

RUTGERS UNIVERSITY

FOOD SCIENCE

Graduate Student Handbook Planning Your Program



Almost **Everything You Need to Know**

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TABLE OF CONTENTS

I.	PHILOSOPHY OF THE FOOD SCIENCE GRADUATE PROGRAM	1
II.	GETTING STARTED	1-3
	A. ADVISORS.....	1
	B. REGISTRATION.....	2-3
	FULL-TIME STUDENT STATUS.....	2
	GRADUATE ASSISTANTSHIP.....	2
	TEACHING ASSISTANTSHIP	2
	GRADUATE FELLOWSHIP	2
	CORE COURSES	2
	RESEARCH CREDITS	2
	<i>FOR THE MASTER OF SCIENCE DEGREE</i>	2
	<i>FOR THE PH.D. DEGREE</i>	2-3
	UNDERGRADUATE COURSES FOR GRADUATE CREDIT	3
	MATRICULATION CONTINUED	3
III.	SEMINAR IN FOOD SCIENCE.....	3-5
	A. MINI SEMINAR.....	3
	B. SEMINAR IN FOOD SCIENCE	4-5
	SEMINAR COMMITTEE	4
	WHO SHOULD REGISTER FOR SEMINAR.....	4
	SEMINAR ORIENTATION & LOTTERY FOR PRESENTATION SCHEDULE	4
	ATTENDANCE REQUIREMENT	5
	MEETING TIMES	5
	SEMINAR REQUIREMENTS.....	5
	<i>MASTER'S STUDENTS</i>	5
	<i>INITIAL PH.D.</i>	5
	<i>FINAL PH.D.</i>	5
	POST-SEMINAR EVALUATION	5
IV.	COURSE CREDIT AND RESEARCH CREDIT REQUIREMENTS FOR FOOD SCIENCE MASTER OF SCIENCE AND PH.D. DEGREE	6-16
	<u>MASTER OF SCIENCE</u>	6-10
	A. DEGREE REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE WITH THESIS (PLAN A).....	6-8
	CORE COURSE	6-7
	SEMINAR IN FOOD SCIENCE.....	7
	ELECTIVES.....	7
	UNDERGRADUATE COURSES FOR GRADUATE CREDIT	7
	TRANSFER CREDITS	7
	THESIS COMMITTEE.....	7
	FINAL EXAMINATION	7
	THESIS AND DISSERTATION STYLE GUIDE.....	7
	CANDIDACY FORM	7-8
	DIPLOMA APPLICATION	8
	KEYS	8

B.	DEGREE REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE WITHOUT THESIS– PLAN B.....	8
	CORE COURSES	8
	SEMINAR IN FOOD SCIENCE.....	8
	ELECTIVES.....	8
	UNDERGRADUATE COURSES FOR GRADUATE CREDIT.....	9
	TRANSFER CREDITS	9
	CRITICAL ESSAY COMMITTEE	9
	FINAL EXAMINATION	9
	CRITICAL ESSAY FORMAT	9
	CANDIDACY FORM	9
	DIPLOMA APPLICATION.....	10
	KEYS	10
V.	MASTER OF PHILOSOPHY	10-11
VI.	DOCTOR OF PHILOSOPHY	11-16
	ENTERING THE PH.D. PROGRAM.....	11
	A. DEGREE REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY (PH.D.) DEGREE	11-16
	CORE COURSES	11-12
	SEMINAR IN FOOD SCIENCE.....	12
	ELECTIVES.....	12
	UNDERGRADUATE COURSES FOR GRADUATE CREDIT.....	12
	TRANSFER CREDITS	12
	DISSERTATION COMMITTEE.....	12-13
	THE WRITTEN PH.D. QUALIFYING EXAMINATION FOR FOOD BIOLOGY AND FOOD ENGINEERING	13
	CUMULATIVE EXAMINATION FOR THE PH.D. IN FOOD CHEMISTRY	13
	THE ORAL PH.D. QUALIFYING EXAMINATION (ADMISSION TO CANDIDACY)	13-14
	THESIS PREPARATION AND COSTS	14-15
	FINAL EXAMINATION	15
	CANDIDACY FORM AND COMPLETING THE DEGREE PROCESS	15-16
	DIPLOMA APPLICATION.....	16
	KEYS	16
VII.	ACADEMIC PERFORMANCE.....	16-17
	STUDENTS ARE REQUIRED TO MAINTAIN AT LEAST A 3.0 GRADE POINT AVERAGE.....	16
	COMPETENCY IN ALL AREAS OF FOOD SCIENCE	16
	TIME TO OBTAIN DEGREE.....	16
	TIME GUIDELINES FOR ADMISSION TO DOCTORAL CANDIDACY.....	16
	INCOMPLETE GRADES.....	16-17
VIII.	PROCEDURES IF THINGS GO WRONG	17
	A. CHANGE IN MAJOR ADVISOR OR THESIS COMMITTEE MEMBERSHIP.....	17
IX.	PROCEDURES FOR APPEALS	17-18
	DISMISSAL FROM THE FOOD SCIENCE GRADUATE PROGRAM.....	17
	EXTENSION OF TIME REQUEST	17
	WRITTEN QUALIFYING OR CUMULATIVE EXAMINATION.....	17
	GRADES	18
	OTHER ISSUES	18

X.	ADDITIONAL INFORMATION AND REGULATIONS.....	18
	GA AND PAID INTERNSHIP	18
	RESEARCH COSTS OF A STUDENT NOT SUPPORTED BY STIPEND	18
	OBLIGATIONS OF GRADUATE ASSISTANTS AND TEACHING ASSISTANTS	18
	SECRETARIAL SERVICES	18
	OFFICE EQUIPMENT	19
	HOURS OF WORK.....	19
	LABORATORY SAFETY AND RIGHT-TO-KNOW LAW	19
	<u>WHAT TO DO WITH BIOMEDICAL WASTE.....</u>	<u>19-20</u>
	<i>BEFORE DECONTAMINATION.....</i>	<i>19</i>
	<i>DECONTAMINATION.....</i>	<i>20</i>
	<i>AFTER DECONTAMINATION.....</i>	<i>20</i>
	LABORATORY EQUIPMENT / GLASSWARE / BENCH SPACE.....	20
	PILOT PLANT OPERATION.....	20
	COMMUNICATION – RUTGERS EMAIL ACCOUNT / DEPARTMENTAL MAIL AND MAILBOXES	20
	REGISTRAR	20
	GRADUATE DESK SPACE	21
	STUDENT ACTIVITIES	21
	HONORARY SOCIETIES	21
	ALUMNI LOAN FUND.....	21
	SEXUAL HARASSMENT	21-22
XI.	ACADEMIC INTEGRITY.....	22
	VIOLATIONS OF ACADEMIC INTEGRITY	22-23
XII.	STUDENT REPRESENTATION AT GRADUATE FACULTY MEETINGS.....	24
XIII.	RECREATION	24
XIV.	UNIVERSITY SUPPORT SERVICES FOR GRADUATE STUDENTS.....	24-25
XV.	GRADUATE SCHOOL-NEW BRUNSWICK CONTACT INFORMATION	25
XVI.	DEPARTMENT OF FOOD SCIENCE CONTACT INFORMATION.....	25-26
XVII.	ABOUT THE FOOD SCIENCE GRADUATE PROGRAM.....	27-32
	FACULTY	27-28
	PROGRAMS	28-29
	COURSE DESCRIPTIONS	29-32
	<i>Appendix I.....</i>	<i>33</i>
	Requirements for the Plan B Critical Essay	
	<i>Appendix II.....</i>	<i>34</i>
	Degree Deadline Dates	

The Graduate Program In Food Science

I. PHILOSOPHY OF THE FOOD SCIENCE GRADUATE PROGRAM

The Graduate Program in Food Science is a research-oriented, basic science-driven program in the life and physical sciences applied to understanding food and food systems.

The purpose of the program is to prepare students for professional careers in food science. We believe that for our students to become good food scientists they must be well versed in the primary disciplines of chemistry, biology, and engineering as they apply to food systems. This is accomplished through a **core curriculum consisting of three courses:**

Food Science Fundamentals I (16:400:513): the fundamental concepts of food chemistry;

Food Science Fundamentals II (16:400:514): the fundamental concepts of food biology;

Food Engineering Fundamentals and Processes (16:400:507): the fundamental concepts of food engineering.

These three courses are supplemented with a variety of advanced courses on specific topics within the core areas.

Courses prepare food science students with the concepts and information necessary for the ultimate goal of providing an abundant supply of safe, wholesome, high quality, inexpensive food for the people of the world.

The second underlying principle that governs the graduate program is that there must be one standard of excellence for all of our students, be they full-time or part-time, thesis or non-thesis Master of Science, or doctoral students. The continuing challenge is to provide flexibility as to how individual students meet this standard rather than having different standards for different types of students.

Research, which comprises a major and in some cases the most important portion of graduate education, adds considerably to a student's knowledge. A central characteristic of food science research is that it involves basic science studies with a practical orientation. A fundamental understanding of the chemical, physical, and biological, including nutritive and health-promoting properties of foods and related systems, is thus essential.

Students completing graduate work in food science are expected to understand, analyze and interpret facts and principles. Equally important is the ability to communicate this knowledge with lucidity, both verbally and written, since all knowledge must be communicated to the larger world.

II. GETTING STARTED

This Food Science Graduate Student Handbook supplements and expands upon the official regulations of the Graduate School—New Brunswick that are summarized in the opening pages of the current Graduate School—New Brunswick Catalog (and available on-line at <http://www.rutgers.edu/catalogs/nb-grad.html>)

**All students are expected to be familiar
with the relevant content of the Graduate School-New Brunswick Catalog**

A. Advisors

Upon arrival, each student should discuss his/her proposed goals, research interests and course needs with the graduate director. Each student is expected to become familiar with the regulations published in the Graduate School-New Brunswick Catalog and this Food Science Graduate Student Handbook.

Graduate students should choose a major advisor as soon as possible. If an advisor is not chosen by the end of the first semester, the graduate director may assign an interim faculty advisor. However, all students should have an academic advisor by the start of their second year of study. Failure to do so could significantly delay the completion of degree requirements.

B. Registration

Full-time student status = 9 credits

Full-time Student Status

Each semester, each graduate student must consult with their major or interim advisor before registering for courses.

A full-time student is registered for 9 credits in a semester. There is no charge for credits beyond the 12 credit load. Students should consult with their advisors to take as many credits as possible while in full-time status as this reduces tuition payments in the final phase of studies. Students cannot register for more than 16 credits without special permission from the Dean of the Graduate School.

If changes (drop/add) are necessary, they should be made in consultation with the advisor. Ideally, literally, the entire graduate program study should be outlined by the student under the guidance of the major or interim advisor before the end of the student's first year of graduate study.

Graduate Assistantship (GA) 16:400:866

All students supported by a graduate assistantship (GA) must register for 6 "E" credits of Graduate Assistantship (16:400:866); because students with a GA are required to work in the laboratory, they cannot take as many credits as students who are self-supported. "E" credits block out the time required for the specific activity and thereby decrease the number of course or research credits a student can take. For example, a student registering for 6 E credits will be permitted to take a maximum of 10 course and research credits. (Similarly, a student registered for 3 E credits of "English As A Second Language" will be permitted only 13 course and research credits.) No tuition is charged for E credits.

Teaching Assistantship (TA) 16:400:877

All students supported by a Teaching Assistantship (TA) must register for 6 "E" credits of Teaching Assistantship (16:400:877) and follow the same registration procedure as outlined above for Graduate Assistants.

Graduate Fellowship 16:400:811

Students supported by a fellowship administered through Rutgers University should register for 0 (zero) credits of Graduate Fellowship (16:400:811); this registration merely serves as an indicator of the fellowship. Students who hold fellowships not administered through Rutgers should not register for Fellowship credits.

**"E" credits do not count toward degree credits.
No tuition is charged for "E" credits.**

Core Courses

Full-time and part-time students are expected to take Food Science Fundamentals I & II (16:400:513 & 514) and Food Engineering (16:400:507) during their first two years after matriculation. Students who have taken courses in food engineering or who feel they have sufficient background in engineering may petition the instructor for an exemption to this course. The instructor will ask students to take a test. It is the student's responsibility to initiate this process. An exemption means you do not need to take the course BUT you do need to take another related food science graduate course(s) to replace the four credits.

Research Credits

For the Master of Science Degree with Thesis (Plan A)

Master's students who are on campus and engaged in research must register for a minimum of 1 credit of research per term.

For the Ph.D. Degree

Doctoral students who are on campus and engaged in research must register for a minimum of 3 credits per term. Those students who are away from campus but working on their thesis or dissertation and in contact with their committee are required to register for a minimum of 1 credit of research per term.

Advanced degree students who have completed all credit requirements for the Ph.D. need only register for one (1) credit per semester (as well as when appropriate, 6E Teaching Assistant [TA] or Graduate Assistant [GA] credits) until they finish the degree, even if they are “on campus”. For example, if a student has 71 degree credits accumulated, a one-credit research registration will be allowed, since that will complete the required 72. Obviously, this means that students who have not completed 72 degree credits, who are post-qualifying, and who are “on campus” will still need to enroll for a minimum of three (3) research credits (as well as when appropriate, 6E TA or GA credits). International students will need to complete a Reduced Credit Load form when registering for less than 9 credits per term.

Note: “On campus” is typically defined as students in the New Jersey, New York, Pennsylvania, Connecticut area.

Undergraduate Courses for Graduate Credit

Graduate students can enroll for up to 12 credits of undergraduate courses and use them toward the advanced degree provided the courses are at the 300 and 400 level and relevant to their area of study; students should discuss the relevance of such courses with their advisor and the graduate director. All upper-level undergraduate courses must be pre-approved by the graduate program director. In order to get graduate credit, such courses must be preceded with a “G” prefix during registration.

All upper-level undergraduate courses must be pre-approved by the graduate program director. In order to get graduate credit, such courses must be preceded with a “G” prefix during registration.

Please see COURSE CREDIT AND RESEARCH CREDIT REQUIREMENTS FOR FOOD SCIENCE MASTER OF SCIENCE AND PH.D DEGREE for details.

Matriculation Continued

All matriculated graduate students must maintain continuous registration once they enter the program. Master’s students not engaged in research (Master’s *without Thesis - Plan B*) and pre-qualifying Ph.D. students who need to take a temporary leave of absence may register for “Matriculation Continued” with the approval of the graduate program director. This approval will be granted for a maximum of two consecutive terms. A Special Permission Number is required to register for this course.

Master’s students engaged in research (Plan A), and fully qualified (post qualifier) Ph.D. candidates must maintain continuous registration and are not permitted to register for Matriculation Continued.

Students who hold F-1 student visas are not permitted to register for “Matriculation Continued

Online Schedule of Classes http://clue.rutgers.edu:8880/sc_pn/plsql/sc_display.main

III. SEMINAR IN FOOD SCIENCE – (Degree Requirement)

A. Mini Seminar

16:400:601 Section 03 - Offered Every Fall

All entering students are expected to register for “Mini Seminar” (16:400:601, section 03); this expectation is especially important for students for whom English is not their native language. This course is designed to give the student familiarity with presenting a seminar in a friendly and relaxed atmosphere.

**B. Seminar in Food Science
(16:400:601,602) Sections 01 & 02 – Offered Every Fall & Spring
Master’s, Initial Ph.D., and Final Ph.D.**

Seminar is an integral component of the Food Science Graduate Program. Seminar meets weekly when classes are in session and provides students and faculty members with a forum to present current research and to discuss the latest developments in the field of Food Science. Seminar provides an important opportunity for members of the Food Science Graduate Program as a whole to interact and exchange ideas. The graduate faculty considers Seminar to be one of the most important learning experiences in a student’s graduate education. As a scientist in academia, government or industry, our graduates will be judged not only on the quality of their research accomplishments but on how well they communicate them to others. We have a proud tradition of teaching our students how to present excellent seminars and this manifests itself in the numerous times our students have given award-winning presentations at national meetings and how well they do when asked to present a seminar as part of the job interview process.

Accordingly, all students and faculty are expected to attend Seminar when they are on campus. All students who are enrolled in Seminar are expected to prepare their presentations carefully and all are required to attend each Seminar during the semesters that they are enrolled. Exceptions to this requirement are allowed only in rare instances when such attendance has clearly become onerous due to a change in circumstance while in the program (for example, relocation to a distant city or extensive job-related travel).

Seminar Committee

The Seminar Committee responsible for seminar each semester shall consist of a faculty coordinator and a second faculty member who will assume the position of coordinator in the following semester. Two student representatives selected by the Food Science Graduate Student Association (GSA) also serve on the committee. Students may rotate on and off the committee but students may not be enrolled in Seminar and serve on the Seminar Committee concurrently.

Who should register for Seminar

Students who wish to register for seminar should do so only after consulting with their advisor to discuss the progress of their research or critical essay. The advisor should notify the Seminar Coordinator that the student is prepared to present. Students who register for seminar are expected to present.

Seminar Orientation & Lottery for Presentation Schedule

At the beginning of each semester, the Faculty Coordinator will schedule a seminar orientation meeting. At this meeting, the seminar schedule will be set and the coordinator will explain specific guidelines covering seminar style, format, abstract preparation, and attendance requirements. * Students with a grade of "incomplete" from a previous semester must go first the next semester and should not register again.

Seminar slots are assigned by lottery. Students who must have a specific date due to extenuating circumstances, (job assignments, committee member availability, etc.) must put their request in writing and provide justification for special consideration. If there are any conflicts that are not resolvable, trades may be arranged before the end of the lottery session but no later than the second class meeting time for Seminar. Final schedules will be posted on the department website. No student may take a grade of “Incomplete” once the schedule has been set. In the rare instance that this may be unavoidable, students who cancel their seminar once the schedule has been set, will be penalized by having their final grade lowered by one letter grade.

No student may take a grade of “Incomplete” once the schedule has been set.

Attendance Requirement

During the semester in which you register for seminar, you are to fulfill the attendance requirement of 14 seminars and give your own seminar presentation. For each seminar not attended, the final grade will be dropped by one-half letter. In addition, all full-time students, even if not registered for the seminar course, are expected to attend.

Part-time students whose jobs do not permit regular attendance may request from the current Seminar Chair, permission to complete the 14 seminar attendance requirement over two consecutive terms. In this case, the student will register for Seminar in the second term.

Meeting Times

Seminar is normally held on Fridays from 3:55-5:15 p.m. in Maclinn Auditorium. Due to periodic large enrollments, it is necessary to “double-up” on most dates. Moreover, it is sometimes necessary to schedule two seminar meetings in a single week. When this occurs, additional seminars will be scheduled on Wednesdays at 5:35–6:55 pm. in Maclinn Auditorium. Wednesday seminars are typically reserved for Final Ph.D. presentation overflow.

Seminar Requirements

Master’s Students (16:400:601 or 02, section 01)

Plan A Master’s students (see below) are required to present one seminar on the results of their thesis research. Plan B Master’s students (see below) are required to present one seminar on the topic of their Critical Essay.

Initial Ph.D. Students (16:400:601 or 02, section 02)

All doctoral students are required to present two seminars. The Initial Ph.D. Seminar should be targeted to a general audience, with the intent of introducing and describing the overall scope of the student’s research problem. The Initial Ph.D. Seminar may consist solely of a critical literature review, or may combine a critical literature review with some preliminary experimental results.

Final Ph.D. Students (16:400:601 or 02, section 01)

The Final Ph.D. Seminar is intended to highlight specific results of the Dissertation research project, and is therefore presented shortly before completion of the Ph.D. degree. Although Final Ph.D. Seminars are oriented towards presentation of key results, they must also contain appropriate background information in order to familiarize the audience with the topic area. Final Ph.D. Seminars may be given in conjunction with the dissertation defense. Immediately after presenting such a Final Ph.D. Seminar, the student would be excused from the seminar to attend the dissertation defense.

Post-Seminar Evaluation

Following each session, the Seminar Committee will meet with each speaker and their advisor for the purpose of providing constructive feedback and to evaluate the strengths and weaknesses of the seminar. The objective of this dialogue is to provide suggestions that will strengthen future presentations. The Faculty Coordinator, taking into account the evaluations of the other faculty member and student representatives, determines the grade for seminar. To avoid conflicts of interest, faculty members cannot provide grades for their own advisees. The grade is based on preparedness, presentation, clarity, and style as described in the guidelines found in Reference Materials at the Seminar website, and not on scientific content or data.

Seminar website <http://www.foodsci.rutgers.edu/gseminar/index.htm>

IV. COURSE CREDIT AND RESEARCH CREDIT REQUIREMENTS FOR FOOD SCIENCE MASTER OF SCIENCE AND PH.D. DEGREE

Master of Science

Two options, Master of Science with Thesis (Plan A) and Master of Science without Thesis (Plan B), are offered for the Master of Science (M.S.) Degree. The Plan A option requires original laboratory research and the writing of a thesis describing the results and conclusions of this research. The Plan B option has no research or thesis requirement; instead the student must submit a critical essay on a topic relevant to food science. Ordinarily, students planning to continue for a Ph.D. complete the Plan A degree option. Plan B degree recipients are not permitted to continue for the Ph.D. degree, except under unusual circumstances.

The Plan A Master's degree is a traditional research degree with the requirement of a thesis based on original research conducted under the direction of a research mentor (major advisor) and approved by a thesis committee.

The Plan A Master's degree prepares the student for a technical career or for further study toward the Ph.D. degree. The generation of a thesis based on original research is the most important single requirement of this degree; in addition, it is usually the rate-limiting step in graduation. Consequently, it is important to select a research mentor and choose a research project as soon as possible after joining the program. The selection of a research project may also influence the selection of elective courses taken for the Master's degree.

The Plan B Master's degree is a non-research degree with the requirement of a critical essay based on a literature review conducted under the direction of an advisor and approved by a thesis committee. The critical essay summarizes the current state of knowledge in a specific field. Please see Appendix for additional details about the preparation of the critical essay.

The Plan B Master's degree prepares the student for a technical career but not typically for further graduate study toward the Ph.D. degree; the Plan B Master's is thus considered a terminal degree. The generation of a critical essay based on a literature review is an important requirement of this degree; however, it is not usually the rate-limiting step in graduation.

Students are expected to select a faculty advisor early in their academic career to advise them about the selection of courses appropriate to their interests and career plans. The student will develop with their advisor an appropriate topic for the critical essay.

Students should consult with their advisor before registering for courses. Courses taken in other programs at Rutgers University are acceptable as long as they are related to the student's studies in Food Science and have the approval of the graduate director.

A. Degree Requirements for the Master of Science with Thesis (Plan A) 30 credits

Course credits: 21
Research credits: 9

A minimum of 21 course credits and 9 research credits distributed in the following manner:

1. Core Courses - Required

An average grade of B or better in the following core courses:

- a. Food Science Fundamentals I (3 credits; fall semester)
- b. Food Science Fundamentals II (3 credits; spring semester)
- c. Food Engineering Fundamentals and Processes (4 credits; spring semester).

Students who have taken courses in food engineering or who feel they have sufficient background in engineering may petition the instructor for an exemption to this course. The instructor will ask students to take a test. It is the student's responsibility to initiate this process. An exemption means you do not need to take the course BUT you do need to take another related food science

graduate course(s) to replace the four credits.

2. Seminar in Food Science (1 credit) - *Required*

Students must present the results of their research during the semester in which they are registered.

3. Electives

At least another 6 credits must be taken in graduate-level courses, those numbered in the 500s and 600s.

No more than three (3) credits of Special Topics may be included in this 6 and applied toward degree credits.

All upper-level undergraduate courses, those numbered in the 300s and 400s, must be **pre-approved** by the graduate program director in order to count toward degree credits.

4. Undergraduate Courses for Graduate Credit

Graduate students can enroll for up to 12 credits of undergraduate courses and use them toward the advanced degree provided the courses are at the 300 and 400 level and relevant to their area of study; students should discuss the relevance of such courses with their advisor and the graduate director. All upper-level undergraduate courses must be **pre-approved** by the graduate program director. In order to get graduate credit, such courses must be preceded with a “G” prefix during registration.

5. Transfer credits

A maximum of 12 credits of relevant graduate course work (as determined by the graduate director) may be transferred from other accredited institutions or other graduate program at Rutgers University and used to satisfy course requirements. Credits for laboratory, special topics, and seminar courses are not transferable; nor are any courses for which a grade of B or its equivalent was not earned. Students may request transfer of these courses after they have completed 12 course credits at Rutgers with grades of B or higher. The Application for Transfer of Credit form is available from the graduate secretary; questions about eligible courses should be directed to the graduate director.

Thesis Committee

The Plan A thesis committee consists of a minimum of three associate or full members of the Food Science graduate faculty; typically the student’s research advisor is the chair of this committee. The student, in consultation with the research advisor, selects the thesis committee. Although it is not required, students are advised to select a committee early in their research program so that the members can provide input into the research project.

Final Examination

Thesis and Dissertation Style Guide

Thesis and Dissertation Style Guide is available at the Graduate School (25 Bishop Place-College Avenue Campus). It contains information regarding style, format, paper, margins, footnotes, etc. and should be followed explicitly. Specific questions should be directed to Barbara Sirman at Sirman@rci.rutgers.edu. Students are advised to attend a thesis preparation workshop offered by the Graduate School-NB.

Candidacy Form

Students should get a copy of the form “Application for Degree of Master of Science” and Checklist from the graduate program secretary or from the Graduate School (25 Bishop Place), complete Part I and return it to the Graduate School-NB one term prior to the final examination. Students should pick up the candidacy form from the Graduate School-NB and bring it to the final examination.

The applicant is responsible for hand-delivering, the signed candidacy form and an unbound original of their thesis on 100% rag or cotton paper to the Graduate School-NB. Three (3) additional signed, (photocopied) title pages and abstracts are required. Extra copies are NOT required on rag paper.

Students are encouraged to provide a copy of their thesis to their committee at least three weeks before the examination. Although this version of the thesis should be essentially complete, students should provide sufficient time between the defense and the Graduate School October, January, and May dated degree deadline dates to make any additions or changes that might be requested by the committee.

Students pursuing a Plan A Master of Science degree must defend their thesis before their committee at a final examination. Students are informed whether or not they have passed the examination immediately after its completion. A student who fails the examination is informed at this time of the reasons for the decision. The student may request that the reasons for the failure be provided in writing within one week of the final examination.

Upon completion of the final examination, the members of the committee sign the form in **Black** ink indicating whether the student has passed or failed the examination. The graduate director signs the form once revisions, if any, have been made to the thesis and a bound copy of the thesis is submitted to him. The copy should be on photocopy paper and placed in a black spring binder. Thesis binders are available at the Cook/Douglass Co-op located at the corner of Nichol Avenue and Lipman Drive on the Cook Campus.

Diploma Application

Diploma application forms can be obtained at the Graduate School or Registrar's Office. Complete the form and submit it before the deadline date.

Keys

Mailbox keys must be returned to the administrative assistant in the Food Science main office, room 107, and all other keys must be returned to Dave Petrenka.

B. Degree Requirements for the Master of Science Degree *without* Thesis (Plan B) 30 credits

Course credits: 30

A minimum of 30 credits of coursework including ***no more than 3 credits of Special Topics (16:400:603) taken while writing the critical essay*** and distributed in the following manner:

1. Core Courses - *Required*

An average grade of B or better in the following core courses:

- a. Food Science Fundamentals I (3 credits; fall semester)
- a. Food Science Fundamentals II (3 credits; spring semester)
- b. Food Engineering Fundamentals and Processes (4 credits; spring semester).

Students who have taken courses in food engineering or who feel they have sufficient background in engineering may petition the instructor for an exemption to this course. It is the student's responsibility to initiate this process. An exemption means you do not need to take the course BUT you do need to take another related food science graduate course(s) to replace the four credits.

2. Seminar in Food Science (1 credit) - *Required*

Students must present the results of their critical essay during the semester in which they are registered.

3. Electives

At least another 8 credits must be taken in graduate-level courses, those numbered in the 500s and 600s.

No more than three (3) credits of Special Topics may be included in this 8 and applied toward degree credits.

All upper-level undergraduate courses, those numbered in the 300s and 400s, must be **pre-approved** by the graduate program director in order to count toward degree credits.

Students may register for up to three credits of Special Topics (16:400:603) for one semester during which they are writing their critical essay; these credits count towards your degree credits. If a grade of "incomplete" is received, the student has two consecutive terms to have the Incomplete changed to a letter grade. Although the results of laboratory research can supplement the critical essay, such work cannot be submitted in place of the essay.

**A term paper submitted for another course is unacceptable as a critical essay
The submission of such will be considered a violation of academic integrity**

4. Undergraduate Courses for Graduate Credit

Graduate students can enroll for up to 12 credits of undergraduate courses and use them toward the advanced degree provided the courses are at the 300 and 400 level and relevant to their area of study; students should discuss the relevance of such courses with their advisor and the graduate director. All upper-level undergraduate courses must be **pre-approved** by the graduate program director. In order to get graduate credit, such courses must be preceded with a “G” prefix during registration.

All upper-level undergraduate courses must be pre-approved by the graduate program director. In order to get graduate credit, such courses must be preceded with a “G” prefix during registration.

5. Transfer credits

A maximum of 12 credits of relevant graduate course work (as determined by the graduate director) may be transferred from other accredited institutions or other graduate program at Rutgers University and used to satisfy course requirements. Credits for laboratory, special topics, and seminar courses are not transferable; nor are any courses for which a grade of B or its equivalent was not earned. Students may request transfer of these courses after they have completed 12 credits at Rutgers with grades of B or higher. The Application for Transfer of Credit form is available from the graduate secretary; questions about eligible courses should be directed to the graduate director.

Critical Essay Committee

The Plan B critical essay committee consists of three associate or full members of the Graduate Program in Food Science: typically the student’s major advisor is the chair of the committee. The student, in consultation with the major advisor, selects the essay committee. The committee should be identified early in the writing process to ensure steady progress.

Final Examination

Critical Essay Format

Style guide is patterned after the Thesis and Dissertation Style Guide available at the Graduate School (25 Bishop Place-College Avenue Campus). It contains information regarding style, format, paper, margins, footnotes, etc. and should be followed explicitly.

Candidacy Form

Students should get a copy of the form “Application for Degree of Master of Science” and Checklist from the graduate program secretary or from the Graduate School (25 Bishop Place), complete Part I and return it to the Graduate School-NB one term prior to the final examination. Students should pick up the candidacy form from the Graduate School-NB and bring it to the final examination.

The applicant is responsible for hand-delivering the signed candidacy form to the Graduate School-NB.

Students are encouraged to provide a copy of their critical essay to their committee at least three weeks before the examination. Although this version of the critical essay should be essentially complete, students should provide sufficient time between the defense and the Graduate School October, January, and May dated degree deadline dates to make any additions or changes that might be requested by the committee.

Students pursuing a Plan B Master of Science degree must defend their critical essay before their committee at a final examination. Students are informed whether or not they have passed the examination immediately after its completion. A student who fails the examination is informed at this time of the reasons for the decision. The student may request that the reasons for the failure be provided in writing within one week of the final examination.

Upon completion of the final examination, the members of the committee will sign the form in **Black** ink indicating whether the student has passed or failed the examination. The graduate director will sign the form once revisions, if any, have been made to the critical essay and a bound copy of the essay is submitted to him. The copy should be on photocopy paper and placed in a black spring binder. Binders are available at the Cook/Douglass Co-op located at the corner of Nichol Avenue and Lipman Drive on the Cook Campus.

Diploma Application

Diploma application forms can be obtained at the Graduate School or Registrar's Office. Complete the form and submit it before the deadline date.

Keys

Mailbox keys must be returned to the administrative assistant in the Food Science main office, room 107, and all other keys must be returned to Dave Petrenka.

Students are encouraged to provide a copy of their critical essay to their committee at least three weeks before the examination. Although this version of the critical essay should be essentially complete, students should provide sufficient time between the defense and the October, January, and May Graduate School deadline dates to make any additions or changes that might be requested by the committee.

Reasonable deadlines for thesis / critical essay preparation are illustrated below:

<u>DATE</u>	<u>EVENT</u>
Oct/Jan/May	Graduate School Deadlines for submission of final copy of approved thesis for Plan A only, and completion of all degree requirements for Plan A and Plan B.
≥ 9 Weeks Before	"Final" draft of thesis / critical essay to advisor.
≥ 5 Weeks Before	"Corrected" thesis / critical essay back from advisor.
≥ 3 Weeks Before	Thesis / critical essay to committee members.
≥ 1 Week Before	Final Examination Allow at least one week to make final corrections, etc.

V. MASTER OF PHILOSOPHY

The Master of Philosophy degree is considered intermediate between the degrees of Master of Science and Doctor of Philosophy. There are three ways to complete the requirements for a Master of Philosophy in Food Science.

1. A minimum of 48 course credits (A, B, C grades only) and a paper published in a peer-reviewed journal in which the student is the principal author. The application form is available from the graduate secretary.
2. A minimum of 48 course credits (A,B,C grades only) and an essay approved by three members of the Graduate Faculty
3. A minimum of 33 course credits and 6 credits of research when associated with an MA or MS thesis.

At least 33 credits of the course requirements must be fulfilled in graduate-level courses (500-600 level), and at least 24 credits must be earned at Rutgers.

In order to qualify for this degree, the student must earn a grade of A in at least 12 credits of the graduate-level courses, with no more than 3 credits of C. All requirements for this degree must be completed within 4 consecutive academic years of first registration. Students for whom transfer of credit is granted must complete their program within 1 year less per 12 credits transferred. No extensions of time will be granted. **The applicant must have passed the Ph.D. qualifying examination.**

The applicant must have passed the Ph.D. qualifying examination.

VI. DOCTOR OF PHILOSOPHY

Entering the Ph.D. Program

A new student who possesses a Master of Science degree in Food Science or a related discipline automatically enters the Ph.D. program. A student who enters with a Bachelor's (undergraduate) degree must typically earn a Master's degree before entering the Ph.D. program. It is possible, however, for a student to apply for admission to the Ph.D. program after publication in a refereed journal of a research paper based on their graduate research at Rutgers; the student must be first (senior) author of the paper. For such an application, the student must have the consent of their advisor, their thesis committee, and the graduate director. The student must submit proof of the acceptance of a manuscript for publication to the graduate director before filing the Change of Status form (available from the graduate secretary).

Students who earn a Master's degree in the Food Science program must submit a **Change of Status** form in order to enter the Ph.D. program; such applications require the consent of the graduate director. Only students who receive a Plan A option Master's degree from Rutgers may normally enter the Ph.D. program. Students who have earned a Plan B Master's degree must petition the graduate director if they wish to enter the Ph.D. program. This petition must have the approval of the student's advisor and the Food Science Graduate Faculty and will be granted only in very unusual circumstances, such as a paper published in a peer-reviewed journal in which the student is the principal author.

Students who earn a Master's degree in the Food Science program must submit a Change of Status form in order to enter the Ph.D. program; such application requires the consent of the graduate director.

Course work used to satisfy the requirements for the M.S. degree at Rutgers may also be used to satisfy the requirements for the Ph.D.

Course work used to satisfy the requirements for the M.S. (or another advanced) degree elsewhere may be used to satisfy up to 24 course credits for the Ph.D.

A. Degree Requirements for the Doctor of Philosophy (Ph.D) 72 credits

Course credits: 33 or more
Research credits 39 or less

A minimum of 33 course credits and 39 research credits distributed in the following manner:

1. Core Courses - *Required*

An average grade of B or better in the following courses:

- a. Food Science Fundamentals I (3 credits; fall semester)
- b. Food Science Fundamentals II (3 credits; spring semester)
- c. Food Engineering Fundamentals and Processes (4 credits; spring semester).

Students who have taken courses in food engineering or who feel they have sufficient background in engineering may petition the instructor for an exemption to this course. It is the student's responsibility to initiate this process. An exemption means you do not need to take the course BUT you do need to take another related food science

graduate course(s) to replace the four credits.

2. Seminar in Food Science (1 credit each) - *Required*

Ph.D. students need to present two seminars, one Initial Ph.D. seminar and one Final Ph.D. seminar. Students must present the results of their research during the semester in which they are registered.

3. Electives

Of the 12 credits required beyond the 21 for the Master of Science with Thesis (Plan A), at least another 9 credits must be taken in graduate-level courses, those numbered in the 500s and 600s.

No more than three (3) credits of Special Topics may be included in this 9 and applied toward degree credits. Additional courses may be required based on the student's background and the proposed course of study. The advisor and Ph.D. committee with the approval of the graduate program director will determine these courses. All upper-level undergraduate courses, those numbered in the 300s and 400s, must be **pre-approved** by the graduate program director in order to count toward degree credits.

4. Undergraduate Courses for Graduate Credit

Graduate students can enroll for up to 12 credits of undergraduate courses and use them toward the advanced degree provided the courses are at the 300 and 400 level and relevant to their area of study; students should discuss the relevance of such courses with their advisor and the graduate director. All upper-level undergraduate courses must be **pre-approved** by the graduate program director. In order to get graduate credit, such courses must be preceded with a "G" prefix during registration.

All upper-level undergraduate courses must be pre-approved by the graduate program director. In order to get graduate credit, such courses must be preceded with a "G" prefix during registration.

5. Transfer credits

A maximum of 24 credits of relevant graduate course work (as determined by the graduate director) may be transferred from other accredited institutions or other graduate program at Rutgers University and used to satisfy course requirements. Credits for laboratory and seminar courses are not transferable; and courses in special topics are only transferable under special circumstances. Only courses with a grade of B or its equivalent may be transferred. Students may request transfer of these courses after they have completed 12 credits at Rutgers with grades of B or higher. The Application for Transfer of Credit form is available from the graduate secretary; questions about eligible courses should be directed to the graduate director.

Students should consult with their advisor before registering for courses. Courses taken in other programs at Rutgers University are acceptable as long as they are related to the student's studies in Food Science and have the approval of the graduate director.

Dissertation Committee

Students select members of their dissertation committee in consultation with and with the approval of their major advisor. The graduate director must endorse the composition of the dissertation committee prior to the oral or final examinations.

The committees for both the oral qualifier and the final defense must contain at least four members, three of whom must be associate or full members of the Graduate Program in Food Science. The fourth member of the oral qualifying committee may be either a member of the Graduate Program or an outside member.

Because the oral qualifying examination is concerned, in part, with the proposed research plan, it is suggested, but not required, that the committee for oral qualifier and final defense be identical. The major advisor is usually the chair of the dissertation committee.

The fourth member of the final defense committee must be an outside member, approved by the graduate director and appointed by the Graduate School—New Brunswick, with research and/or academic credentials appropriate for such service; the outside member should be from outside the University when possible but must in all cases be from

outside the Graduate Program in Food Science. The student's major advisor should submit the appointment request, in writing, to the graduate program director and provide a Curriculum Vitae or Biographical Sketch that includes degrees received, dates, institution names, and a list of publications. Students are personally responsible for requesting participation by each committee member selected.

The Written Ph.D. Qualifying Examination for Food Biology and Food Engineering

Students must demonstrate competency in all three areas of food science before taking the Ph.D. Written Qualifying Examination in their disciplinary specialty; such competency is usually demonstrated by having an average grade of B or better in the three required courses Food Science Fundamentals I & II and Food Engineering Fundamentals and Processes. Students must obtain written permission from their major advisor (expressed by letter or email to the graduate director) before taking this examination.

Written examinations may be taken in any one of the disciplinary areas, food chemistry, food biology, or food engineering. Students may choose the disciplinary area in which they wish to be examined. Written qualifying examinations for the Ph.D. in food biology and food engineering are scheduled twice yearly, in January and June.

All faculty members as well as those students who are qualified Ph.D. candidates are encouraged to submit questions to the faculty area coordinator. An area examination committee composed of faculty members responsible for each disciplinary area selects questions. Each question is graded by the individual who submitted it on a 0-100 basis. After grading is completed, the area examination coordinator will compile the grades and review them with the faculty examination committee to determine if the student has passed or failed the examination. A student, upon the recommendation of the committee, may be required to retake all or part of the examination. Students may only sit for the examination, or parts of the examination, twice. The area examination committee may also recommend that the student no longer be permitted to continue as a candidate for the Ph.D. degree. The student would then not be allowed to take the oral examination and would be so notified (with the concurrence of the faculty) by the major advisor, in writing.

Students must be informed of their grades on the written qualifying examination within 30 days of the date of the examination. Students may obtain photocopies of their corrected examination paper from the graduate director and may discuss their answers and grades with the faculty member(s) who wrote and graded the questions.

Cumulative Examination for the Ph.D. in Food Chemistry

The cumulative exam will be held six times a year, in February, March, April, September, October, and November, on the second Saturday morning from 9:00 am to 12:00 pm. Each student has total 12 chances, and has to pass six before failing six exams. All students have to finish them before the end of the third year of their Ph.D. studies. Students can start taking the cumulative anytime. In most cases, the students will start taking the exams in their second year. Each time, only one faculty member will give questions from books or recent food science journals. Only *Pass* or *Fail* (with **70%** as the pass grade) will be given.

The professor will post the reading materials two to four weeks before the exam. The students should sign up for the exam one week ahead, but can withdraw before taking the exam.

The results of cumulative exams for food chemistry students will be reviewed after two years of their Ph.D. studies. Any request for the extension of cumulative exams beyond the three-year period requires a majority vote of the chemistry graduate faculty.

After obtaining their major advisor's written approval, students register for one of the three exams with the graduate director. The registration deadline for these exams is usually two weeks before the exam.

The Oral Ph.D. Qualifying Examination (Admission to Candidacy)

The oral qualifying examination is the final evaluation that a student undergoes prior to admission to candidacy for the degree of Doctor of Philosophy; successfully passing the oral examination results in official admission to candidacy for the Ph.D. degree. The oral qualifying examination is scheduled only after the written examination has

been passed. The oral qualifying examination concentrates, for the most part, on the student's specialized field (food biology, food chemistry or food engineering) with particular emphasis on the proposed research project. At the oral examination, the student defends a written dissertation proposal that describes their proposed program of research and explains its importance and relevance to the field. Students must discuss the content of their dissertation proposal with their major advisor (research mentor) prior to preparing it.

The oral examination has two purposes. It certifies that the student is fully qualified to be a Ph.D. candidate and it certifies that the research plan, if successfully completed, would merit the conferral of a Doctor of Philosophy degree. The oral examination should be taken as soon as possible after the written examination, but in no case should be taken more than six months after the written examination.

The oral qualifying examination must be advertised on all bulletin boards in the Food Science and Center for Advanced Food Technology (CAFT) buildings and is open to all members of the Graduate Program in Food Science.

The form for Admission to Candidacy should be obtained from the office of the graduate director (or the Graduate School, 25 Bishop Place). Shortly before you plan to take the oral qualifying examination, you should complete Part I of the form. Courses and grades being submitted in partial fulfillment of degree requirements must be listed on this form before the committee meeting. Admission to candidacy requires the signature of the committee members and the graduate director. After the examination, the form must be hand-delivered to the Graduate School (25 Bishop Place) for approval of the Dean; the form is then kept on file at the Graduate School until it is brought to the final examination.

Students are informed whether or not they passed the oral qualifying examination immediately after the completion of the examination. A student who fails the examination is informed at this time of the reasons for the decision. The student may request that the reasons for the failure be provided in writing within one week of the examination.

Thesis Preparation and Costs

The thesis reports on an original investigation in an area of Food Science. Students should obtain a Thesis and Dissertation Style Guide available at the Graduate School-NB (25 Bishop Place-College Avenue Campus) and are strongly encouraged to attend a thesis preparation workshop offered by the Graduate School-New Brunswick.

All thesis research data must be accurate and recorded in suitable notebooks that remain the property of the University. The cost of the thesis preparation (which includes copying) is the responsibility of the student.

Faculty advisors should read and return theses with corrections to their students within a month of receiving them. If the faculty advisor is unable to correct the thesis within a month, the student may provide the draft copy to the committee members so as not to delay the defense and final examination of the degree candidate. Students should note that the professor is not required to approve the thesis within a month. The thesis may be returned with extensive corrections and/or requests for additional experiments.

Students should provide members of their committee with a copy of the thesis three weeks prior to the defense. With permission of their advisor, the student may provide the committee a draft copy lacking final pagination, vita, acknowledgments or other "finishing touches." The faculty expects that students and advisors work together during the process of thesis preparation; last minute surprises from either side should thus rarely occur.

Reasonable goals for thesis preparation are illustrated below:

<u>DATE</u>	<u>EVENT</u>
Oct/Jan/May	Graduate School Deadlines for submission of final copy of approved thesis and completion of all degree requirements.
≥ 9 Weeks Before	“Final” draft of thesis to advisor.
≥5 Weeks Before	“Corrected” thesis back from advisor.
≥ 3 Weeks Before	Thesis to committee members.
≥ 1 Week Before	Final Examination Allow at least one week to make final corrections, etc.

Final Examination

The final examination committee may have the same composition as the oral examination committee. The graduate director and the Graduate School prior to the defense must approve the composition of the Dissertation Committee; the outside member(s) must have research or academic qualifications appropriate for such a responsibility and must be approved by the Dean of the Graduate School well in advance of the defense. Students are personally responsible for requesting participation by each committee member selected.

The University requires that the Doctor of Philosophy degree not be conferred until after one academic year beyond the date of the oral qualifying examination, that is, beyond admission to candidacy for the Ph.D. degree.

The final defense examination must be advertised on all bulletin boards in the Food Science and Center for Advanced Food Technology (CAFT) buildings and is open to all members of the Graduate Program in Food Science.

At the final defense the doctoral candidate must defend the thesis to assure the committee that s/he is deserving of the Doctor of Philosophy degree. Students are informed whether or not they have passed the final examination immediately after completion of the final examination. A student who fails the examination is informed at this time of the reasons for the decision. The student may request that the reasons for the failure be provided in writing within one week of the final examination.

The committee also has the option of recommending re-examination of the candidate and re-evaluation of the thesis at a later date (following the addition of further experimental results, data analyses, background discussion, etc., to the thesis). If the candidate is unable to comply with the requirements for re-examination, dismissal from the program is recommended to the graduate program faculty through the graduate director. The graduate faculty, as in all cases dealing with such a serious matter, can recommend alternative solutions or uphold the decision to dismiss.

Candidacy Form and Completing the Degree Process

Prior to the final examination, pick up your Application for Admission to Candidacy for Degree of Doctor of Philosophy that was filed with the Graduate School after the oral qualifying examination. The candidate should list on this form prior to the final defense all courses taken in partial fulfillment of the requirements of the Ph.D. degree. The final examination committee certifying that the candidate has either passed or failed the final examination, after the thesis defense, sign this form. The graduate director will sign the form once revisions, if any, have been made to thesis and a bound copy of the thesis is submitted to him. The copy should be on photocopy paper and placed in a black spring binder. Thesis binders are available at the Cook/Douglass Co-op located at the corner of Nichol Avenue and Lipman Drive on the Cook Campus.

The applicant is responsible for hand-delivering, the signed candidacy form and an unbound original of their thesis on 100% rag or cotton paper to the Graduate School-NB. Four (4) additional signed, (photocopied) title pages and abstracts are required. Extra copies are NOT required on rag paper. Please refer to the Graduate School-NB Checklist for Ph.D. Degree.

Diploma Application

Diploma application forms can be obtained at the Graduate School or Registrar's Office. Complete the form and submit it before the deadline date.

Keys

Mailbox keys must be returned to the administrative assistant and all other keys must be returned to Dave Petrenka.

VII. ACADEMIC PERFORMANCE

Students are Required to Maintain at Least a 3.0 Grade Point Average

The Committee on Academic Standings and Standards reviews student transcripts twice a year. Those students whose grade point average (GPA) is below 3.0 will, with the concurrence of the graduate faculty, be placed on academic probation. Students, who are unable to raise their GPA to 3.0 within two semesters, in the absence of mitigating circumstances, may be dismissed from the program by majority vote of the faculty.

Competency in All Areas of Food Science

In addition to maintaining at least a 3.0 GPA, students must demonstrate competency in each of the core areas of food science, that is, chemistry, biology and engineering. This will be demonstrated by an average grade of "B" or better in Food Science Fundamentals I (16:400:513), Food Science Fundamentals II (16:400:514) and Food Engineering Fundamentals & Processing (16:400:507), with all courses carrying equal weight, despite the fact that 507 is a 4 credit course. An average grade of B or better in the undergraduate engineering sequence (401 and 402), or its equivalent, may be substituted for 507. Students need not register for these courses but may, instead, take all the examinations given in these courses to demonstrate that they possess an understanding of the subject at the level of a "B" or better. Full-time and part-time students are expected to take Food Science Fundamentals I & II (16:400:513 & 514) and Food Engineering (16:400:507) during their first two years after matriculation.

Time to Obtain Degree

The Academic Standings and Standards Committee will monitor progress toward the Master's and Ph.D. degrees. Full-time Master's degrees should be completed within 3 years of matriculation while part-time Master's degrees should be completed within 6 years for Plan A and within 5 years for Plan B. Students who do not meet these guidelines will be referred to the graduate faculty with a recommendation for action up to and including dismissal from the Graduate Program in Food Science. A full-time Ph.D. degree should be completed within 7 years after matriculation. Part-time Ph.D. students should obtain their degrees within 10 years of matriculation.

Time Guidelines for Admission to Doctoral Candidacy

Full-time Ph.D. students should be admitted to candidacy within 3 years of the time they matriculate and part-time Ph.D. students should be admitted to candidacy within 5 years of the time they matriculate.

Incomplete Grades

Failure to complete all requirements of a particular course may result in a grade of Incomplete (INC). All course work required to fulfill an Incomplete must be completed within one year; an extension of time may be requested from the Graduate School with the approval of the graduate director. The policy of the Graduate School on Incomplete grades states that any student who has obtained more than one Incomplete will be allowed one semester to reduce the number to one (or none), after which time the student will not be allowed to register for additional courses until the Incompletes are completed or "abandoned". ("Abandoned" means that the student has agreed that the course may no longer be completed and the faculty has agreed to allow the student to continue with a Permanent

Incomplete on his or her record.) Poor grades cannot be removed from the record by retaking the course and obtaining a better grade.

VIII. PROCEDURES IF THINGS GO WRONG

Problems and concerns should be discussed with the graduate director who may then review them with the program faculty, and where applicable, with the department chair. Students having differences with other students or with a faculty member should speak in confidence with the graduate director, with the chairman of the department, or with any faculty member in whom they believe they can confide.

A. Change of Major Advisor or Thesis Committee Membership

Should a student's major advisor leave the University, the student must consult with the graduate director concerning the appointment of a new major advisor. After retirement, a major professor, as a Professor Emeritus, can serve as the major advisor (chair) of a committee established prior to retirement. Emeritus professors may serve on new committees as "additional" members only (that is, they do not count toward the number of program or outside members required.) A student may request a change in major advisor by consulting with the graduate director.

Students may request change in the faculty membership on their thesis committee in consultation with their major advisor and the graduate director. Substitutions in committee membership are the responsibility of the graduate director and will occur only if a member is unable to serve or if a student's dissertation topic changes, requiring a new dissertation director and/or modification in the committee. In cases other than these, approval for change in committee membership rests with the Dean of the Graduate School-New Brunswick.

A student recommended for non-continuation in the program or denial of a degree may appeal this decision in person before a meeting of the Food Science Graduate Program Faculty. The student may request that their major advisor or another member of the program serve as their counselor in this appeal. The student may not be present during the deliberation phase of the appeal.

IX. PROCEDURE FOR APPEALS

Dismissal from the Food Science Graduate Program

Appeals of a decision to recommend dismissal of a student from the graduate program must be made in writing to the graduate faculty through the graduate director. Appeals of placement on probation (for example, conditions for admissions, re-examination requirements, etc.) must be made in writing to the graduate director.

Extension of Time Request

Requests for extension of the deadline for satisfying the Ph.D. qualifying examination requirements must be made in writing to the chair of the student's thesis committee with a copy to the graduate director. If the request is denied, the committee recommends to the graduate program director that the student be dismissed from the Ph.D. program or transferred to Master's degree status. The student may appeal this recommendation to the graduate program faculty. Students may respond in writing to negative evaluations of their progress. The student's response will be placed on file along with the written faculty evaluation.

Written Qualifying Examination

Complaints concerning grades on the written qualifying examination should be addressed to the faculty members(s) who graded the question. If the complaint is not resolved satisfactorily between the student and the faculty member(s), the student may appeal in writing to the graduate director.

Grades

Complaints concerning a course, test or assignment grade should be addressed to the instructor of the course. If the matter is not resolved satisfactorily between student and instructor, the student may appeal to the graduate director, who will attempt to resolve the dispute informally. If this attempt is unsuccessful, the student may appeal, in writing, to the graduate program faculty.

Other Issues

Other student appeals and complaints may be addressed to the graduate director, who will consult with all parties involved and propose a resolution to the problem. If this informal mediation is unsuccessful, the matter may be referred to the graduate program faculty for a formal review and decision.

Students may appeal decisions of the graduate director or the graduate program faculty to the Dean of The Graduate School—New Brunswick.

X. ADDITIONAL INFORMATION AND REGULATIONS

GA and Paid Internship

Students cannot hold a paid internship and GA at the same time.

Research Costs of a Student Not Supported by Stipend

The research costs for a student not supported by a stipend are the responsibility of the student's major advisor.

Obligations of Graduate Assistants and Teaching Assistants

A graduate assistant (GA) or a teaching assistant (TA) can be required to devote a maximum of 15 hours a week to the department at the discretion of the major advisor or assigned teaching faculty while school is in session. GA's may not be required to work more than 35 hours a week when classes are not in session.

Schedules are to be worked out with their advisors. Students should confer on a regular basis with their advisor on research projects.

Assistantships and fellowships are awarded to graduate students on an annual basis. Every graduate student should be aware that their assistantship or fellowship may not be renewed if they have failed to meet their obligations or if funding for the assistantship is no longer available. A student will be informed of termination of support in accord with University procedures.

A graduate student is expected to devote at least three hours per week for each registered credit of research. For example, a graduate student with a graduate assistantship registered for 3 credits of research should devote 24 hours per week (15 departmental hours and 9 research credit hours). A graduate student who has failed to meet these requirements may receive a U (Unsatisfactory) grade for research for the applicable semester or summer term or may have their graduate assistantship terminated at the end of the academic year.

After one twelve-month appointment, graduate assistants and research fellows are entitled to 22 working days as vacation during the following fiscal year. Vacation leaves are to be arranged through the major advisor and his/her secretary should be notified of any absences.

Secretarial Services

Under no circumstances will secretaries type material for personal business. The major advisor must approve secretarial services pertaining to research reports and project reports.

Office Equipment

Office equipment is not to be used by graduate students without permission.

The account number for the photocopy machine in Room 106 can be obtained from your advisor for official purposes.

Hours of Work

Normal hours are 8:30am to 4:30pm Monday through Friday. Students are not permitted to work alone in the laboratories unless approved by their major advisor.

It is a university regulation that a student must have someone in close proximity when working in the laboratory after hours.

Laboratory Safety and Right-to-Know Law

**To Report a Fire or Other Emergency
Call the Rutgers Police Emergency Number 6-9611**

Every student is required to be familiar with the Department Safety Manual and must attend periodic seminars on Safety and the New Jersey Right-to-Know Law.

Know the location of the nearest emergency exits, fire extinguishers, as well as the fire alarm pull switches.

What to do when the fire alarm sounds:

Turn off all Bunsen burners or electrical equipment. Leave the fume hoods turned on.

Close all doors but do not lock them in case emergency personnel need to enter a room.

Walk down the nearest stairway and exit the building. **Do Not Use The Elevator**

Move away from the building. Look for other people in your group or lab to make sure everyone is present.

Do not re-enter the building until told by emergency personnel that it is safe to do so.

What to do with Biomedical Waste:

Before Decontamination:

SHARPS: Syringes, needles, glass Pasteur pipettes, capillaries, microscope slides.
Do Not Remove Or "Clip" Needles From Syringes as this can create an aerosol.

All sharps are to be placed in labeled, puncture-resistant, covered, and autoclavable container (available from Mr. Yakov Uchitel). They should not be removed from this container.

Sharps containers should be marked with autoclave tape before autoclaving.

OTHER: Petri Dishes, Disposable pipettes, gloves, centrifuge or sample tubes, pipette tips, disposable filters, or anything that "looks like" medical waste.

All these materials are to be placed in clear autoclave bags. Bags must not be orange. Bags must not be taped shut. Any "Biohazard" label should be placed on inside of bag and folded over outside of bag so that it shows when in use. (When the bag is finally closed after autoclaving, the label should face inward and shouldn't be visible).

Decontamination:

All items must be autoclaved for 60 minutes to sterilize.

After Decontamination:

SHARPS: autoclaved (sterilized) bags of sharps should be given to Mr. Yakov Uchitel.

OTHER: autoclaved (sterilized) bags of other materials should be taped shut and then placed in trash disposal container.

Laboratory Equipment/Glassware/Bench Space

All equipment, supplies, laboratory space should be properly cared for. Students should be familiar with any operating procedures of equipment before using it. All equipment, glassware and laboratory space should be cleaned and left in proper operating condition for subsequent users.

Any equipment, which is not operating properly, should be reported to the major advisor and to Mr. Dave Petrenka (Ext. 249).

Most instruments are assigned to an individual faculty or his/her designee. Students should consult with the assignee before using or moving the equipment. If you do not know who is responsible, see Mr. Uchitel and be sure you know what you are doing before you use the equipment. Please do not be afraid to ask for help (Ext. 242).

Stockroom: Certain specialty gases, bulk chemicals and supplies will be available from the department stockroom (room 307). See Mr. Uchitel (Room 419) for these supplies and dry ice (which is charged to your advisor).

Pilot Plant Operation

All work to be done in the pilot plant is to be scheduled through Mr. Dave Petrenka or through a particular faculty member responsible for the equipment. No one may work alone with pilot plant equipment; at least one other person must be present on the same floor. Operating instructions on equipment and necessary supplies should be obtained from a member of the department familiar with the operation of the equipment. Any operating failure in equipment should be reported promptly.

Communication – Rutgers Email Account / Departmental Mail and Mailboxes

All students must obtain a Rutgers University e-mail address and provide this address to the graduate secretary.

Computing services website: <http://www.nbcs.rutgers.edu/index.php>

We will provide information to you through the bulletin board outside of Room 107, your assigned mailbox or e-mail. Mailboxes that do not appear to be used will be reassigned.

Do not treat the department mailbox as your personal mailbox for bank statements, drivers license, and other personal mail. Communication from the Food Science Graduate Program will be made by e-mail as much as possible. Students are responsible for checking their e-mail for these messages.

Registrar

It is your responsibility to make sure that the Registrar has your correct address and that you receive your registration materials. This will ensure correct mailing address for your term bill. The Graduate School-New Brunswick and the Food Science graduate program must also have your current contact information.

Registrar – New Brunswick website: <http://registrar.rutgers.edu/NBINDEX.HTM>

Graduate Student Desk Space

Each graduate student will be assigned laboratory bench space when necessary and available. Each full-time graduate student will be assigned a desk or desk space as it becomes available. The major advisor requests laboratory bench and desk assignments for each student. Desk assignments are made through the office of the department chair at the request of the student's major advisor.

Student Activities

Graduate students are strongly encouraged to participate in activities of the Graduate Student Association (GSA), which is open to all graduate students. Members of the GSA participate in planning and executing professional and social events both inside and outside the department/program. Professional programs include industrial speakers and tours of food manufacturing facilities, annual career fairs, and career guidance seminars. Annual social activities include the Halloween party in October, the Holiday party in December, barbeques throughout the year, and many other activities. Students are rewarded for their participation in GSA activities (and for participation in local activities of the Institute of Food Technologists, IFT); these rewards typically involve financial support to attend the Institute of Food Technologists Annual meeting in early summer.

GSA meetings are typically held monthly during the academic year. All GSA meetings will be announced in the GSA newsletter, at Seminar, by email, and through notices posted around the building. The GSA electronic newsletter also keeps students up to date about scholarships and any other important information students might need.

The graduate program bulletin board outside Room 107 also serves as a message center to graduate students. Sign-up sheets for New York IFT and Central New Jersey IFT monthly meetings and activities as well as University Graduate Student Association activities are posted.

Elections are held every year. Leadership positions include President, Vice President, Secretary, and Treasurer. Details about these positions will be distributed prior to elections. Names and contact information for the current officers of the GSA is posted on the graduate program bulletin board outside Room 107.

Honorary Societies

1. Phi Tau Sigma

Graduate Students with a grade point average of 3.5 or better may be nominated for this organization after two semesters. Students are re-screened after each term. The Phi-Tau Sigma Committee will elect those nominated by a process considering their potential advancement in food science and related activities.

2. Sigma XI

Students may be nominated as either associate or full members in Sigma XI. Nominations are made for associate membership at the Master's level and for full membership at the Ph.D. level. Nominations are not automatic. Associates may be nominated for full membership. Start by requesting the nomination from any faculty member or your faculty advisor.

Alumni Loan Fund

Small emergency loans are available. The loan request is worked out on an individual basis with the graduate director.

Sexual Harassment

Sexual harassment of students by faculty, administrators or other employees, or fellow students is a form of sex discrimination prohibited by university policy and by the Education Amendments Act of 1972. The graduate program strives to maintain a collegial atmosphere among all its members. Sexual harassment will not be tolerated.

The university has both formal and informal procedures for resolving problems relating to sexual harassment. Students are encouraged to raise questions or bring problems for strictly confidential discussion to the graduate director, their advisor, or any faculty member with whom they are comfortable. Since these problems sometimes arise from cultural differences, personal misunderstandings, or are otherwise unintended, it is best to deal with them as soon as possible so that the situation can be remedied. Students may also bring their complaints directly to the Director of University Harassment Compliance. (732-445-3020 ext. 626).

XI. ACADEMIC INTEGRITY

There is growing concern among scientists about ethical issues such as plagiarism, misrepresentation and falsification of data, improper use of privileged information, confidentiality, ownership of data, authorship and other issues that influence the integrity of the scientific process. The Graduate Program in Food Science holds all of its members as well as students to the highest ethical standard; any form of cheating on exams, plagiarism in a course or on a publication, and falsification of research data are not tolerated. Students who are aware of any ethical violations should bring them to the attention of the professor in charge of the course, their advisor, the graduate director or the Food Science Graduate Program Academic Integrity Committee.

The university Academic Integrity Policy states:

"Academic freedom is a fundamental right in any institution of higher learning. Honesty and integrity are necessary preconditions to this freedom. Academic integrity requires that all academic work be wholly the product of an identified individual or individuals. Joint efforts are legitimate only when the assistance of others is explicitly acknowledged. Ethical conduct is the obligation of every member of the university community and breaches of academic integrity constitute serious offenses."

The principles of academic integrity entail simple standards of honesty and truth. Each member of the university has a responsibility to uphold the standards of the community and to take action when others violate them. All students in the Graduate Program in Food Science are expected to be familiar with the Academic Integrity Policy of Rutgers University and are required to sign an Academic Integrity Pledge indicating their familiarity.

Faculty members have an obligation to educate students to the standards of academic integrity, and to report violations of these standards to the appropriate deans.

Students are responsible for knowing what the standards are and for adhering to them. Students should also bring any violations of which they are aware to the attention of their instructors.

Violations of Academic Integrity

Any involvement with cheating, the fabrication or invention of information used in an academic exercise, plagiarism, facilitating academic dishonesty, or denying others access to information or material may result in disciplinary action. Breaches of academic integrity can result in serious consequences ranging from reprimand to expulsion from the university.

The university classifies violations of academic integrity into four categories based on the level of seriousness of the behavior. A brief description of these categories is provided below. (Note that this is a general description and should not be considered as all-inclusive.)

**The University Considers Any Violation
Of Academic Integrity By A Graduate Student
As Potentially A Level Four Violation**

**Therefore, A Graduate Student Who Commits
Any Violation Of Academic Integrity
May Be Expelled From The University**

Level One Violations

These violations may occur because of ignorance or inexperience on the part of the person(s) committing the violation and ordinarily involve a very minor portion of the course work.

Examples: Improper footnoting or unauthorized assistance on academic work.

Recommended Sanctions: Make-up assignment at more difficult level, or assignment of no-credit for work in question, or required attendance at a workshop on ethics.

Level Two Violations

Level two violations involve incidents of a more serious nature and affect a more significant aspect or portion of the course.

Examples: Quoting directly or paraphrasing without proper acknowledgment on a moderate portion of the assignment, failure to acknowledge all sources of information and contributors who helped with an assignment, submission of the same work for more than one course without permission from the instructor.

Recommended Sanctions: One or all of the following: probation, a failing grade on the assignment, and/or a failing grade in the course.

Level Three Violations

Level three offenses involve dishonesty on a significant portion of course work, such as a major paper, hourly, or final examination. Violations that are premeditated or involve repeat offenses of level one or level two are considered level three violations.

Examples: Copying from or giving others assistance on an hourly or final examination, plagiarizing major portions of an assignment, using forbidden material on an hourly or final, using a purchased term paper, presenting the work of another as one's own, altering a graded examination for the purpose of obtaining a higher grade.

Recommended Sanctions: Suspension from the university for one or more terms with a notation of "academic disciplinary suspension" placed on a student's transcript for the period of suspension. Expulsion from the university and a permanent notation on the student's transcript may also be imposed.

Level Four Violations

Level four violations are the most serious breaches of academic integrity. They include repeat offenses of level three violations.

Examples: Forgery of grade change forms, theft of examinations, having a substitute take an examination, dishonesty relating to senior thesis, Master's thesis, or doctoral dissertation, sabotaging another's work, the violation of the ethical code of a profession or all infractions committed after return from suspension for a previous violation.

Recommended Sanctions: Expulsion from the university and a permanent notation on the student's transcript.

Faculty who believe that violations have occurred should immediately contact the dean's office of their college/school. Students who suspect that other students are involved in actions of academic dishonesty should speak to the instructor of the course, their major advisor, or the graduate director.

Please refer to the current Graduate School—New Brunswick Catalog for additional information or pick up an Academic Integrity: Issues for Graduate Students brochure from the graduate program secretary of Graduate School-New Brunswick

XII. STUDENT REPRESENTATION AT GRADUATE FACULTY MEETINGS

Two full time graduate students and two part-time graduate students are elected/selected by their peers to serve as representatives to the meetings of the Graduate Program in Food Science. Students have a full voice and vote in all matters, except those relating to faculty and/or student personnel matters.

XIII. RECREATION

The following notes have been prepared with the cooperation of current graduate students. They are intended to give you a few pointers on finding activities other than work.

There is a University-wide Graduate Student Association (GSA). Its many activities range from biweekly dance parties to organized trips to New York City. The association has a lounge, located in the College Avenue Campus Student Center where you can formally meet other graduate students. To get there, you can take one of the intercampus buses.

As its name implies, the intercampus bus system can take you to any of the campuses in the New Brunswick area. These are Busch, College Avenue, Cook/Douglass and Livingston. Throughout the year many interesting activities are held on these campuses. To find out about current activities, you should scan the last page of the *Rutgers Newsletter*. This is published each Friday during the academic year, and is placed in the mailbox of each full-time graduate student. Another source of information is the *Daily Targum*, the Rutgers student newspaper. It is published Monday through Friday during the academic year. The Thursday issue usually contains an entertainment section.

For local daily coverage you may purchase a local paper such as the *Home News Tribune*, which serves central New Jersey. For other areas in New Jersey, you may have to read the *Newark Star-Ledger*, or the *New York Times*. On Fridays the *New York Times* publishes a listing of movies being shown in most theaters in North and Central New Jersey (as well as New York).

Information of a more permanent nature is available from various sources. A very good source of information on restaurants, stores, etc., is *The Pauper's Guide*. This is a publication of the GSA available at no cost to graduate students. The guide, which also lists university sponsored clubs open to graduate students, was revised recently by GSA volunteers and is available through the University GSA.

Information on interesting places to visit in New Jersey can be found in *Away We Go*. This publication is inexpensive and informative but a car is needed to go to most of the places it describes.

Incidentally, the state offers good hiking trails in many parks including High Point State Park and in the Delaware Water Gap. New York State also has some good places (the Catskills and the Adirondacks). If you enjoy canoeing, you might want to read *Exploring the Little Rivers of New Jersey* by James and Margaret Caldwell.

Other interesting places in New Jersey include the amusement park Great Adventure, Atlantic City, and the Meadowlands. Rutgers participates in intercollegiate basketball, football, soccer, baseball, wrestling, gymnastics, swimming, and other sports; most sports have both men's and women's teams which compete during the academic year. Football and soccer games are held in stadiums located on the Busch campus; the basketball team plays in the Louis Brown Athletic Center on the Livingston Campus; other sports compete at venues throughout the New Brunswick Campus.

There are excellent athletic facilities for personal use on Cook Campus, as well as on Busch Campus. Racquetball and tennis courts, an Olympic-sized pool, a fitness center, saunas and steam rooms are all within a few hundred yards of the Food Science Building on Cook. These are open to full and part-time students.

XIV. UNIVERSITY SUPPORT SERVICES FOR GRADUATE STUDENTS

When calling from within the university, dial 2 or 5 as indicated; when calling from a non-university phone, dial 932 or 445 as indicated before the university extension. The area code is 732.

Emergency (on campus)	6-911
Alcohol Assistance	2-7976
Campus Bus Information	2-7817
Change of name/address	5-3556
Computing Services (RUCS)	5-2296
Counseling	Cook: 2-9150 2-8982 Douglass: 2-9070 Livingston: 5-4140 Rutgers: 2-7884
Dining Services (meal card info)	2-8041
Disabilities, Transportation	2-7744
English as a Second Language	5-7422
Financial Aid	2-7057
Harassment Office	5-3020 ext. 626
Housing Information	5-2215
Hurtado Health Center	2-7401/7402
International Center	2-7015
Parking	2-7744
Records	5-3260
Registrar	5-3556/3557
Sexual Assault Services	2-1181
Student Accounting	2-7019
Teaching Assistant Project	2-7747
Touchtone Registration	5-1999
Transcripts	5-3536/3146

XV. GRADUATE SCHOOL-NEW BRUNSWICK CONTACT INFORMATION <http://gsnb.rutgers.edu>

Associate Dean: Barbara Bender	Academic Support & Graduate Student Services	2-7747	bbender@rci.rutgers.edu
Administrative Assistant: Barbara Sirman	Degree Requirements	2-8122	sirman@rci.rutgers.edu
Administrative Assistant: Alexandra Bachmann	Registration Issues	2-7449	abachman@rci.rutgers.edu
Secretary: Dorothy Amorosi	Degree Forms, etc.	2-7034	amorosi@rci.rutgers.edu

XVI. DEPARTMENT OF FOOD SCIENCE CONTACT INFORMATION

Food Science Department: Phone: 732-932-9611 Fax: 732-932-6776

Administrative Positions	Email Address	Ext.
Graduate Director: Chi-Tang Ho	ho@aesop.rutgers.edu	235
Graduate Secretary: Millie Kwiatkowski	kwiatkowski@aesop.rutgers.edu	207
Chairman of Food Science: Jozef Kokini	kokini@aesop.rutgers.edu	201
Administrative Assistant: Paulette Arico	arico@aesop.rutgers.edu	202
Systems Support Specialist: Yakov Uchitel	uchitel@aesop.rutgers.edu	242
Facility Engineer (Pilot Plant): Dave Petrenka	petrenka@aesop.rutgers.edu	249

Food Science Department: Phone: 732-932-9611 Fax: 732-932-6776

Graduate Faculty	Email Address	Ext.	Primary Research Interest
Carman, George	carman@aesop.rutgers.edu	217	Food Biology
Chen, Suzie (Lab for Cancer Research, Busch)	suziec@rci.rutgers.edu	732-445-3400 x227	Food Biology
Chikindas, Michael	tchikindas@aesop.rutgers.edu	218	Food Biology
Daun, Henryk	daun@aesop.rutgers.edu	230	Food Chemistry
Frenkel, Chaim (Foran Hall, Cook)	frenkel@aesop.rutgers.edu	732-932-9711 x365	Food Biology
Gallo, Michael (EOHHSI, Busch)	magallos@ehhs.rutgers.edu	732-445-0175	Food Biology
Hartman, Thomas	thartman@aesop.rutgers.edu	310	Food Chemistry
Ho, Chi-Tang	ho@aesop.rutgers.edu	235	Food Chemistry
Huang, Qingrong	qhuang@aesop.rutgers.edu	2-7193	Food Chemistry
Karwe, Mukund	karwe@aesop.rutgers.edu	224	Food Engineering
Kokini, Jozef	kokini@aesop.rutgers.edu	201/313	Food Engineering
Lachance, Paul	lachance@aesop.rutgers.edu	243	Food Biology
Lee, Tung-Ching	lee@aesop.rutgers.edu	236	Food Chemistry
Leustek, Thomas (Foran Hall, Cook)	leustek@aesop.rutgers.edu	732-932-8165 x326	Food Biology
Liu, Sean	liu@aesop.rutgers.edu	240	Food Engineering
Ludescher, Richard	ludescher@aesop.rutgers.edu	231	Food Chemistry
Matthews, Karl	matthews@aesop.rutgers.edu	219	Food Biology
Montville, Thomas	montville@aesop.rutgers.edu	222	Food Biology
Quadro, Loredana	quadro@aesop.rutgers.edu	261	Food Biology
Rafi, Mohamed	rafi@aesop.rutgers.edu	258	Food Biology
Schaffner, Donald	schaffner@aesop.rutgers.edu	214	Food Biology
Schaich, Karen	schaich@aesop.rutgers.edu	233	Food Chemistry
Suh, Nanjoo	nsuh@rci.rutgers.edu	732-445-3400 x226	Food Biology
Takhistov, Paul	takhistov@aesop.rutgers.edu	238	Food Engineering
Tepper, Beverly	tepper@aesop.rutgers.edu	221	Food Biology
Nilgun Tumer	tumer@aesop.rutgers.edu	732-932-8165 x 215	Food Biology
Wang, Shaw (Chem/Bioch. Eng., Busch)	shaww@sol.rutgers.edu	732-445-3360	Food Engineering
Yam, Kit	yam@aesop.rutgers.edu	241	Food Engineering
Yang, Chung-Shu (Lab for Cancer Research, Busch)	csyang@rci.rutgers.edu	732-445-3400 x 248	Food Chemistry

XVII. ABOUT THE FOOD SCIENCE GRADUATE

2005-2007

FOOD SCIENCE 400

Degree Programs Offered: Master of Science, Doctor of Philosophy *Director of Graduate Program:* Chi-Tang Ho, 107 Food Science Building, Cook Campus (732/ 932-9611, ext. 207)

Members of the Graduate Faculty

George M. Carman, *Professor of Food Science, CC; Ph.D., Massachusetts*

Biochemistry; membranes, phospholipids, and enzymes

Suzie Chen, *Associate Professor of Chemical Biology, EMSP; Ph.D., Albert Einstein College of Medicine*

Mechanics of cell differentiation and carcinogenesis

Michael Chikindas, *Assistant Professor of Food Science, CC; Ph.D., Institute of Genetics and Selection of Industrial Microorganisms (Russia)*

Microbiology; genetics; biotechnology; antimicrobial peptides

Henryk Daun, *Professor of Food Science, CC; Ph.D., Politechnika Gdanska*

Chemistry of food colors; thermal degradation of foods

Chaim Frenkel, *Professor of Horticulture, CC; Ph.D., Washington State*

Postharvest biology: senescence science, fruit ripening, and stress

Michael Gallo, *Professor of Environmental and Community Medicine, UMDNJ–RWJMS; Ph.D.,*

Albany Medical College

Food additives; phototoxins; dermatotoxicology

Thomas G. Hartman, *Adjunct Research Professor of Food Science, CAFT; CC; Ph.D., Rutgers*

Advanced instrumental analytical techniques as applied to food chemistry, mass spectrometry, chromatography, infrared spectroscopy, toxicology

Chi-Tang Ho, *Professor of Food Science, CC; Ph.D., Washington*

Flavor, chemistry, natural products

Qingrong Huang, *Assistant Professor of Food Science, CC; Ph.D., Nebraska*

DNA/protein chips; food delivery systems; nanotechnology

Mukund V. Karwe, *Associate Professor of Food Science, CC; Ph.D., Rutgers*

Numerical simulation of thermal transport in extrusion and baking processes; laser Doppler anemometry applications in food processing, effect of processing on nutraceuticals in food, high hydrostatic pressure processing of food

Jozef Kokini, *Professor of Food Science, CC; Ph.D., Carnegie Mellon*

Food rheology; biophysical properties, extrusion

Paul A. Lachance, *Professor of Food Science, CC; Ph.D., Ottawa*

Nutrition; nutritional aspects of food processing

Tung-Ching Lee, *Professor of Food Science, CC; Ph.D., California (Davis)*

Food chemistry and biochemistry; biotechnological applications in food processing; seafood technology; nutritional and safety aspects of food processing

Thomas Leustek, *Professor of Biochemistry and Microbiology, CC; Ph.D., Rutgers*

Nutritional value of plant crops, sulfur metabolism; molecular genetics and biochemistry

Sean Liu, *Professor of Food Science, CC; Ph.D., Kansas State*

Membrane processes; flavor encapsulation; nutraceutical recovery from by-products; food nanotechnology

Richard D. Ludescher, *Professor of Food Science, CC; Ph.D., Oregon*

Food biophysics; protein chemistry; optical luminescence

Karl Matthews, *Associate Professor of Food Science, CC; Ph.D., Kentucky*

Pathogenesis and reservoirs of foodborne pathogens

Thomas J. Montville, *Professor of Food Science, CC; Ph.D., Massachusetts Institute of Technology*

Microbial food safety; fermentations; biotechnology

Loredana Quadro, *Assistant Professor of Food Science, CC; Ph.D., Naples*

Nutrients: their metabolism and effects on human health

Mohamed M. Rafi, *Assistant Professor of Food Science, CC; Ph.D., Kerala*
Biochemistry; nutrigenomics; molecular and cellular mechanisms of health promoting nutraceuticals from foods and medicinal plants

Donald W. Schaffner, *Extension Specialist in Food Science, CC; Ph.D., Georgia*
Predictive food microbiology; quantitative microbial risk assessment

Karen M. Schaich, *Associate Professor of Food Science, CC; Sc.D., Massachusetts Institute of Technology*
EPR studies of free radicals; lipid oxidation; co-oxidation of macromolecules; chemistry of antioxidants

Nanjoo Suh, *Assistant Professor of Chemical Biology, EMSP; Ph.D., Illinois*
Chemoprevention of cancer, animal models of breast cancer

Paul Takhistov, *Associate Professor of Food Science, CC; Ph.D., USSR Academy of Science*
Nonthermal food processing; biofilms; biosensors; nanotechnology

Beverly J. Tepper, *Associate Professor of Food Science, CC; Ph.D., Tufts*
Nutrition; taste genetics; taste in disease, food intake regulation; sensory evaluation

Nilgun Tumer, *Professor of Plant Biology & Pathology, CC; Ph.D., Purdue*
Ribosome inactivating proteins, translation, food biotechnology

Shaw S. Wang, *Professor of Chemical and Biochemical Engineering, SE; Ph.D., Rutgers*
Biochemical engineering; food science and technology

Kit L. Yam, *Associate Professor of Food Science, CC; Ph.D., Michigan State*
Food packaging engineering, polymeric material

Chung S. Yang, *Professor of Pharmacognosy, EMSP; Ph.D., Cornell*
Cancer prevention by dietary constituents; molecular and cellular mechanisms of carcinogenesis

Programs

The following areas of specialization are offered: basic studies in physical, chemical, or biological changes in foods; chemistry of fats and oils; flavor chemistry, including isolation and identification of food flavors; chemistry of food proteins; nutritional aspects of food products; food enzymology and biochemistry; food microbiology; food toxicology; heat and mass transfer in foods, energy conservation in processing; food packaging, theoretical aspects, functionality, and properties; food colors; food emulsions; sensory attributes of foods; and biotechnology. The program is suitable for part-time study.

Applicants are expected to have completed one year each of calculus, physics, and organic chemistry, and to have some foundation in the biological sciences. Biochemistry, microbiology, and / or nutrition are recommended, as is statistics. Some undergraduate food science courses may be taken for graduate credit. The Graduate Record Examination must be taken.

Food science offers a Master of Science degree with options for a thesis or non-thesis program. In the thesis option, the student must take a minimum of 21 course credit, which includes a public seminar, 9 research credits, carry out a research problem, write a thesis, and pass an oral defense of the thesis. For the non-thesis option, the student must have a minimum of 30 course credits which includes a public seminar, present a critical essay based on a literature review conducted under the direction of an advisor, and pass an oral defense of the critical essay. A non-thesis M.S. normally is considered a terminal degree. However, the student with the support of his or her major adviser may petition the faculty for permission to continue with the Ph.D. program.

The student should demonstrate proficiency in food science by the satisfactory completion of course work in the following areas: food science fundamentals, food science seminar (1 credit), food biochemistry, food engineering, nutrition, food analysis or quantitative analysis, and food microbiology. Any of the above requirements may be waived, except seminars, if the student has had courses that satisfy the core requirements.

Students must demonstrate proficiency in food biology, food chemistry, and food engineering early in their academic careers. They are required to complete with an average grade of *B* or better 16:400:507 Food Engineering Fundamentals and Processes and 16:400:513,514 Food Science Fundamentals I,II.

The Ph.D. requires a minimum of 72 credits beyond the bachelor's degree, of which 33 or more must be course credits and an additional 39 credits of research. Candidates who have any deficiencies upon admission are required to make up these deficiencies before receiving the degree.

Qualifying examinations for the doctorate include both written and oral examinations. A student must take a written qualifying examination in either food biology or food physics/engineering. Cumulative examinations are required for food chemistry. After passing the written qualifying examination, the student takes the oral qualifying examination, which normally includes approval of the research proposal for the dissertation. A student who fails all or part of the written qualifying examination may, with the concurrence of the faculty and his or her adviser, retake one time those portions of the examination that he or she failed. Likewise, a student who does not pass the oral qualifying examination may retake the examination once, with the dissertation committee's concurrence. After passing both the written and oral components of the qualifying examination, the student is recommended as a candidate for the Ph.D. There is no language or residence requirement for the Ph.D. degree.

The master of philosophy degree is an option for doctoral candidates.

Graduate assistantships, teaching assistantships, and fellowships are available to qualified students. Academic and research training in packaging science and engineering as applicable to food are possible in this program. For further information concerning this option, refer to the listing under Packaging Science and Engineering in this chapter.

Graduate Courses

16:400:501. (F) FLAVOR CHEMISTRY (3)

Ho. Prerequisite: One year of organic chemistry or equivalent.

Isolation, fractionation, and identification of the desirable and objectionable flavor constituents in food; chemical mechanisms for the formation of flavor components in food; methods for measuring flavor and flavor stability of food and food components; manufacture of food flavors.

16:400:502. (F) FOOD SCIENCE INSTRUMENTATION (3)

Hartman, Ho. Prerequisite: Organic chemistry.

Theory, methodology, and application of chromatographic methods, including high-performance liquid, thin-layer, and gas chromatography. Theory, methodology, and application of spectrometry, including visible color, ultraviolet, infrared, NMR, and mass spectrometry.

16:400:504. (S) CARBOHYDRATES IN FOODS (3)

Prerequisite: Organic chemistry.

The basic chemistry and technology of carbohydrates in food products. Functional properties of carbohydrates are related to their structures and uses in food systems, with an emphasis on industrial gums.

16:400:505. (S) LIPID CHEMISTRY (4)

Schaich. Prerequisite: 16:400:513 or permission of instructor.

Structure and composition of lipids; chemical and physical properties; lipid structures in foods and biological materials; processing of fats and oils; fractionation, purification, and analysis of lipids; chemistry of degradation, autoxidation, pro-and antioxidants; emulsions and emulsifiers; membranes; health effects and physiology of lipids.

16:400:506. (S) CHEMISTRY OF FOOD PROTEINS (3)

Ludescher. Prerequisite: 16:400:513.

Study of the molecular structure, physical chemical properties, and functions of proteins and their constituents. Special emphasis on the relationship between molecular structure and function in food proteins.

16:400:507. (S) FOOD ENGINEERING FUNDAMENTALS AND PROCESSES (4)

Karwe. Prerequisites: Physics, calculus.

Principles of material and energy balance, thermodynamics, fluid flow, and heat and mass transfer. Review of unit operations: thermal processing, refrigeration, freezing, evaporation, dehydration, extraction, filtration, membrane processes. Introduction to microwave, high pressure, and pulsed electric field processing.

16:400:510. (S) FOOD RHEOLOGY (3)

Kokini. Prerequisites: 16:400:507, 517.

Concepts of flow and deformation behavior and their application in food materials. Rheological properties for liquid and solid materials. Methods of measurement of rheological properties in food systems. Rheology stability and rheology texture relationships used to illustrate applications of rheology in product quality. Basic equations of fluid flow and their application in selected flow processes such as extrusion and spinning.

16:400:511. (S) FOOD ENZYMOLOGY (3)

Carman. Prerequisites: General biochemistry, 16:400:513,514.

Methods of measuring enzymatic activities; extraction of enzymes from microbial, plant, and animal systems; methods of enzyme purification and characterization; and regulation of enzyme activities by activators, inhibitors, and by covalent modification. Enzymes used by the food industry and methods for controlling endogenous enzyme activities.

16:400:512. (S) MICROBIAL FERMENTATION IN FOOD BIOTECHNOLOGY (3)

Montville. Prerequisites: 16:400:513, 514 or permission of instructor.

Utilization and physiology of beneficial microorganisms in the food, pharmaceutical, and biotech industries, with emphasis on the lactic acid bacteria. Metabolic regulation of fermentation products, the role of bioenergetics and transport pathways, probiotics. Laboratory and industrial use of fermentors and chemostats, new microbiological technologies, and novel approaches to the use of microorganisms.

16:400:513. (F) FOOD SCIENCE FUNDAMENTALS I (3)

Lee, et al. Prerequisite: Organic chemistry.

Basic chemistry of carbohydrates, proteins, lipids, vitamins, and water independent of and in relation to interaction during processing.

16:400:514. (S) FOOD SCIENCE FUNDAMENTALS II (3)

Matthews. Prerequisite: General microbiology or biochemistry.

Mechanistic examinations of foodborne microbes, enzymology, biotechnology, postharvest physiology, nutrition, and current concepts in food safety as related to food composition and processing.

16:400:515. (F) PRINCIPLES OF FOOD PROCESS ENGINEERING I (3)

Prerequisites: 11:400:401,402 and a year of calculus, or equivalent.

Applications of kinetic models to microbial growth and inactivation, as well as quality attributes in foods. Influence of temperature, water activity, and phase change on reaction rates. Use of transient-state heat and mass transfer to describe temperature and water activity distribution histories within foods during typical preservation processes. Integration of kinetic models and temperature/ water activity distributions into models for prediction of microbial safety and product quality as function of process conditions and/ or storage environment.

16:400:517. (F) APPLIED MATHEMATICS IN FOOD SCIENCE (3)

Prerequisites: 11:400:401, 402 or 16:400:507 and a year of calculus or equivalent.

Applications of numerical methods to solution of problems encountered in food science. Linear analysis and matrices, functions of single and multiple variables, solutions to ordinary and partial differential equations, and data analysis and modeling. Applications to heat and mass transfer problems in food systems during phase change. Software packages.

16:400:519. (F) FOOD SAFETY (3)

J. Rosen. Prerequisite: Organic chemistry.

Chemistry and toxicology of food additives, pesticides, mycotoxins, and materials naturally present in food. Chemical carcinogenesis. Role of diet in both cancer causation and cancer inhibition.

16:400:521. (F) CHEMISTRY OF FOOD COLORS (3) Daun. Prerequisites: Organic chemistry, physics.

Occurrence, structure, and physical and chemical properties of synthetic and natural food colors. Interactions between color substances and other food components during processing and storage. Analytical aspects of food colors.

16:400:526. (F) PREDICTING SHELF LIFE OF FOODS (3)

Yam. Prerequisite: B.S. degree in food science, chemistry, or a related field.

The concept of shelf life, factors affecting shelf life, and strategies for shelf life extension. Applications of chemical and microbial kinetics to quantify food deteriorative reactions, mass transfer theories to quantify the movement of gases and vapors through package, and basic calculus to develop predictive shelf life models. Case studies and computer programs.

16:400:530. (S) ADVANCED FOOD SENSORY SCIENCE (3)

Tepper. Prerequisites: 01:960:401 or equivalent; basic physiology; nutrition.

In-depth study of the principles of sensory physiology, taste psychophysics, and sensory evaluation with emphasis on food and food constituents and the various methods of product testing. Includes laboratory exercises.

16:400:592. (S) ADVANCED MASS TRANSFER IN FOOD SYSTEMS (3)

Liu. Prerequisites: College physics, organic chemistry, and college math including calculus, or permission of instructor.

Fundamentals of mass transfer in various food and food processing systems. Diffusions in solids, liquids, vapors, polymer films, and diffusions coupled with heat transfer and/ or chemical reactions. Special processes and phenomena: adsorption, extraction, spray drying, membrane separations, and controlled release.

16:400:601,602. SEMINAR IN FOOD SCIENCE (1,1)

Required of all students.

Student and guest speakers. Topics presented contribute to some facet of food science. Student participation is focused on providing experience in preparing, presenting, and defending scholarly research.

16:400:603. SPECIAL TOPICS IN FOOD SCIENCE (BA)

Conference 3 hrs.

Designed to permit a student to work on a relatively short-term library or laboratory project and prepare a final annotated paper, or to elect a specially arranged course of a visiting investigator.

16:400:605. (F) MICROBIAL FOOD SAFETY (3)

Matthews. Prerequisites: 01:119:390 and 11:126:302 or equivalent.

Traditional and emerging pathogens, behavior (phenotypic and genetic) in food systems and host(s); government and industry regulations.

16:400:606. (F) FOOD PACKAGING SCIENCE AND TECHNOLOGY (3)

Yam. Prerequisite: B.S. degree in food science, chemistry, or related field.

Packaging material science and applications, package systems analysis, modified atmosphere packaging, aseptic food packaging, microwavable food packaging, active and intelligent packaging, package and the environment, and regulatory aspects of food packaging.

16:400:609. (F) THERMAL AND NONTHERMAL PROCESSING OF FOODS (3)

Karwe. Prerequisites: Undergraduate or graduate degree in any of the following: food science, chemical engineering, mechanical engineering, physical sciences. Some knowledge of simple programming (BASIC, Excel, Fortran, MatLab).

Topics: heat sterilization/ canning/ retorting, UHT, aseptic processing, frying, baking, ohmic heating, microwave heating, extrusion, high hydrostatic pressure, pulsed electric, pulsed light, oscillating magnetic field, irradiation.

16:400:610. (S) NUTRAGENOMICS AND NUTRACEUTICALS (3)

Rafi. Prerequisite: 16:400:514 or biochemistry or permission of instructor.

Host-immune responses in diseases, signal transduction pathways in cancer and inflammation, transcription factors, proteomics, bioavailability of nutraceuticals, signaling molecules and their interactions with nutraceuticals. Role of nutraceuticals in health promotion and its mechanism of action. Isolation and identification of health promoting nutraceuticals and separation techniques. Beneficial and questionable effects of nutraceuticals and the development of future foods.

16:400:611. (S) POLYMERIC PROPERTIES IN FOOD (3)

Kokini. Prerequisites: 16:400:507, 510, 517.

Polymeric properties of biological materials, organization of macromolecules in the form of food; physical and physicochemical properties and their quantitative treatment; quantitative design principles for the structure and organization of foods.

16:400:612. (F) COLLOIDAL CHEMISTRY OF FOOD (3)

Takhistov. Prerequisites: Calculus I, physical chemistry, or permission of instructor.

Principles of colloid and interface science. Analysis and design of the biocolloidal, food, and various natural dispersion systems in the context of fundamental physico-chemical interactions between surfaces/ phases. Major course topics are: suspensions, emulsions, foams, and biocolloids (cell/ cell and cell/ surface interactions).

16:400:613. (F) NANOTECHNOLOGY AND ITS APPLICATIONS IN BIOTECHNOLOGY AND FOOD (3)

Huang. Prerequisites: Physical chemistry or permission of instructor

Basic concepts, investigation tools, and fundamental issues of nanotechnology, with emphasis on the applications of nanotechnology in agricultural and food systems, healthcare, food safety, and food packaging. Self-assembly, scanning probe microscopy, micro- and nanoencapsulation, organic/ inorganic nanocomposites, DNA, and protein chips.

16:400:701,702. RESEARCH IN FOOD SCIENCE (BA,BA)

Appendix I
Requirements For The Plan B Critical Essay

The writing of a Plan B critical essay must be a scholarly endeavor that demonstrates a student's in-depth understanding of a chosen subject area. The "critical essay" must contain a complete and comprehensive review of the literature on the topic including relevant current citations and significant historical literature. It should summarize and critically evaluate approaches, techniques and methodologies that define the current state of knowledge in the subject area. It must also include the student's own interpretation of the literature and suggest future research directions. A style guide for the critical essay is shown below.

Preparing The Critical Essay

General Specifications. The manuscript must be prepared on 8-1/2" X 11" good quality white bond paper. The text must be double-spaced throughout with 1" margins on all sides. Standard type-face should be used. All pages should be numbered in Arabic numerals beginning with -1- on the first page of text placed in the upper right corner.

Typical Contents of Essay

Title Page (separate)

Abstract page

Table Of Contents (With Page References)

Text

Introduction to topic

Main body, with larger divisions and important minor divisions indicated by suitable, consistent, headings

Analysis of current state of knowledge

Summary and conclusions including possible future work

Footnotes (if applicable)

References: see below

Appendices (if present)

The reference list may be prepared in either numbered or alphabetized style and cited, in parentheses, within the text. Journal citations in the reference list may be cited in the format of an appropriate journal (Journal of Food Science, for example), or in the following format:

Snell, E.E., Guirard, B.M., Williams, R.J. 1943. Occurrence in natural products of a physiologically active metabolite of pyrooxidine. Journal of Biological Chemistry, 143:519-530.

Book references may be cited as follows:

Lever, J.E. 1982. Cell culture models to study epithelial transport. In: Membranes and Transport, ed. A.N. Martonosi, pp. 231-236. New York: Plenum.

Appendix II

Degree Deadline Dates

All materials must be submitted to the Graduate School-New Brunswick by:

For an October dated degree	October 3, 2006
For a January dated degree	January 4, 2007
For a May dated degree	May 1, 2007

Diploma Application Form must be submitted to the Registrar Office by:

For an October dated degree	October 3, 2006
For a January dated degree	January 4, 2007
For a May dated degree	March 15, 2007