would change about your time here?*

OPEN-ENDED: *What are the best and worst aspects of this Department?*

Department of Food Science
Graduate Student Graduation Check-Out List

Food Science graduate students should follow the procedures listed below before leaving the University to ensure good standing at the time of their departure. Please submit this completed form to the Graduate Program Coordinator prior to departure from campus.

Student's Name: _____ **Graduation Semester**:_____

Have you activated your intent to graduate through LionPATH by the semester deadline? _____

Date of Thesis Defense: _____

Thesis/Dissertation Title:

_____
_____
_____
_____

Please complete all obligations below with the assistance of those listed:

1. **Advisor(s):**
   - Complete oral presentation of thesis/dissertation
   - Make arrangements for completion of thesis/dissertation
   - Submit thesis/dissertation online for approval by deadline
   - Complete PSU Transfer/Separation Checklist with advisor when GA terminated

2. **Finance Assistant:**
   - Return Purchasing Card
   - Submit all paperwork for PCard, travel expenses, petty cash, etc.

3. **Facilities:**
   - Return **all** keys to Room 115 Ag. Admin. Bldg.

4. **Department Head**
   - Schedule Exit Interview with Department Head (via Department Head's Admin Assistant)

5. **Forwarding address:** **Employer Name & Address:**

   _____ _____
   _____ _____
   _____ _____
   _____ _____