

**IDAHO STATE BOARD OF EDUCATION**

**ACADEMIC/PROFESSIONAL-TECHNICAL EDUCATION**

**FULL PROPOSAL**

to initiate a

**NEW, EXPANDED, COOPERATIVE, DISCONTINUED, PROGRAM COMPONENT OR OFF-CAMPUS  
INSTRUCTIONAL PROGRAM OR ADMINISTRATIVE/RESEARCH UNIT**

Submitted by:

**University of Idaho**

Institution Submitting Proposal

**College of Agriculture and Life Sciences**

Name of College, School or Division

**Department of Food Science & Toxicology**

Name of Department(s) or Area(s)

A **New**, Expanded, Cooperative, Contract, or Off-Campus Instructional Program Leading to:

**Ph.D. Food Science**

\_\_\_\_\_  
Degree/Certificate & 2000 CIP

\_\_\_\_\_  
Program Change, Off-Campus Component

**Fall Semester 2003**

Proposed Starting Date

This proposal has been approved by:

\_\_\_\_\_  
College Dean (Institution) Date

\_\_\_\_\_  
Chief Academic Officer (Institution) Date

\_\_\_\_\_  
Graduate School Dean (as applicable) Date

\_\_\_\_\_  
President Date

\_\_\_\_\_  
Chief Fiscal Officer (Institution) Date

\_\_\_\_\_  
SBOE/OSBE Approval Date

## 1. Describe the nature of the request.

This request is for a new, research intensive Ph.D. program in Food Science at the University of Idaho (UI). The program will be offered on the Moscow campus by the Department of Food Science and Toxicology (FST) in the College of Agricultural and Life Sciences. Students will be required to meet graduate program requirements outlined by the College of Graduate Studies, along with specific additional requirements established by the department. The Ph.D. degree in Food Science is a research intensive degree. Students will be required to complete an independent research project under the guidance of a major professor and write and defend a dissertation reflecting original thought.

No additional faculty, staff, space, equipment, or courses are needed. The program will be funded by reallocation (less than \$150,000 per year) within the existing Food Science graduate program. Students will take courses at both UI and in the Department of Food Science and Human Nutrition (FSHN) at Washington State University (WSU) under the existing Memorandum of Understanding “UI/WSU Coordinated Program in Food Science” approved in April 1997 (please refer to the attached document). Our students will interact with faculty at both universities allowing for a more diverse education and access to faculty expertise and research facilities at both institutions.

## 2. Quality

There is no formal accreditation procedure for graduate programs in Food Science. The primary professional society of food scientists is the Institute of Food Technologists (IFT). This society has over 28,000 members world-wide. IFT reviews the quality of undergraduate Food Science programs every 5 years (UI underwent a review in 2002), but does not review graduate programs at this time.

The FST faculty will continuously assess program quality using alumni surveys, employer satisfaction surveys and other indices of student performance, such as:

- Number of Ph.D. applications for admission
- Scores on GRE exams of entering students
- Average GPA of admitted Ph.D. students
- Number of Ph.D. students enrolled
- Number of Ph.D. students receiving national scholarships
- Number of graduate student awards at national competitions
- Number of peer-reviewed publications derived from dissertation research
- Number of Ph.D. degrees awarded
- Placement of Ph.D. graduates
- Summary of employer satisfaction surveys for recent graduates
- Summary of alumni surveys

Program quality will be reviewed annually by FST External Advisory Board to make sure graduates meet expectations of the food industry. The External Advisory Board is made up of eight individuals from the food and allied industries, relevant trade associations and state governmental organizations.

The program will also undergo a comprehensive review every 5 years organized by the USDA Cooperative State Research, Education and Extension Service. The review is initiated by formal request of the Dean of the College of Agricultural and Life Sciences. The review team is generally comprised of 4-5 external reviewers selected from universities and food companies from around the nation. The review team typically spends 4-5 days on-site reviewing the teaching, research and extension programs of the department.

Should the University or SBOE determine that an external review of the program proposal is necessary, we suggest contacting the following department heads of well-established Food Science programs around the nation:

Dr. Robert McGorin  
Department of Food Science  
Oregon State University  
Corvallis, OR 97331-8575  
541-737-8737  
[mcorrin@bcc.orst.edu](mailto:mcorrin@bcc.orst.edu)

Dr. Faye Dong  
Dept. Food Science and Human Nutrition  
University of Illinois  
Champaign, IL 61801  
217-244-4498  
[fayedong@staff.uiuc.edu](mailto:fayedong@staff.uiuc.edu)

Dr. Charles Shoemaker  
Dept. Food Science and Technology  
University of California, Davis

Davis, CA 95616-8598  
530-752-8079  
[cfshoemaker@ucdavis.edu](mailto:cfshoemaker@ucdavis.edu)  
Dr. Mark Uebersax  
Dept. Food Science and Human Nutrition  
Michigan State University  
East Lansing, MI 48824-1224  
517-355-8474, ext. 100  
[uebersax@msu.edu](mailto:uebersax@msu.edu)

Dr. Clark Brekke  
Dept. Food Science and Technology  
University of Tennessee  
Knoxville, TN 37901-1071  
865-974-7331  
[cbrekke@utk.edu](mailto:cbrekke@utk.edu)

The names of additional reviewers can be provided upon request.

**2a. Curriculum:**

*Guidance Committee.* Composition of the 4-member graduate committee will follow guidelines established by the graduate school. The student will prepare, in conference with the major professor and committee, a Ph.D. degree study plan outlining all course work to be completed to fulfill the requirements for the degree.

*Academic Requirements.* Credit requirements for the Ph.D. are established by the College of Graduate Studies. Ph.D. students are required to complete 78 credits beyond the B.S. degree. Students must take 52 credits at the 500 level and above, and at least 33 credits of the 78 credits must be in courses numbered other than 600 (Doctoral Research and Dissertation).

Background courses (14 credits). Background courses are required to ensure students have a common background in key disciplinary areas. Equivalent courses taken as an undergraduate or part of the M.S. degree will satisfy these requirements.

1. Food Chemistry – FST 460 and FST 461
2. Food Safety and Microbiology - FST 416 and FST 417
3. Food Processing and Engineering – FST 433 or FST 570
4. Statistics – STAT 401

Core courses (13 credits). Students will be required to take 13 credits in core Food Science courses at the graduate level. Courses that satisfy this requirement include:

1. FST 501 Seminar (1 cr). Students will be required to take 1 credit of FST 501 Seminar to learn how to prepare and present oral and poster technical presentations.
2. FST 590 Food Science Research Seminar (2 cr). FST 590 is a seminar series designed to introduce students to a range of current research topics in Food Science.
3. FST 588 (2 cr). Students will be required to take FST 588 Food Science Teaching Practicum for 2 credits to learn teaching techniques and gain first-hand teaching experience.
4. Other FST coursework (9 cr). Other required core FST course work will be determined by the student's major professor and graduate committee.

Broadening courses (9 credits). Students will be required to take at least 9 credits of course work outside the discipline in a supporting area. Broadening courses, generally determined by the research project and at the graduate level, may be taken in a variety of disciplines including microbiology, biochemistry, engineering, nutrition, and statistics, among others.

Research credits (FST 600, minimum of 30 credits). All students will be required to complete a research project under the direction of a major professor and graduate committee. Upon approval of the dissertation project outline by the major professor and guidance committee, the student will prepare a research proposal for presentation and discussion at the preliminary exam.

*Examinations.* The preliminary exam will usually be given during the students fifth semester in the program and consist of three components: a written general subject exam, a written research proposal and an oral examination. The purpose of the written general subject exam is to evaluate the student's ability to integrate and apply knowledge obtained in the background and core courses recommended for the Ph.D. program to general problems in Food Science. After passing the written general exam, the student will be required to write a research proposal describing their dissertation research. The research proposal will be written in the format of a federal research grant and presented in a public seminar. The purpose of the preliminary oral exam, conducted in closed session with the FST faculty and student's dissertation committee, is to evaluate the student's preparation and knowledge in the research area to determine their potential to communicate ideas, design experiments, conduct research and interpret data. After passing the preliminary exam and completing the laboratory based research project, the student will write a dissertation and defend the dissertation publicly during a final oral exam. Ph.D. dissertations are expected to represent significant, original contributions to research. The dissertation research will typically be submitted for publication in the form of 2-3 refereed scientific articles in professional journals.

**Graduate courses offered by the Department of Food Science & Toxicology**

The UI and WSU have a cooperative program in Food Science that allows graduate students from both universities to participate in a joint curriculum. Our students interact with faculty at both universities allowing for a more diverse education and expanded access to research facilities. Both UI and WSU faculty co-teach many of these courses. Ph.D. students from WSU are enrolled in our courses.

FST 416 Food Microbiology (2 cr), Purpose for enumeration, detection, and identification of microorganisms in food products; physical, chemical, and environmental factors influencing growth and survival of foodborne microorganisms; pathogenic and spoilage microorganisms in food and their control. Prerequisite: MMBB 154 or 250.

FST 417 Food Microbiology Laboratory (2 cr), Methods for enumeration, detection and identification of spoilage and pathogenic microorganisms in food. Two 3-hr labs a week. Prerequisite or corequisite: FST 416

FST 433 Agricultural Processing Systems (3 cr), Principles of heat transfer, steam, air-vapor mixtures, refrigeration and fluid flow as applied to commodity processing and storage.

FST 460 Food Chemistry (3 cr), Fundamentals of food chemistry; composition of foods and the changes that occur during processing. Prerequisite: Chem 275, 276, MMBB 380.

- FST 461 Food Chemistry Laboratory (1 cr), Experiments related to properties, reactions, and interactions of chemical components of foods.
- FST 462 Food Analysis (4 cr), Introductory food analysis; methods common to many food commodities. Prerequisite: Chem 275, 276, MMBB 250.
- FST 482 Food Process Engineering Design (3 cr), Fundamentals for design of food processing systems; food properties; thermal and physical processes. Prerequisite: FST433.
- FST 489 Food Product Development (3 cr), Course serves as a capstone experience for Food Science seniors, and will require the application of food chemistry, food processing/engineering, microbiology course knowledge in formulating a new food product. Prerequisites: FST 303, FST 416, FST 460 or permission.
- FST 500 Master's Research and Thesis (credits arranged).
- FST 501 Seminar (credits arranged). Prerequisite: permission
- FST 502 Directed Study (credits arranged). Prerequisite: permission
- FST 504 Special Topics (credits arranged). Prerequisite: permission
- FST 505 Principles and Methods of Toxicology (3 cr), Principles of modern, predictive toxicology; actions, biological disposition, and environmental fate of natural products, drugs, pesticides, food chemicals, and pollutants.
- FST 506 Principles of Pharmacology (2 cr), Fundamental mechanisms of drug action and the factors that modify drug responses; autonomic and cardiovascular pharmacology.
- FST 509 Principles of Environmental Toxicology (3 cr), Fundamental toxicological concepts including dose-response relationships, absorption of toxicants, distribution and storage of toxicants, biotransformation and elimination of toxicants, target organ toxicity and teratogenesis, mutagenesis, and carcinogenesis; chemodynamics of environmental contaminants including transport, fate, and receptors; chemicals of environmental interest and how they are tested and regulated; risk assessment fundamentals. Registration for 509 requires preparation of an additional in-depth report. Prerequisite: Biol 100 or Biol 201, Chem 111, Chem 275; Chem 113 and Stat 251 recommended.
- FST 510 Advanced Food Chemistry (3 cr), Chemical, physical, and toxicological properties of water, vitamins, pigments, synthetic colors, minerals, miscellaneous food additives, and natural toxicants. Prerequisite: MMBB 380. (Offered alternative years)
- FST 512 Food Carbohydrates and Lipids (3 cr), Occurrence, structure, properties and functions of carbohydrates, lipids and proteins in foods. Prerequisite: MMBB 380. (Offered alternative years)
- FST 513 Food Proteins and Enzymes (2 cr), Chemistry/biochemistry of proteins/enzymes applied to food research and industry; protein functionality/enzyme technology application to food industry.
- FST 527 Transmission Electron Microscopy (3 cr), Discussion and application of basic skills required in use of transmission electron microscope, including simple specimen preparation techniques and photographic darkroom skills. Additional projects/assignments required for graduation credit.
- FST 529 Dairy Products (3 cr), Dairy chemistry, microbiology, sanitation, product development and processing from cow to consumer. Prerequisites: MMBB 250 and 300.
- FST 532 Metabolism of Drugs and Toxins (2 cr), Pathways, enzymology, and mechanisms of metabolism of drugs, environmental contaminants, and other xenobiotics; pharmacological and toxicological impact of metabolism. (Offered alternative years)
- FST 540 Biological Electron Microscopy (4 cr), Application of biological specimen preparation techniques in EM, including ultramicrotomy and use of specific stains. Registration for FST 540 requires completion of a written report. Prerequisite: FST J427/J527).
- FST 541 Scanning Electron Microscopy (3 cr), Theory and principles of scanning electron microscopy as investigative tool; includes operation and maintenance of electron microscope, specimen preparation, and photographic darkroom procedure. Students registering for FST 541 are required to complete an additional research paper.
- FST 564 Food Toxicology (3 cr), General Principles of toxicologic evaluation of chemicals which intentionally or unintentionally enter the food chain. Toxicology of food additives, colors, preservatives, drugs, pesticides and natural toxins in foods and risk characterization. Prerequisites: MMBB 300 or 380.
- FST 565 Wine Microbiology and Processing (3 cr), Technical principles related to the processing and fermentation of wines with an emphasis on microbiology. Prerequisites: MMBB 250 or 300.

FST 570 Advanced Food Technology (3 cr), Physical principles of food preservation and recent advances in food technology. Additional projects/assignments required for graduate credit. Prerequisite: FST 416, FST 433 or permission.

FST 587 Food Process Engineering Design (3 cr), Fundamentals for design of food processing systems; food properties; thermal and physical processes. Prerequisite: FST 433.

FST 590 Food Science Research Seminar (1 cr max. arr.) Current topics and research in food science and related areas. Prerequisite: Perm.

One new course is required to meet Ph.D. program requirements.

FST 588 Food Science Teaching Practicum (1-3), Supervised teaching in a university setting. Prerequisite: Admission to food science graduate program and permission of department.

No additional course work is required to implement a Ph.D. degree. However, several of our newer faculty members will be developing graduate courses within the next 2 years in their areas of specialization.

## 2b. Faculty in the Department of Food Science and Toxicology

Each graduate faculty member will have the opportunity to direct Ph.D. students. More information about faculty research interests can be found at the department website <http://www.ag.uidaho.edu/fst>. Collectively, the FST faculty have served as the major professor or dissertation research advisor of over 28 Ph.D. students to-date at other universities or in other departments. The FST faculty have also served on over 49 Ph.D. graduate committees. No additional faculty members are required to implement the program. The demands of the Ph.D. program can be met by reallocation within the current faculty workload.

Name	Current Rank	Highest Degree	Time Commitment	Specialty
Larry Branen	Professor	Ph.D. Purdue Univ.	10%	Food chemistry, food safety
Jeffry Culbertson	Associate Professor	Ph.D. Washington St. Univ.	10%	Food chemistry, food processing
Jerry Exon	Professor	Ph.D. Univ. of Idaho	10%	Food toxicology, food safety, immunotoxicology, carcinogenesis
Kerry Huber	Assistant Professor	Ph.D. Purdue Univ.	10%	Food chemistry, starch chemistry, Wheat and potato quality
Open	Research Assistant Professor	Ph.D.	10%	Molecular biology, bio-electronic detector systems
Gregory Moller	Associate Professor	Ph.D. Univ. Calif., Davis	10%	Toxicology, analytical chemistry
Denise Smith	Professor	Ph.D. Washington St. Univ.	15%	Food chemistry, food safety, meat and dairy product quality and safety
Pawan Singh	Assistant Professor	Ph.D. Purdue Univ.	10%	Food engineering, rheology
Patricia Talcott	Associate Professor	Ph.D. Univ. Idaho, D.V.M. Washington St.	5%	Veterinary toxicology
Gulhan Yuksel	Assistant Professor	Ph.D. Univ. Wisconsin	10%	Food biotechnology, food safety, food microbiology
Paul Kuber*	Adjunct Assistant Professor (from Animal Vet Sci)	Ph.D. Washington St. Univ.	3%	Meat science/quality/processing
Brian He*	Adjunct Assistant Professor (from Biol. Agr. Engin.)	Ph.D. Univ. Illinois	3%	Food and biosystems engineering

\*Adjunct approval process in progress.

## 2c. Students

We anticipate enrolling 9-10 full-time Ph.D. students in the program at any one time. Most students will have M.S. degrees in Food Science or related fields such as Microbiology, Chemistry, Biology, Biochemistry, Nutrition, Plant Science, Animal Science, or Agricultural Engineering. We expect students to enroll from other universities in Idaho, from across the United States and from several foreign countries. We will recruit students from around the globe, but focus on students in the Northwest.

A Ph.D. degree in Food Science will not draw students away from other majors at the UI, but will attract new students to the University. The department will enroll fewer M.S. students. All students admitted into the Ph.D. program will be supported on assistantships, fellowships or scholarships. The primary source of student support will be via assistantships from faculty research grants, but a few will qualify for existing teaching assistantships and Idaho Experiment Station research assistantships.

**2d. Infrastructure Support**

The program will be administered by the Head of FST (0.15 FTE). Departmental staff support, analytical instrumentation and laboratory space, and library resources are adequate to support a Ph.D. program.

**2e. Future plans (discuss future plans for expansion or off-campus delivery)**

There are no immediate plans to offer this research-based degree at off-campus locations.

**3. Duplication**

The UI currently offers B.S. and M.S. degrees in Food Science. We are the only Food Science program in Idaho. Approximately 35 land-grant universities in the United States offer the Ph.D. degree in Food Science. In the west, only Utah (Utah State), Oregon (Oregon State), California (UC-Davis, Cal Poly) and Washington (Washington State) offer a Ph.D. in Food Science. Montana, Wyoming, Nevada, New Mexico, Arizona, South Dakota and North Dakota do not offer a Ph.D. degree in Food Science.

The Department of Food Science and Toxicology at the UI and the Department of Food Science and Human Nutrition at WSU offer highly collaborative teaching, research and extension programs. In fact, the two departments engage in more collaborative activities than any other departments at the two schools. The FSHN at WSU has 10 graduate faculty in Food Science, as well as 14 M.S. and 13 Ph.D. students pursuing degrees in Food Science. There are numerous opportunities for our students to interact with research faculty in Food Science at WSU. The proximity of the two departments and our willingness to collaborate will strengthen the Ph.D. programs at both universities. Each faculty has graduate status at the other university. The graduate teaching component of the Ph.D. degree will be offered as a cooperative program under existing arrangements with the FSHN at WSU (please refer to the attached document). Several graduate courses are co-taught by faculty from both universities. Food Science faculty at the two schools currently serve jointly on M.S. and Ph.D. graduate committees, faculty search committees, graduate and undergraduate curriculum committees, and promotion and tenure committees. All UI Food Science faculty already participate in the written portion of the Ph.D. preliminary exams at WSU. Faculty also collaborate on grant proposals and research projects, and have published joint publications. Research seminars are coordinated and attended by faculty and students in both departments. A letter of support for this request is provided by Dr. Alan R. McCurdy, Chairperson of the Department of Food Science and Human Nutrition at Washington State University (see attached letter).

**4. Centrality**

The UI is a research-extensive, land-grant institution “committed to undergraduate and graduate-research education. (1).” The Idaho State Board of Education has listed agriculture as one of the primary emphasis areas of the institution. Teaching, research and extension activities in FST are directly linked to the land-grant, agricultural mission of the University of Idaho.

The College of Agricultural and Life Sciences has established five priority areas:

- Competitive Agriculture
- Community Development
- Natural Resources and the Environment
- Health, Food Safety and Quality
- Youth and Families.

The Ph.D. program in Food Science will add significantly to the impact of the college in the Health, Food Safety and Quality area. The program will also impact the Competitive Agriculture, Community Development and Natural Resources and the Environment emphasis areas.

**5. Demand for the program**

Food Science is the scientific discipline supporting the nation’s largest manufacturing industry. Food processing is the largest manufacturing employment sector in the state and adds significant value to Idaho’s raw farm commodities. The food and beverage manufacturing industry employs more than 16,460 people in Idaho, adding \$4.1 billion to the state’s economy (2). There are over 250 food processing operations in Idaho, ranging from cottage industries to multi-national corporations. Some of the food companies in Idaho include Simplot, Kraft, Basic American Foods, Nonpareil, Jerome Cheese, Heinz, Purely Supreme and Clear Spring Foods.

Food scientists are employed around the world by large and small food processing companies, food ingredient suppliers, food quality assurance and testing labs, federal and state governmental agencies, and academia. Food science is a multidisciplinary science that applies biology, chemistry, nutrition, engineering, and other sciences to improve the safety and quality of food products, develop new food products, and design new, safer, and more energy efficient food processes. Food scientists work to enhance the quality of foods through biotechnology, as well as improve the microbial and chemical safety of foods. Food scientists develop new food ingredients and new food products, extend the shelf life of foods, improve food quality, devise new processing technologies and work to reduce processing waste. All of the food products in a grocery store and many foods offered on restaurant menus have been developed and tested by food scientists.

Career opportunities for graduates are excellent and starting salaries are highly competitive. According to a recent USDA report (3), food scientists are predicted to see a strong employment market through 2005 and beyond. We achieve 100% job placement of our B.S. and M.S. students, and national trends indicate we can expect the same outcome for our Ph.D. students. The median starting salary for a Ph.D. in Food Science is \$60,000 annually (4).

Demand for graduate studies in Food Science is high around the nation. The largest number of graduate applications in the College of Agriculture and Human Ecology at Washington State University during spring semester 2002 was from students interested in Food Science. Demand for our revitalized graduate program in Food Science is increasing. Graduate applications for our M.S. degree program have increased from 7 in 1999 to 28 in 2000. We received over 47 inquiries about our graduate program from June to August 2002 (a 3 month period). At least 12 of these students asked specifically about a Ph.D. program in Food Science. There are currently 10 M.S. Food Science students, and 2 Ph.D. and 3 M.S. Environmental Science (interdisciplinary program) students in our department. As our new faculty continue to build their research programs and bring in additional grant support, we anticipate being able to accommodate 20-22 Food Science graduate students in the department. Based on national norms within the discipline, we expect this to translate to 12-13 M.S. students and 8-9 Ph.D. students.

FST faculty are currently serving as dissertation advisors of Ph.D. students enrolled in other departments, because the complexity of much of the research being undertaken by FST faculty requires Ph.D. level students. This arrangement is not ideal for the student, the faculty member, or the department. Advising Ph.D. students from other departments allows research projects to be completed, but the students are not well prepared for careers in Food Science.

As stated above in 2c. Students, we expect students to enroll from other universities in Idaho, from across the United States and from several foreign countries. We will recruit students from around the globe, but focus on students in the Northwest. A Ph.D. degree in Food Science will not draw students away from other majors at the UI, but will attract new students to the University. The department will enroll fewer M.S. students.

**6. Resources – fiscal impact and budget**

The Ph.D. program in Food Science will be funded by internal allocation of existing dollars.

I. PLANNED STUDENT ENROLLMENT <sup>1</sup>		<b>FY04</b>		<b>FY05</b>		<b>FY06</b>
A. New Enrollments		3		3		3
B. Shifting Enrollments		0		0		0
Total Enrollment		3		6		9
II. EXPENDITURES	<b>FTE</b>	<b>FY04</b>	<b>FTE</b>	<b>FY05</b>	<b>FTE</b>	<b>FY06</b>
A. Personnel Costs						
1. Faculty <sup>2</sup>	0.7	\$53,040	0.7	\$54,101	0.7	\$55,183
2. Administrators <sup>3</sup>	0.15	\$14,552	0.15	\$14,842	0.15	\$15,140
3. Adjunct faculty	0	0	0	0	0	0
4. Graduate/instructional assistants <sup>4</sup>	0	0	0	0	0	0
5. Research personnel	0	0	0	0	0	0
6. Support personnel <sup>5</sup>	0.25	\$6,250	0.25	\$6,375	0.25	\$6,503
7. Fringe benefits		\$21,419		\$21,849		\$22,286
<b>Total FTE Personnel and Costs</b>	1.1	\$95,261		\$97,167		\$99,112
B. Operating Expenditures		<b>FY04</b>		<b>FY05</b>		<b>FY06</b>
1. Travel <sup>6</sup>		\$1,000		\$1,000		\$1,000
2. Professional services		0		0		0
3. Other services		0		0		0
4. Communications <sup>7</sup>		\$1,500		\$1,500		\$1,500
5. Utilities		0		0		0
6. Materials & supplies <sup>8</sup>		\$1,000		\$1,000		\$1,000
7. Rentals		0		0		0
8. Repairs & maintenance		0		0		0
9. Material & goods for manufacture & resale		0		0		0
10. Miscellaneous		0		0		0
<b>Total Operating Expenditures</b>		\$2,500		\$2,500		\$2,500
C. Capital Outlay						
1. Library resources <sup>9</sup>		0		0		0
2. Equipment		0		0		0
<b>Total Capital Outlay</b>		0		0		0
D. Physical Facilities		0		0		0
E. Indirect Costs (overhead)		0		0		0
<b>GRAND TOTAL EXPENDITURES</b>		<b>\$97,761</b>		<b>\$99,667</b>		<b>\$101,612</b>

III. REVENUES	FY04	FY05	FY06
A. Source of Funds			
1. Appropriated funds—	\$97,761	\$99,667	\$101,612
Reallocation -- MCO <sup>10</sup>			
2. Appropriated funds—	0	0	0
New – MCO			
3. Federal funds <sup>11</sup>	0	0	0
4. Other grants	0	0	0
5. Fees	0	0	0
6. Other	0	0	0
<b>GRAND TOTAL REVENUES</b>	<b>\$97,761</b>	<b>\$99,667</b>	<b>\$101,612</b>
B. Nature of Funds			
1. Recurring	\$97,761	\$99,667	\$101,612
2. Non-recurring	0	0	0
<b>GRAND TOTAL REVENUES</b>	<b>\$97,761</b>	<b>\$99,667</b>	<b>\$101,612</b>

**Footnotes:**

- <sup>1</sup> All students in the program are expected to be registered as full-time students.
- <sup>2</sup> Each graduate faculty in the department will devote approximately 10% of their time to the Ph.D. program.
- <sup>3</sup> The Ph.D. program will be directed by the FST department head as part of regular administrative duties.
- <sup>4</sup> Research assistantships will be funded by extramural grants (federal and other) obtained by the graduate faculty, and are not listed in this budget.
- <sup>5</sup> Internal reallocation will be used to support the salary of one administrative assistant.
- <sup>6</sup> Travel funds will be used to bring 2-4 well-qualified students to campus for a recruiting visit each year. Recruiting trips for graduate students, which have become the norm in Food Science departments, are required if we are to compete for the highest quality graduate students.
- <sup>7</sup> Communications will cover fax, phone and other communication expenses associated with the Ph.D. program.
- <sup>8</sup> Materials and supplies includes program advertising costs and general office supplies to support the program.
- <sup>9</sup> Library resources are adequate to support the program and are supplemented by the WSU library system that has an extensive collection in Food Science and related scientific disciplines.
- <sup>10</sup> The program will be funded by internal reallocation using existing funds by shifting some resources from the current M.S. program to the new Ph.D. program.
- <sup>11</sup> Extramural grants obtained by the faculty will be used to fund research projects and student assistantships. Indirect costs returned from grant funding will be used to maintain and purchase state-of-the-art scientific equipment to supplement equipment funds obtained by the faculty.

**References**

- 1. University of Idaho Strategic Plan. 1998. University of Idaho, Moscow, ID.
- 2. U.S. Census Bureau. 1997 Economic Census: Manufacturing Idaho. [http://www.census.gov/epcd/ec97/id/ID000\\_31.htm](http://www.census.gov/epcd/ec97/id/ID000_31.htm)
- 3. Goecker, A.D., Whatley, C.M., and Gilmore, J. 1999. Employment Opportunities for College Graduates in the Food and Agricultural Sciences, United States, 2000-2005. USDA CSREES.
- 4. Mermelstein, N.H. 2002. Median Starting Salaries Reach \$45,000. Food Technology 56(3):47-52.