

**CORNELL UNIVERSITY  
ANNOUNCEMENTS**

**JANUARY 25, 1965**

**NUTRITION  
1965-1966**

**GRADUATE SCHOOL OF NUTRITION**

# ACADEMIC CALENDAR

## SECOND TERM, SPRING OF 1965

Second-term registration,  
 old students ..... Jan. 25... M  
 Examinations begin ..... Jan. 26... T  
 Examinations end ..... Feb. 3... W  
 Midyear recess ..... Feb. 4... Th  
 Midyear recess ..... Feb. 5... F  
 Registration, new students.. Feb. 6.... S  
 Second-term instruction  
   begins, 8 a.m. .... Feb. 8... M  
 Midterm grades due..... Mar. 26... F

Spring recess:  
 Instruction suspended,  
   12:50 p.m. .... Mar. 27.... S  
 Instruction resumed,  
   8 a.m. .... Apr. 5... M  
 Second-term instruction  
   ends ..... May 29.... S  
 Examinations begin ..... May 31... M  
 Examinations end ..... June 8... T  
 Commencement Day ..... June 14... M

## ACADEMIC YEAR, 1965-1966

Freshman Orientation ..... Sept. 18.... S  
 Registration, new students.. Sept. 20... M  
 Registration, old students.. Sept. 21... T  
 Instruction begins, 1 p.m... Sept. 22... W  
 Midterm grades due..... Nov. 10... W  
 Thanksgiving recess:  
 Instruction suspended,  
   12:50 p.m..... Nov. 24... W  
 Instruction resumed,  
   8 a.m..... Nov. 29... M  
 Christmas recess:  
 Instruction suspended,  
   12:50 p.m..... Dec. 18.... S  
 Instruction resumed,  
   8 a.m..... Jan. 3... M  
 First-term instruction ends.. Jan. 22.... S  
 Second-term registration,  
   old students..... Jan. 24... M

Examinations begin..... Jan. 25... T  
 Examinations end..... Feb. 2... W  
 Midyear recess..... Feb. 3... Th  
 Midyear recess..... Feb. 4... F  
 Registration, new students.. Feb. 5.... S  
 Second-term instruction  
   begins, 8 a.m..... Feb. 7... M  
 Midterm grades due..... Mar. 26.... S  
 Spring recess:  
 Instruction suspended,  
   12:50 p.m..... Mar. 26.... S  
 Instruction resumed,  
   8 a.m..... Apr. 4... M  
 Instruction ends,  
   12:50 p.m..... May 28.... S  
 Examinations begin..... May 30... M  
 Examinations end..... June 7... T  
 Commencement Day..... June 13... M

*The dates in the calendars above are tentative.*

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CORNELL UNIVERSITY

GRADUATE SCHOOL  
OF NUTRITION

1965-1966

The Graduate School of Nutrition, a unit of Cornell University, is supported in part by state appropriations through the State University of New York

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# GRADUATE SCHOOL OF NUTRITION

## ADMINISTRATION

PERKINS, JAMES A., A.B., Ph.D., President of the University  
CORSON, DALE R., Ph.D., Provost of the University  
KEAST, WILLIAM R., Ph.D., Vice President for Academic Affairs of the University  
BARNES, RICHARD H., Ph.D., Dean of the School  
YOUNG, CHARLOTTE M., Ph.D., Secretary of the School

## FACULTY

*In this list the titles and departments of primary affiliation of faculty members are indicated.*

ASDELL, S. A., Ph.D., Professor, Animal Husbandry  
BAKER, ROBERT C., Ph.D., Professor, Poultry Husbandry  
BARNES, RICHARD H., Ph.D., Professor, Graduate School of Nutrition  
BENTON, DUANE A., Ph.D., Associate Professor, Animal Husbandry  
BUCK, PAUL A., Ph.D., Associate Professor, Dairy and Food Science  
CALL, DAVID L., Ph.D., Associate Professor, H. E. Babcock Professorship of Food Economics, Graduate School of Nutrition  
COMAR, CYRIL L., Ph.D., Professor, Physical Biology  
DANIEL, LOUISE J., Ph.D., Professor, Biochemistry  
DARLING, C. DOUGLAS, M.D., Professor, University Health Services  
DONALD, ELIZABETH A., Ph.D., Assistant Professor, Food and Nutrition  
FINN, ROBERT K., Ph.D., Professor, Chemical Engineering  
GAYLOR, JAMES L., Ph.D., Associate Professor, Graduate School of Nutrition  
HACKLER, L. ROSS, Ph.D., Assistant Professor, Food Science and Technology, Geneva  
HAND, DAVID B., Ph.D., Professor, Food Science and Technology, Geneva  
HARTMAN, JOHN D., Ph.D., Professor, Vegetable Crops  
HERRINGTON, BARBOUR L., Ph.D., Professor, Dairy and Food Science  
HESTER, E. ELIZABETH, Ph.D., Professor, Food and Nutrition  
HOLLEY, ROBERT W., Ph.D., Professor, Biochemistry  
HOGUE, DOUGLAS E., Ph.D., Associate Professor, Animal Husbandry  
ISENBERG, F. M. R., Ph.D., Associate Professor, Vegetable Crops  
JOHNSTON, FRANCES A., Ph.D., Professor, Food and Nutrition  
KROOK, LENNART P., D.V.M., Ph.D., Associate Professor, Pathology and Bacteriology  
KUTA, EDWIN J., Ph.D., Assistant Professor, Food and Nutrition  
LEE, FRANK A., Ph.D., Associate Professor, Food Science and Technology, Geneva  
LENGEMANN, FREDERICK W., Ph.D., Associate Professor, Physical Biology  
LONGRÉE, KARLA, Ph.D., Professor, Institution Management  
LOOSLI, JOHN K., Ph.D., Professor, Animal Husbandry

- LUTWAK, LEO, Ph.D., M.D., James Jamison Professor of Clinical Nutrition,  
Graduate School of Nutrition
- MATTICK, LEONARD R., Ph.D., Associate Professor, Food Science and Technology,  
Geneva
- MAYNARD, LEONARD A., Ph.D., Professor Emeritus, Graduate School of Nutrition
- MCCORMICK, DONALD B., Ph.D., Associate Professor, Graduate School of Nutrition
- MONDY, NELL, Ph.D., Associate Professor, Food and Nutrition
- MOORE, NORMAN S., M.D., Professor, University Health Services
- MORRISON, MARY A., Ph.D., Associate Professor, Food and Nutrition
- MOYER, JAMES C., Ph.D., Professor, Food Science and Technology, Geneva
- NELSON, WALTER L., Ph.D., Professor, Biochemistry
- NESHEIM, MALDEN C., Ph.D., Associate Professor, Poultry Husbandry
- NEWMAN, KATHERINE, J., Ph.D., Associate Professor, Food and Nutrition
- PEDERSON, CARL S., Ph.D., Professor, Food Science and Technology, Geneva
- PERSONIUS, CATHERINE J., Ph.D., Professor, Food and Nutrition
- POND, WILSON, Ph.D., Associate Professor, Animal Husbandry
- REID, JOHN THOMAS, Ph.D., Professor, Animal Husbandry
- RIVERS, JERRY MARGARET, Ph.D., Assistant Professor, Food and Nutrition
- ROBINSON, WILLARD B., Ph.D., Professor, Food Science and Technology, Geneva
- ROE, DAPHNE ANDERSON, M.D., Assistant Professor, Graduate School of Nutrition
- SCOTT, MILTON L., Ph.D., Professor, Poultry Husbandry
- SEELEY, HARRY W., JR., Ph.D., Professor, Dairy and Food Science
- SHALLENBERGER, ROBERT S., Ph.D., Associate Professor, Food Science and Tech-  
nology, Geneva
- SMITH, ORA, Ph.D., Professor, Vegetable Crops
- SMITH, SEDGWICK E., Ph.D., Professor, Animal Husbandry
- SMOCK, ROBERT M., Ph.D., Professor, Pomology
- STEININGER, GRACE, Ph.D., Professor, Food and Nutrition
- TURK, KENNETH L., Ph.D., Professor, Animal Husbandry
- VANBUREN, JEROME P., Ph.D., Associate Professor, Food Science and Technology,  
Geneva
- VAN VEEN, ANDRÉ G., Ph.D., Professor, Graduate School of Nutrition
- WARNER, RICHARD G., Ph.D., Professor, Animal Husbandry
- WASSERMAN, ROBERT H., Ph.D., Professor, Physical Biology
- WELLINGTON, GEORGE H., Ph.D., Professor, Animal Husbandry
- WILLIAMS, HAROLD H., Ph.D., Professor, Biochemistry
- WRIGHT, LEMUEL D., Ph.D., Professor, Graduate School of Nutrition
- YOUNG, CHARLOTTE M., Ph.D., Professor, Graduate School of Nutrition
- YOUNG, ROBERT J., Ph.D., Associate Professor, Poultry Husbandry

## STAFF

- ARMITAGE, SHIRLEY O., L.P.N., Research Nurse
- BELKIN, BARBARA, B.S., Research Technician
- BERRSFORD, KATHLEEN, M.S., Editor of School Publications
- BORONKAY, CAROLYN H., B.S., Research Dietitian
- BRUNEAU, LUCILE S., L.P.N., Research Nurse
- COLBERT, ELLEN S., R.N., Research Nurse
- DAVIDSEN, KENDRA J., R.N., Research Nurse

#### FACULTY AND STAFF

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DELWICHE, CONSTANCE N., M.F.S., Research Technician  
FIALA, GRACE F., A.B., Research Technician  
GILBERT, KENNETH E., B.S., Administrative Assistant  
HÖTZEL, DIETER G., Ph.D., Research Associate  
KWONG, EYA H., Ph.D., Research Associate  
LABADAN, BEATRIZ A., M.N.S., Research Technician  
LADUE, LESLIE, L.P.N., Research Nurse  
MAY, CYNTHIA P., Research Technician  
MILLER, PEARL S., M.S., Research Technician  
MOORE, A. ULRIC, Ph.D., Research Associate  
NIGHTINGALE, MARIA S., M.S., Research Technician  
SAMUELSON, LAVERNA B., R.N., Research Nurse  
SCHULTZ, A. LOUISE, R.N., Research Nurse  
SUNDELL, HELEN, E., R.N., Research Nurse  
SWAN, PATRICIA O., B.S., Research Technician  
WESTON, MARILYN O., B.S., Research Technician





# THE GRADUATE SCHOOL OF NUTRITION

THE GRADUATE SCHOOL OF NUTRITION at Cornell offers academic and research programs in nutritional and food science, leading to the professional degrees, Master of Nutritional Science (M.N.S.) and Master of Food Science (M.F.S.). These programs are offered to students who wish to pursue a scientific career related to nutritional and metabolic studies or food processing.

Nutritional science is attractive to many candidates because of their interest in a specific area of the field. But to others deciding upon a field of advanced study, the term "nutritional science" may have only general implications. Possibly this is because the science of nutrition draws upon a number of disciplines—biochemistry, physiology, and other biological and social sciences—which are then used in combinations to uncover new knowledge in nutrition or to put into use that which is already known.

A career related to nutritional and metabolic studies, then, could mean carrying on research in a biochemical laboratory, in a clinical setting, or working with experimental animals—and in the applied areas of public health, working with people, or seeking a better understanding of the complex nutrition problems of the developing countries of the world.

For anyone who prefers to work in the biological sciences, a rapidly developing field is that of nutritional biochemistry. Today the science of nutrition cannot exist separately from fundamental biochemistry. These two areas are closely allied and the science of nutrition is generally considered a branch of biochemistry. One function of modern nutrition is the development of biochemical knowledge that can be applied to the intact organism. The Graduate School of Nutrition has aligned its research programs with heavy emphasis on fundamental biochemistry in areas ranging from the study of enzymological phenomena at a sub-cellular level to the application of biochemistry in experimental animals and in man, both normal and diseased.

In the field of food science, the School's program also emphasizes study in the biological sciences. Training in this field may lead to a laboratory career, possibly involving research dealing with the processing and preservation of foods or the development of new foods. Or, in an area of increasing importance, food scientists are conducting research on the organoleptic properties of foods and food mixtures, and studying the food

preferences and habits of population groups, often for the purpose of introducing new or modified foods in developing countries.

Frequently when a student enters the School, he is undecided about where his interest in nutrition lies. With the first term of study devoted largely to basic science courses, he then has time to explore the possibilities, both through course work and through discussion with his professors and associates. At the School he also has the advantage of working in an intimate environment where all of the students are pursuing advanced work either in nutritional or food science—students with varying backgrounds and interests—and representing many countries.

Although the professional degree programs are designed to prepare students to enter a career upon graduation, they also fill an increasing need of graduate students who are interested in the biological sciences, but who are not certain about the field of graduate work they wish to enter. These programs have proved particularly valuable in helping such students decide upon a specific field of study for the Ph.D. degree, and to decide upon an area of professional career development.

## THE FACULTY

Because the School serves as an integrating center for graduate academic and research programs in nutrition at Cornell, the faculty of a number of departments and divisions of the University are drawn upon to provide counseling and instruction in the School's program. Many of these faculty members are appointed jointly in the Graduate School of Nutrition.

In addition, the School has its own core faculty with offices and laboratories in Savage Hall or in its Clinical Nutrition Unit in Sage Hospital. Among these professors are biochemists, working in rather fundamental areas of nutritional biochemistry; clinicians working actively in nutritional research programs; experimental nutritionists using animals to replicate some of the more serious nutritional problems of man; public health nutritionists, training students for careers in community nutrition; and experts in international nutrition, conducting research and training students in those areas of nutrition which are, to some extent, unique to the developing countries of the world.

The complete faculty of the School also includes animal nutritionists, food economists, food scientists, and specialists in related areas of agriculture and home economics.

Although frequently members of the core faculty serve as advisers in planning a student's curriculum and directing his special research problem, an adviser may be selected from among those on the complete faculty.

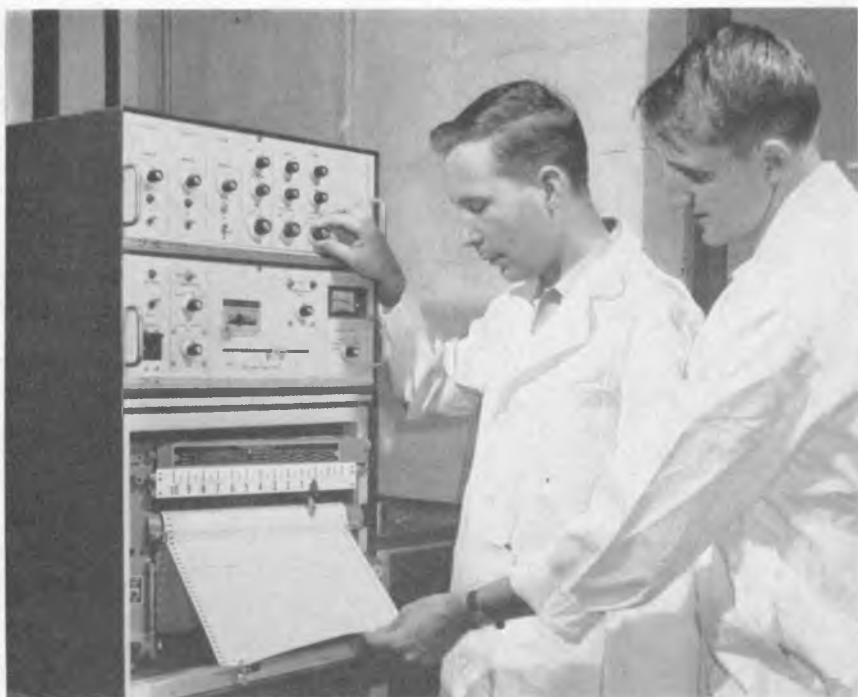
## THE SCHOOL'S PROFESSIONAL DEGREES

The School of Nutrition was organized in 1941 to serve as an integrating center on the campus for the planning of academic and research programs

related to nutrition. The first school of its kind, it is still unique in its organization. From the start, the programs for the professional degrees, Master of Nutritional Science and Master of Food Science, were designed around a core of sufficiently strong and basic predetermined courses to enable a student, upon graduation, to enter a career without taking further advanced study.

In building the curriculum for a student's program, these core courses in the fundamental sciences are used to provide a broad base that will be useful in any area of nutritional or food science. Emphasis in elective courses is then placed on the development of knowledge and skills needed in preparation for specialized types of careers.

The high standards of the School—its requirements for admission, its caliber of instruction, and its requirements for graduation—all contribute to the high degree of proficiency attained by its graduates in their professional careers. Although the M.N.S. and M.F.S. degrees complete the advanced study of many students, a number of students, during their work in these programs, become interested in continuing study toward a Ph.D. degree with specialization in such areas as nutrition, biochemistry, physiology, or food science and technology.



*Professor Gaylor demonstrates the use of gas chromatography for sensitive micro-analytical analysis of steroids.*

## ADMISSION

To be admitted to the School the applicant must hold a baccalaureate degree from a college or university of recognized standing or have completed work equivalent to that required for such a degree. He must have a definite professional interest in the field of either nutritional science or food science.

### Course Requirements

To qualify for one of the graduate degrees, a candidate must have completed, with a superior record, courses in the following subjects with the approximate number of semester hours as stated.

*Physical sciences:* a total of 20 hours divided among chemistry, physics, and mathematics. Courses in quantitative chemistry and organic chemistry are prerequisites to courses required for graduation. If they are not offered for entrance, they must be taken following admission. Students who enter without college training in physics are required to take an elementary course in this subject before graduation. Credits for beginning courses in physics and chemistry, including organic and quantitative analysis, cannot be counted toward the credits required for graduation.

*Biological sciences:* a total of 12 hours in such courses as biology, botany, zoology, bacteriology, and physiology for candidates for the M.N.S. degree. Courses in animal or human nutrition up to three hours may be counted in the biological sciences. Elementary courses in bacteriology or physiology cannot be counted toward graduation. For candidates for the M.F.S. degree, eight hours are required in the biological sciences. Elementary courses in bacteriology cannot be counted toward graduation. However, an elementary course in bacteriology is prerequisite for advanced courses in bacteriology.

*Social studies:* a total of nine hours in such subjects as economics, government, education, psychology, sociology, anthropology, and history.

*Other courses:* the applicant's record must show evidence that he has satisfactorily completed other courses prerequisite to those required by a candidate for a degree. An applicant who cannot meet in full the specific course requirements may be admitted if the faculty of the School so recommends, with the understanding that the deficiencies must be made up before graduation.

### Non-Candidates

Admission as noncandidates is open to applicants who desire to register for a term or more to take specific courses but who do not wish to become candidates for a degree. Such applicants must hold Bachelors' degrees, must meet the other requirements specified for admission, and must show evidence that the courses desired will be of special benefit to them in their professional careers.



*Professor McCormick and a graduate student use a recording spectrophotometer to measure changes in optical absorbcancy of coenzymes.*

## University Requirements

Applicants must meet the general requirements for admission to the Graduate School as set forth in the *Announcement of General Information* and the *Announcement of the Graduate School*.

## Health Requirements

The following health requirements for entering graduate students have been adopted by the Cornell Board of Trustees. Failure to fulfill these requirements will result in loss of the privilege of registering the following term. The responsibility for fulfilling these requirements rests with the student.

**IMMUNIZATION . . .** A satisfactory certificate of immunization against smallpox, on the form supplied by the University, must be submitted before registration. It will be accepted as satisfactory only if it certifies that within the last three years a successful vaccination has been performed. If this requirement cannot be fulfilled by the student's home physician, opportunity for immunization will be offered by the Cornell medical staff during the student's first semester, with the cost to be borne by the student. If a student has been absent from the University for more than three years, immunity will be considered to have lapsed, and a certificate of revaccination must be submitted.

**HEALTH HISTORIES . . .** Students accepted for admission will be required to submit health histories on forms supplied by the University.

**X-RAY . . .** Every student is required to have a chest X-ray. He may present a chest film, made by a private physician, on or before entering Cornell, provided that it was obtained within six months of initial registration and is of acceptable quality; or he may present a chest X-ray report, provided that the radiograph was taken within the six months of initial registration, contains the film number and name and address of the X-ray facility, and is signed by a radiologist; or he may have a chest X-ray at Cornell during the orientation period or at some other specified time shortly thereafter, in which case the charge will be included in the registration fee.

*When a student who has been away from the University for more than a year wishes to re-enter, he must, at his own expense, once more fulfill the chest X-ray requirement and also fill out a new health history.*

## APPLICATIONS AND REGISTRATION

Applicants for admission should address their inquiries to the Office of the Graduate School, Sage Graduate Center, Cornell University, Ithaca, New York 14850. The form the applicant will receive is one which is used in all areas of graduate study and does not apply in all of its details to Graduate School of Nutrition applicants. In completing the form, applicants should indicate an interest in either *nutritional science for the M.N.S. degree* or in *food science for the M.F.S. degree in the Graduate School of Nutrition*. In neither program is it necessary to indicate a minor area of study. No application will be acted upon until all credentials enumerated in the application form have been filed.

All students admitted to the Graduate School of Nutrition must register through the Graduate School Office, Sage Graduate Center, at the beginning of each term or session.

## REQUIREMENTS FOR GRADUATION

For graduation a student must have completed at least two units of residence and at least 36 semester hours of specified and approved courses of which not more than 10 can be in research (Graduate School of Nutrition 199). In the event that certain required courses have been completed satisfactorily by the student prior to his admission to the Graduate School, substitutions will be made with the approval of his faculty adviser.

Certain elective courses may be required as deemed appropriate by the adviser and the faculty of the Graduate School of Nutrition to round out the student's professional training in nutritional science or food science. The student must prepare a written report on an approved problem that may or may not require laboratory research, and must pass a final examination. The curriculum differs in accordance with the field in which the student wishes to specialize, as follows:

### Nutritional Science

The specialized training in this field, leading to the degree of Master of Nutritional Science, emphasizes the basic scientific knowledge and techniques of nutrition. The completion of the following curriculum is required:

# REQUIREMENTS FOR GRADUATION

	<i>Hours</i>		<i>Hours</i>
Biochemistry .....	6	History of Nutrition .....	1
Principles of Nutrition .....	3	Seminars .....	1
Laboratory work in nutrition.....	3	Advanced courses in human or	
Advanced Physiology .....	6	animal nutrition .....	4
Food Economics .....	3	Special problem .....	6 to 10
Statistics .....	3		

In addition, the requirements include such approved electives as the faculty adviser and the faculty of the School may deem appropriate and necessary to round out the student's training in the field of nutritional science.

Faculty members advising students for the M.N.S. degree include Professors S. A. Asdell, R. H. Barnes, D. A. Benton, D. L. Call, C. L. Comar, Louise J. Daniel, J. L. Gaylor, L. R. Hackler, R. W. Holley, D. E. Hogue, Frances A. Johnston, L. P. Krook, F. W. Lengemann, J. K. Loosli, L. Lutwak, D. B. McCormick, N. S. Moore, Mary A. Morrison, W. L. Nelson, M. C. Nesheim, Katherine J. Newman, W. G. Pond, J. T. Reid, Jerry M. Rivers, Daphne A. Roe, M. L. Scott, S. E. Smith, Grace Steininger, K. L. Turk, A. G. van Veen, R. G. Warner, R. H. Wasserman, H. H. Williams, L. D. Wright, Charlotte M. Young, and R. J. Young.

## COURSES APPROVED FOR ADVANCED NUTRITION CREDIT

Animal Husbandry 510	Special Topics in Animal Nutrition	1 <sup>a</sup>
Biochemistry 510	Biochemistry and Nutrition of the Vitamins	2
Biochemistry 520	Advanced Biochemistry	1 or 2 <sup>a</sup>
Biochemistry 521	Advanced Biochemistry	1 or 2 <sup>a</sup>
Food and Nutrition 324	Nutrition	3 <sup>b</sup>
Food and Nutrition 330	Nutrition and Disease	3
Food and Nutrition 402	Readings in Nutrition	2
Food and Nutrition 424	Advanced Nutrition	2
Food and Nutrition 440	Nutrition and Growth	2
Poultry Husbandry 510	Advanced Poultry Nutrition	2
School of Nutrition 100	Problems and Programs in International Nutrition	4
School of Nutrition 160	Nutritional Biochemistry	3
School of Nutrition 381	Field Observation and Experience in Community Nutrition	1
School of Nutrition 382	Field Observation and Experience in Community Nutrition	1
School of Nutrition 392	Clinical and Public Health Nutrition	3
Veterinary Pathology and Bacteriology 155	Pathology of Nutritional Diseases	3

<sup>a</sup> Depending upon the topic.

<sup>b</sup> If equivalent not previously taken.

## Food Science

The specialized training in this field, leading to the degree of Master of Food Science, emphasizes the sciences involved in food processing and utilization. The completion of the following curriculum is required.

GRADUATE SCHOOL OF NUTRITION

	<i>Hours</i>		<i>Hours</i>
Biochemistry .....	6	Statistics .....	3
Advanced courses in bacteriology..	6	Nutrition .....	3
Approved courses in food		Seminars .....	1
science .....	11	Special problem .....	6 to 10

In addition, the requirements include such approved electives as the faculty adviser and the faculty of the School may deem appropriate and necessary to round out the student's training in the field of food science.

Faculty advising students for the M.F.S. degree include Professors R. C. Baker, R. H. Barnes, P. A. Buck, D. L. Call, R. K. Finn, D. B. Hand, J. D. Hartman, B. L. Herrington, Elizabeth E. Hester, F. M. R. Isenberg, E. J. Kuta, F. A. Lee, Karla Longrée, L. R. Mattick, Nell Mondy, J. C. Moyer, W. L. Nelson, C. S. Pederson, Catherine J. Personius, W. B. Robinson, H. W. Seeley, R. S. Shallenberger, O. Smith, R. M. Smock, J. P. VanBuren, A. G. van Veen, G. A. Welling-ton, and L. D. Wright.

#### COURSES APPROVED FOR ADVANCED FOOD SCIENCE CREDIT

Biochemistry 410	Food Biochemistry	3
Biochemistry 510	Biochemistry and Nutrition of the Vitamins	2
Dairy Science 232	Fluid Milk Processing and Quality Control	4
Dairy Science 333	Food Products from Milk Fermentations	5
Dairy Science 340	Dairy and Food Engineering	4
Dairy Science 431	Analytical Methods	4
Dairy Science 433	Chemistry of Milk	2 <sup>a</sup>
Food and Nutrition 316	Science of Food	3 or 4
Food and Nutrition 317	Science of Food, Laboratory	1
Food and Nutrition 318	Experimental Food Methods	2
Food and Nutrition 403	Special Problems for Graduate Students	*
Food and Nutrition 404	Readings in Foods	2
Food Science 361	Principles of Food Technology	3 or 5
Food Science 362	Principles of Food Technology	3 or 5
School of Nutrition 100	Problems and Programs in International Nutrition	4
School of Nutrition 159	Food Economics	3
School of Nutrition 250	Seminar in World Problems of Food and Population	2
Pomology 201	Post-harvest Physiology, Handling and Storage of Fruits	3
Poultry Husbandry 450	Poultry Meat and Egg Technology	3
Vegetable Crops 222	Potato Production and Processing	3
Vegetable Crops 412	Handling and Marketing Vegetable Crops, Advanced Course	4

<sup>a</sup> Depending upon the topic.

<sup>b</sup> Credits as arranged.

#### Special Problem

The work involved in the report on an individual problem required for both degrees may be carried out with the approval of the student's faculty adviser



under the direction of any member of the faculty of the School whom the student may choose and who is willing to supervise it. The report must be approved by the supervising faculty member and the original copy submitted to the Office of the Dean of the Graduate School of Nutrition at least one week prior to the beginning of the final examination period. Directions concerning the form in which the report is to be presented may be obtained either from the student's faculty adviser or from the Office of the Dean of the Graduate School of Nutrition.

## Examination

A final examination, either oral or written or both, is required for either degree. Examinations are conducted by a committee consisting of the faculty adviser plus one other member to be designated by the faculty of the Graduate School of Nutrition or its delegated agent.

## Credit for Summer Session Study

A student registered in the School may receive credit for work done in the University Summer Session if his program is approved in advance by his faculty adviser. To receive this credit he must also be registered in the Summer Session.

A student who has been registered in the School for one term after receiving his Bachelor's degree may, with the approval of his faculty adviser, register for a minimum of four and a maximum of twelve weeks for work in the summer on his individual problem under personal direction of a member of the faculty of the School and thus earn residence credit. The student can thus make use of the summer period to meet, in whole or in part, the requirements of six to ten hours granted upon the completion of his report on an approved problem.

## Residence Requirements

To receive a degree from the School, a student must complete at least two terms

*A research dietitian supervising the preparation of metabolic diets in the special kitchen of the School's Clinical Nutrition Unit.*



of residence after receiving the Bachelor's degree from Cornell or elsewhere. (In most instances, students need more than two terms of residence in which to complete all degree requirements.)

## TRAINING FOR SPECIALIZED FIELDS

### Nutritional Science

Many opportunities are open to graduates with the M.N.S. degree. Among these are positions in research in universities, government and industrial laboratories, metabolic wards and clinics in hospitals, college teaching, and nutrition education and public health work in local, state, national and international agencies. Foreign students receive training useful in many teaching and governmental positions in their native countries.

The basic training for the M.N.S. degree emphasizes the physical and biological sciences and the principles of nutrition of all species. Through appropriate electives, students learn to apply these disciplines in either human or animal nutrition. Facilities for research include biochemical, microbiological, and physiological laboratories, experimental animal quarters, a diet table for experimental work in human nutrition, a metabolic unit in Cornell's Sage Hospital for the study of nutrition in relation to disease, and, often, opportunity to participate in surveys.

Special opportunities are provided for students of appropriate background who wish to prepare themselves for work as community nutritionists with health and welfare agencies. Here, the approved electives will include certain phases of social science, the elements of public health, clinical and public health nutrition, and appropriate informational service techniques. Opportunities for supervised experiences with community and health agencies are available for selected students. Students accepted for training in this area must plan financially for three to four weeks of residence away from Cornell to cover the field experience. Two weeks of this will be in the fall just prior to the academic year; the third and possible fourth week may be either during the spring recess or immediately following final examinations. In addition, suitable students are urged to spend a two months' period in the summer in "in-service" training in nutrition as applied to the community and to public health. Help will be given in making the necessary contacts. These opportunities will provide assignments which can be used as the basis for meeting the requirement for a report on an individual problem.



*Here, a technician uses special automated equipment for analysis of the hundreds of samples taken in metabolic balance studies at the Clinical Nutrition Unit.*

To meet the need for professionally trained men and women in government and international agencies, the School offers a program in international nutrition. Designed especially for American students, it is open also to others interested in the practical application of nutrition and food science to the problems of developing countries. The program includes courses in the sciences basic to nutrition that are extensive enough to equip students for a variety of careers in nutrition. Emphasis in electives is then placed on specialized study in problems and programs in international nutrition and related fields such as agriculture, public health, extension teaching, sociology, and anthropology. When the opportunity exists, field experience will be given. Training will also be integrated with agricultural and public health programs whenever possible. Several traineeships and assistantships are available to qualified students. For further details, request the descriptive leaflet, *Program in International Nutrition*, from the School.

Students with interest in the feed industry should have completed reasonably broad training in livestock production, including poultry, prior to admission. The training will stress principles of animal nutrition, animal physiology, experimental methods, and analytical procedures. To round out the training, courses in food economics, marketing, and business administration are provided.

## Food Science

Growing emphasis on food—its availability, quality, processing, packaging, as well as its nutritive value—indicates a period of expanding opportunities for those trained in food science. The Graduate School of Nutrition offers programs for M.F.S. candidates which lead to careers in food production, research, quality control, technical sales, teaching, and government and international nutrition work.

Since all techniques for food processing and handling must be based on a thorough knowledge of food characteristics, the Graduate School of Nutrition prescribes an M.F.S. program emphasizing the sciences fundamental to the field, namely, chemistry, biochemistry, and bacteriology. The student who masters these sciences may easily learn the details of special food techniques on the job. His basic academic training therefore does not include specialized technology courses in food processing, packaging, and the like.

Work on the special problem may be carried on either at the Ithaca campus or at the New York State Agricultural Experiment Station at Geneva, New York. Staff members advise students and acquaint them with the several research projects under way, including studies of food spoilage, flavor, composition, preservation, fermentation, and irradiation effects.

## TUITION AND FEES

A registration deposit of \$28 must be made by every applicant accepted for admission unless the candidate has previously matriculated as a student at Cornell University. A check or money order payable to Cornell University should be remitted to the Graduate School, Sage Graduate Center, upon notification of acceptance. This deposit pays the matriculation fee, chest X-ray fee, and examination book charge and covers certain expenses incident to graduation if the student receives a degree. The deposit will not be refunded to any candidate who with-

draws his application after May 22, or after 20 days following his admission approval.

Limited refunds of tuition and fixed fees will be made to students who withdraw from the University prior to the completion of a term, for reasons accepted as satisfactory. For students who do not complete a term, tuition and other fees will be charged at the rate of 10 per cent for each week, or fraction of a week, from the first day of registration to the date of withdrawal as certified by the School; if, however, withdrawal is made within six days of the date of registration, no charge is assessed. The registration deposit will not be refunded.

The tuition for students registered in the Graduate School of Nutrition is \$200 a term payable at the beginning of each term. Certain assistantships carry a waiver of tuition.

A General Fee of \$187.50 a term payable at the beginning of each term is required of each registrant of the Graduate School of Nutrition whether he is



*The behavioral abnormalities of a young pig subjected to severe protein malnutrition are being studied here. In the lower picture a litter mate given a normal diet is examined by Professor Pond, Dean Barnes, and Dr. Ulric Moore.*



receiving full residence credit or not. The General Fee contributes toward the services supplied by the libraries, Clinic and Sage Hospital, and the student union in Willard Straight Hall, and pays a portion of the extra cost of laboratory courses and general administration.

Students of the Graduate School of Nutrition who attend classes in the Summer Session must register both in the Graduate School and in the Summer Session and pay the tuition and other fees required by the Summer Session. No fee is required for Summer Research if a student was regularly registered in the Graduate School during the previous academic year.

A graduate student who returns to the University to present his thesis and to take the final examination for an advanced degree, all other work for that degree having been previously completed, must register as a "candidate for degree only" and pay a fee of \$35.

If it is necessary for a student to withdraw, he should make arrangements at the Graduate School office before leaving the campus.

*Tuition or fees may be changed by the Board of Trustees at any time without previous notice.*

## ASSISTANTSHIPS AND TRAINEESHIPS

A number of assistantships and traineeships are available in the School's research programs, and any student admitted to the School may apply for this type of financial aid. The stipend is approximately \$3,000 for a twelve-month appointment; in some instances it is prorated on a nine-month basis. The appointments carry waiver of tuition, but the student must pay all fees required by the Graduate School. For September appointment, application should be made by March 1 to the Secretary, Graduate School of Nutrition, Savage Hall. Announcement of appointments will be made on or about April 1.

### Public Health Traineeships for Public Health Personnel

Students interested in preparing for positions as public health nutritionists may apply for public health traineeship awards from the U. S. Public Health Service. Applicants may secure application forms and additional information from any of the Regional Medical Directors of the U. S. Public Health Service or from the Chief, Division of General Health Services, Bureau of State Services, Public Health Service, Department of Health, Education, and Welfare, Washington, D.C.

## ADVISORY SERVICE FOR STUDENTS PREPARING AT CORNELL TO ENTER THE SCHOOL

Students in the Colleges of Agriculture, Arts and Sciences, or Home Economics at Cornell University, who prepare for admission to the Graduate School of Nutrition, may be advised during the period of preparation by members of the faculty of the School who are also members of the faculty of the college in which the students matriculate.

Undergraduates who are interested in nutrition and who are matriculating at

Cornell University for the first time should state upon the application for admission that nutrition is the business or profession (field of work) which they expect to enter upon completion of their studies. This is necessary in order that appropriate faculty advisers may be assigned to them.

## HEALTH SERVICES AND MEDICAL CARE

Health services and medical care for students are centered in two Cornell facilities: the Gannett Medical Clinic (out-patient department) and the Sage Hospital. Students are entitled to unlimited visits at the Clinic (appointments with individual doctors at the Clinic may be made, if desired, by calling or coming in person; an acutely ill student will be seen promptly whether he has an appointment or not). Students are also entitled to laboratory and X-ray examinations indicated for diagnosis and treatment, hospitalization in the Sage Hospital with medical care for a maximum of fourteen days each term, and emergency surgical care. The cost of these services is covered in the General Fee.

On a voluntary basis, insurance is available to supplement the services provided by the General Fee. For further details, including charges for special services, see the *Announcement of General Information*. If, in the opinion of the University authorities, the student's health makes it unwise for him to remain in the University, he may be required to withdraw.

## HOUSING FOR GRADUATE STUDENTS

### Dormitory Accommodations

The University has established Sage Hall as a graduate residential center. Its dormitory facilities accommodate approximately 100 men in the north side of the building and 105 women in the south side. The Graduate Center, which is available for use by all graduate students and faculty, also contains a cafeteria seating 200, study rooms, and lounges. In addition, Cascadilla Hall has been newly remodeled to accommodate approximately 140 single graduate men.

Applications for dormitory accommodations may be made any time after January 1 for the coming academic year by writing the Department of Housing and Dining Services, 223 Day Hall.

### Family Accommodations

The University, through the Department of Housing and Dining Services, has three apartment developments for married students and their families. They are Cornell Quarters, Pleasant Grove Apartments, and Hasbrouck Apartments, with total housing for about 400 families. All apartments are unfurnished. For further information and application, write the Department of Housing and Dining Services, Room 223, Day Hall.

The Department of Housing and Dining Services also maintains a list of available rental housing in the Ithaca area. Information on housing currently available can be obtained only at the Off-Campus Housing Office, Room 223, Day Hall. Lists cannot be sent out because changes occur daily. Students desiring off-campus housing should come to Ithaca well in advance of the term opening to arrange for such accommodation.

## DESCRIPTION OF COURSES

THE FOLLOWING list of courses includes both those previously specified as required for the degrees offered and some of those from which electives may be selected, with the approval of the student's faculty adviser, in accordance with his specific field of interest.

The information in parentheses following the name of the course refers to the college in which the course is given, the department, and the course number. In registering for any of these courses the information shown in the parentheses should be given rather than the name of the course. In some instances the time and place are not given in the descriptive material enclosed in the parentheses following the title of the course. To obtain this information the student should consult the specific departmental office or the individual Announcements issued by the colleges concerned.

For courses marked with an asterisk (\*), "advanced nutrition" credit may be given. For those marked with a dagger (†), "advanced food science" credit may be given.

### NUTRITION

**PRINCIPLES OF ANIMAL NUTRITION** (*Agriculture; Animal Husbandry 410*). Fall. Credit three hours. Prerequisites, a course in human or veterinary physiology and a course in organic chemistry or biochemistry. Lectures, M W F 10. Morrison 342. Professor LOOSLI.

The chemistry and physiology of nutrition and the nutritive requirements for growth, reproduction, lactation, and other body functions.

**LABORATORY WORK IN ANIMAL NUTRITION** (*Agriculture; Animal Husbandry 411*). Spring. Credit three hours. Prerequisites, quantitative analysis, Animal Husbandry 410 or its equivalent, and permission of the instructor. M W F 2-4:30. Morrison 342 and 443. Associate Professor WARNER.

Each student engages in a series of short research projects with experimental animals, such as rats, dogs, and sheep. Both classical and modern techniques of animal experimentation are taught. The applications of biochemical methods to the solution of animal nutrition problems are included.

**NUTRITION** (*Home Economics; Food and Nutrition 324*). Spring. Credit three hours. Prerequisites, elementary college courses in nutrition, biochemistry, and human physiology.

Discussion, T Th 8, Th 2-4. Van Rensselaer 339.

Associate Professor NEWMAN.\*

Principles of nutrition as they relate to energy metabolism, proteins, fats, minerals, and vitamins. Use of professional literature to acquaint the student with considerations involved in the application of nutrition information to human nutrition problems, to illustrate methods used in studying nutrition, and to provide experience in interpretation of scientific reports.

**MATERNAL AND CHILD NUTRITION** (*Home Economics; Food and Nutrition 340*). Fall and spring. Credit two hours. Prerequisite, Food and Nutrition 103 or 192. May not be taken concurrently with or following Food and Nutrition 324. Majors with special interest in this subject may elect Food and Nutrition 340 as sophomores or request permission to register for Food and Nutrition 440 as seniors. Lecture and discussion, W F 8. Van Rensselaer 339. Associate Professor NEWMAN.

Family nutrition with special emphasis upon the nutritional needs of the mother and child. Relation of nutrition to physical growth.

**PROBLEMS AND PROGRAMS IN INTERNATIONAL NUTRITION** (*School of Nutri-*

tion 100). Fall. Credit four hours. Registration by permission. Lectures, M W 11-12:30, F 11-12. Savage Hall. Professor VAN VEEN.\* †

To acquaint students with the planning of effective programs and policies in the fields of nutritional and food science with the purpose of improving nutrition conditions in developing countries, with proper emphasis on the role of agriculture and public health. Among topics considered are typical foods and diets in different parts of the world, assessment of food and nutrition conditions, protein-rich and other protective foods, food processing and preservation in developing countries, food standards, and food control.

**ADVANCED NUTRITION (Home Economics; Food and Nutrition 424).** Fall. Credit two hours. Prerequisite, Food and Nutrition 324 or equivalent. M W 10. Van Rensselaer 339. Associate Professor MORRISON.\*

Recent advances in nutrition. Emphasis on human nutrition.

**READINGS IN NUTRITION (Home Economics; Food and Nutrition 402).** Spring. Credit three hours. Prerequisite, Food and Nutrition 324 or equivalent. T Th 11-12:30. Van Rensselaer 301. Assistant Professor RIVERS.\*

Critical review of literature on selected topics in the field of nutrition. Emphasis on human nutrition. Topics are changed each term so the course may be repeated for credit with permission of the instructor.

**[NUTRITION AND GROWTH (Home Economics; Food and Nutrition 440).** Fall. Offered in even-numbered years. Credit two hours. Prerequisite, Food and Nutrition 324 or equivalent. Signature of instructor required for undergraduate students. T Th 10. Van Rensselaer 301. Associate Professor NEWMAN.\*

Information on growth which is of particular interest to nutritionists. Survey of methods used in studying physical and chemical growth. Relation between nutrition and growth. *Not offered in 1965.*

**HISTORY OF NUTRITION (Agriculture; Animal Husbandry 515).** Fall. Credit one hour. T h 4:30. Savage 130. Professor ———.

The purpose is to familiarize the student with the background literature in nutrition and to improve his technique in using the libraries. Each student prepares four written reports and summarizes these in brief oral reports to learn better ways to present technical information.

**POULTRY NUTRITION (Agriculture; Poultry Husbandry 310).** Spring. Credit three

hours. Prerequisite, chemistry and physiology or permission of instructor. Not open to freshmen. Lectures, M W F 8. Rice 300. Associate Professor R. J. YOUNG.

The principles of poultry nutrition and their application to poultry feeding and feed manufacturing.

**ADVANCED POULTRY NUTRITION (Agriculture; Poultry Husbandry 510).** Spring. Credit three hours. For graduate students only. Not given every year and not unless ten or more students apply for the course. T 2 and Th 2-4. Rice 201. Professor SCOTT.\*

A study of one or more important fields of research in poultry nutrition, a critical consideration of the experimental methods used in conducting the investigations, and discussion of further studies needed, including the planning of the experiments.

**SPECIAL TOPICS IN ANIMAL NUTRITION (Agriculture; Animal Husbandry 510).** Spring. Credit one hour. Registration by permission. Th 8. Morrison 342. Professors REIN and S. E. SMITH.\*

A presentation and discussion of the knowledge and techniques of special fields of animal nutrition, with particular reference to farm animals.

**SEMINAR IN ANIMAL NUTRITION (Agriculture; Animal Husbandry 619).** Fall. Credit one hour. Open to graduate students with major field of study in animal nutrition. Registration by permission. T 4:30. Morrison 348. Animal Nutrition staff.

A critical review of the literature and other topics of special interest to graduate students in animal nutrition.

**NUTRITION SEMINAR (School of Nutrition 292).** Spring. Credit one hour. Registration by permission. M 4:15. Savage 100. Professor R. H. BARNES and staff.

**SEMINAR IN NUTRITION (Home Economics; Food and Nutrition 420).** Fall. Credit one hour. T 4:30. Van Rensselaer 339. Assistant Professor DONALD and department staff.

**CLINICAL AND PUBLIC HEALTH NUTRITION (School of Nutrition 392).** Spring. Credit three hours. Prerequisites, a course in nutrition, in physiology, and in biochemistry. Registration by permission of the instructor. For graduate students only. M W F 10. Savage 116. Professor C. M. YOUNG and members of the medical staff.\*

Designed to familiarize the student with some



of the applications of nutrition to clinical and public health problems.

**FIELD OBSERVATION AND EXPERIENCE IN COMMUNITY NUTRITION** (*School of Nutrition 381-382*). Throughout the year. Credit one hour (a term). Prerequisites (or in conjunction with), School of Nutrition 392 and Engineering 2509. Registration by permission only. For graduate students only. A two-week full-time field period just prior to the academic year and one to two weeks during the spring recess and/or immediately following final examinations in the spring term. Time and place as arranged. Visiting Assistant Professor — and Professor C. M. YOUNG.\*

Supervised observation and experience in community nutrition programs. Students must be prepared to defray expense of living costs in the communities selected for the field experience. Every effort will be made to keep costs minimal.

**NUTRITION AND DISEASE** (*Home Economics; Food and Nutrition 330*). Fall. Credit three hours. Prerequisite, Food and Nutrition

324 or equivalent. Discussion, M W F 9. Van Rensselaer 3-M-11. Assistant Professor RIVERS.\*

Study of the physiological and biochemical anomalies in certain diseases and the principles underlying nutritional therapy. Independent survey of the technical literature in this field.

**NUTRITIONAL BIOCHEMISTRY** (*School of Nutrition 160*). Spring. Credit three hours. Prerequisites, Biochemistry 400 or the equivalent and a beginning course in nutrition, e.g., Animal Husbandry 410, Poultry Husbandry 310, or Food and Nutrition 324. Lectures, T Th S 8. Savage 100. Professors R. H. BARNES and WRIGHT and Associate Professors GAYLOR and McCORMICK.\*

The biochemical bases of processes related to nutrition in the intact animal will be discussed. Emphasis will be placed on the integration of physiological and biochemical mechanisms in digestion, absorption, transport, and metabolism and will include comparative aspects of the normal and pathologic states.

## PUBLIC HEALTH

**ENVIRONMENTAL SANITATION** (*Engineering 2509*). Spring. Credit three hours. M W F 9. Hollister 202. Professor GATES.

Lecture-discussion, reports, and field trips. Concepts of environmental health and their application to municipal and metropolitan sanitation. Introduction to water resource systems; water supply systems; municipal, industrial, and private waste-water disposal systems; disposal of solid wastes; radiological health; air and water quality control; particularly as these principles and methods apply to environmental health planning and control.

**INTRODUCTION TO CLINICAL MEDICINE AND PUBLIC HEALTH PROGRAMS** (*Business and Public Administration 141*). Spring. Credit three hours. Malott Hall. Visiting Professor SAMSON and Assistant Professor YOUNG.

The objective of this course is to familiarize the student with the principal diseases of modern life, and to demonstrate how these conditions are controlled in individuals and in communities. Major emphasis is given to those conditions which directly affect the management of hospitals. Consideration is given to the training of physicians, medical and surgical specialists, nurses, and other personnel; the nature of specialized hospital equipment and other facilities for diagnosis and treatment;

and the principal procedures used by physicians in diagnosis and treatment in hospitals and in their offices. For those diseases amenable to group action for community-wide control, the nature of control measures by various public and private agencies, and the effectiveness of legislation and of voluntary action in such control, are examined. Major public health problems of various parts of the contemporary world are discussed, and visits are made to near-by hospitals and medical centers at appropriate points in the course.

**SEMINAR ON HEALTH AND SOCIETY** (*Business and Public Administration 455*). Spring. Credit three hours. Assistant Professor WHITE.

An examination of the contributions of the social sciences and other disciplines to an understanding of current problems in the health field and in hospital administration in particular.

The primary objective of the course is to increase the student's ability to evaluate research reports and other studies, to assess their relevance for the field, and to formulate his own problems in a manner conducive to scientific investigation.

**CLINICAL AND PUBLIC HEALTH NUTRITION** (*School of Nutrition 392*). Spring. Credit three hours. Prerequisites, a course in

nutrition, in physiology, and in biochemistry. Registration by permission of the instructor. For graduate students only. M W F 10. Savage 116. Professor C. M. YOUNG and members of the medical staff.\*

Designed to familiarize the student with some of the applications of nutrition to clinical and public health problems.

**FIELD OBSERVATION AND EXPERIENCE IN COMMUNITY NUTRITION** (*School of Nutrition 381-382*). Throughout the year. Credit one hour (a term). Prerequisites (or in conjunction with), School of Nutrition 392 and

Engineering 2509. Registration by permission only. For graduate students only. A two-week full-time field period just prior to the academic year and one to two weeks during the spring recess and/or immediately following final examinations in the spring term. Time and place as arranged. Visiting Assistant Professor ——— and Professor C. M. YOUNG.\*

Supervised observation and experience in community nutrition programs. Students must be prepared to defray expense of living costs in the communities selected for the field experience. Every effort will be made to keep costs minimal.

## FOOD SCIENCE

**PRINCIPLES OF FOOD TECHNOLOGY** (*Agriculture; Food Science 361-362*). Throughout the year. Credit three or five hours a term. Prerequisites, Chemistry 353 or equivalent. Bacteriology 101, Physics 102. Lectures, T Th 10. Riley-Robb 225. Laboratory, Th 2-4:30. Riley-Robb 44. For those who register for 5 hours credit: prerequisite, a course in calculus, or analytical geometry and differential equations, and a course in biochemistry. Additional lecture and laboratory, T 1-4:30. Riley-Robb 44. Associate Professor BUCK.†

The fundamentals involved in the processing, production, and distribution of raw material to finished product, with emphasis on the unit operations and processes employed by the canning, freezing, fermentation, and dehydration industries. The fundamental and physical properties of foods, and their nutritive components, food additives and preservatives, and the principles of manufacture are discussed. Laboratory practice involves actual processing and preservation of various food products, and field trips.

**FOOD BIOCHEMISTRY** (*Agriculture; Biochemistry 410*). Spring. Credit three hours. Prerequisite, Biochemistry 400. Lectures, M W F 11. Savage 100. Associate Professor SHALLENBERGER and staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.†

A discussion of some of the important non-microbial changes in foods, such as denaturation and the Maillard browning reaction. Emphasis is placed on the occurrence, significance, and prevention or control of the changes as they affect the color, odor, flavor, texture, or nutritive value of foods.

**FOOD BIOCHEMISTRY SEMINAR** (*School of Nutrition 294*). Fall. Credit one hour. Regis-

tration by permission. M 4:30. Savage 130. Professor BARNES, Associate Professor SHALLENBERGER, and staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.

Assignments and discussions of literature pertaining to the biochemical aspects of foods and food processing.

**FOOD PROCESSING INSTRUMENTATION** (*Agriculture; Food Science 466*). Fall. Credit three hours. Prerequisite or concurrent, Food Science 361. Lectures, M W 9. Riley-Robb 225. Laboratory, F 2-4:30. Riley-Robb 146. Assistant Professor NOWREY.

Principles of engineering analysis and judgment are employed in examination of instruments for measurement and control of food processes. Topics include pressure, temperature, and flow measurements, plus selected instruments for measuring physical and chemical properties of foods. Electronic components of electrical instruments are discussed. The use of instruments in the enforcement of food laws is also presented.

**FOOD ENGINEERING CALCULATIONS** (*Agriculture; Food Science 467*). Spring. Credit three hours. Prerequisite, Food Science 361. Lectures, M W 9. Riley-Robb 225. Laboratory, F 2-4:30. Riley-Robb 146. Assistant Professor NOWREY.

Analysis and presentation of technical data collected from food processes using statistical and graphical methods. Empirical equations and dimensional analyses are also discussed. The use of computers in programing food processes is presented.

**[FLUID MILK PROCESSING AND QUALITY CONTROL** (*Agriculture; Dairy Science 232*).]

Spring. Credit four hours. Given in alternate years. Prerequisites, Dairy Science 162 and Bacteriology 101 or the equivalent. Associate Professor MARCH and assistants.†

The scientific, technical, and sanitary aspects of the fluid milk industry. *Not given in 1965*].

**[FOOD PRODUCTS FROM MILK FERMENTATIONS (Agriculture; Dairy Science 333).** Fall. Credit five hours. Given in alternate years. Prerequisites, Dairy Science 101, Bacteriology 101, and organic chemistry or biochemistry. Lectures and laboratories, T Th 11-12:50 and 1:40-4:30. Stocking 120. Professor KOSIKOWSKI and assistant.†

The chemistry, bacteriology, and technology of milk fermentations leading to important foods, including cheese, butter, yoghurt, sour cream, buttermilk, and fermented milks. Consideration is given to chemical by-products of milk fermentations such as casein, lactic acid, and alcohol. Line-flow processing practices are carried out in the laboratory. *Not given in 1965*.]

**CONCENTRATION AND FREEZING OF MILK AND MILK PRODUCTS (Agriculture; Dairy Science 334).** Spring. Credit five hours. Given in alternate years. Prerequisite, Dairy Science 232. Lectures, T Th 11-12:50. Laboratory, T Th 1:40-4:30. Stocking 120. Professor JORDAN and assistant.

The principles and practice of making condensed and evaporated milk, milk powders, ice cream, and by-products, including a study of the physical, chemical, and biological factors involved.

**ANALYTICAL METHODS (Agriculture; Dairy Science 431).** Spring. Credit four hours. Prerequisites, college physics and quantitative analysis. Lectures, T Th 11. Laboratory practice, T 1-5. Stocking 119. Assistant Professor SHERBON and assistant.†

A study of the more important operations and apparatus used in quantitative analysis, and their practical application.

**CHEMISTRY OF MILK (Agriculture; Dairy Science 433).** Fall. Credit two hours. Prerequisites, qualitative and quantitative analysis and organic chemistry. Hours by arrangement. Stocking 120. Assistant Professor SHERBON.†

The subject matter changes from year to year. It may deal with colloidal phenomena in milk and its products. It may deal with the enzymes of milk, with milk proteins, with milk fat, or with chemical reactions and equilibria in dairy products. Graduate students may reregister in successive years and find little duplication of material.

**DAIRY AND FOOD ENGINEERING (Agriculture; Dairy Science 340).** Fall. Credit four hours. Given in alternate years. Prerequisites, Physics 101 and 102 or the equivalent and Dairy Science 162. Lectures, M W 10. Laboratory, W 2-4:30. Stocking 120. Professor JORDAN.†

Engineering aspects of dairy and food-plant operations.

**SCIENCE OF FOOD (Home Economics; Food and Nutrition 316).** Fall. Credit three (lectures only) or four hours. Prerequisite, F.N. 215 or 217, and a college course in organic or biochemistry. Students who have had limited laboratory experience in comparative foods *must* register for four hours. Lecture, T Th S 9. Van Rensselaer 339. For students registered for four credit hours, laboratory Th 2-4. Van Rensselaer 358. Professor HESTER, Professor PERSONIUS, and Assistant Professor DONALD.†

Scientific principles underlying modern food theory and practice. The relation to food preparation of the physical and chemical properties of proteins, fats, starches, sugars, leavening agents, and pigments; the properties of true solutions and principles of crystallization; colloidal systems—gels, sols, foams, and emulsions. Laboratory experiments designed to illustrate the effect of varying ingredients and preparation procedures on the quality of food products.

**SCIENCE OF FOOD—LABORATORY (Home Economics; Food and Nutrition 317).** Fall. Credit one hour. Prerequisite or parallel, F.N. 316. Laboratory T or W 1:40-4:20. Van Rensselaer 358. Assistant Professor DONALD.†

Laboratory experiments designed to illustrate the physicochemical behavior of colloidal and crystalline systems and chemical reactions of the food components.

**EXPERIMENTAL FOOD METHODS (Home Economics; Food and Nutrition 318).** Spring. Credit three hours. Prerequisite, Food and Nutrition 316. Courses in statistics and Food and Nutrition 317 are desirable but not required. Laboratory, M F 1:30-4:30. Van Rensselaer 358. Professor HESTER and Assistant Professor DONALD.†

Application of scientific theories and methods in the design and performance of experimental food problems and in the interpretation and evaluation of results. Independent laboratory problems.

**SPECIAL PROBLEMS FOR GRADUATE STUDENTS (Home Economics; Food and Nutrition 403).** Fall and spring. Credit and hours to be arranged. Department staff.†

For graduate students recommended by their chairmen and approved by the instructor in charge for independent, advanced work. Experience in research laboratories in the department may be arranged.

**[READINGS IN FOOD (Home Economics; Food and Nutrition 404).** Fall. Credit two hours. Prerequisite, Food and Nutrition 316 or equivalent. T Th 11. Van Rensselaer 301. Department staff.†

Critical review of current literature. Emphasis on experimental data basic to the scientific principles underlying modern theory and practice in food preparation. *Not given in 1965.*]

**SEMINAR IN FOOD (Home Economics; Food and Nutrition 421).** Spring. Credit one hour. Assistant Professor KUTA. T 4:30. Van Rensselaer 339.

**SANITARY ASPECTS OF MENU ITEM PREPARATION IN QUANTITY (Home Economics; Institution Management 429).** Spring. Credit two hours. Prerequisite, a course in general bacteriology. Instructor's consent required. M W 2. Van Rensselaer G-62. Professor LONGRÉE.

Topics will include sources of food contamination, holding conditions as they affect bacterial multiplication, and principles of sanitary handling and holding of ingredients and menu items, as they apply to hospital and school food services. Emphasis will be placed on the presentation of recent research data.

**[POULTRY MEAT AND EGG TECHNOLOGY (Agriculture; Poultry Husbandry 450).** Spring. Credit three hours. Given in alternate years. Prerequisites, Chemistry 303, or its equivalent, and Bacteriology 101. Professor BAKER.† *Not given in 1965.*]

**POST-HARVEST PHYSIOLOGY, HANDLING, AND STORAGE OF FRUITS (Agriculture; Pomology 201).** Fall. Credit three hours. Prerequisite, Pomology 101 or 102. Lectures, T Th 8. Plant Science 143. Laboratory, F 2-4:30. Plant Science 107. Professor SMOCK.†

The chemistry and physiology of fruits as they affect quality and marketability are studied. Handling methods, maturity indices, and storage practices are considered. Practical work involves grading and inspection of fruits and storage of fruit in different ways. One Saturday field trip is required.

**POTATO PRODUCTION AND PROCESSING (Agriculture; Vegetable Crops 222).**

Spring. Credit three hours. Lectures, T Th 10.

East Roberts 222. Laboratory, T 2-4:30. East Roberts 223. Professor ORA SMITH.†

General principles and practical phases of potato production, storage, and processing are discussed. Growth processes and soil and environmental factors are emphasized as influencing production. Topics such as storage methods, grading, packaging, cooking quality, nutritive value, processing, and industrial uses of potatoes also are studied. Two field trips, one of which is all day, are taken to potato farms and processing plants.

**VEGETABLE CROPS, ADVANCED COURSE (Agriculture; Vegetable Crops 401).** Fall. Credit four hours. Prerequisites, Vegetable Crops 211 and Botany 235. Intended primarily for advanced undergraduate and graduate students. Lectures, M W F 11. East Roberts 222. Laboratory, M 2-4:30. East Roberts 223. Professor KELLY.

A systematic study of the literature dealing with practices in vegetable production. Results of experiments that have been conducted or are being conducted are studied, and their application to the solution of practical problems is discussed.

**HANDLING AND MARKETING VEGETABLES, ADVANCED COURSE (Agriculture; Vegetable Crops 412).** Fall. Credit four hours. Lectures, T Th 11. East Roberts 222. Laboratory, T or W 2-4:30. East Roberts 223. Professor HARTMAN.†

(Students registered for the Tuesday laboratory are scheduled to go on a field trip at 9:30 a.m., Wednesday, the day on which classes officially begin at noon in the fall term.) The handling of vegetables from harvest, whether for fresh market or processing, through the marketing channels to the consumer; personnel, facilities, machinery, and organization of the industry; quality measurement and grade standards; federal, state, and other regulations; principles and practices in precooling, storage, packaging, prepackaging, other types of handling.

This course has the same lectures, laboratories, and field trips as Vegetable Crops 212. Much more outside reading of research and trade publications in the area covered by the course is required in Vegetable Crops 412 than in Course 212, and different examinations are given for the two courses.

**[RESEARCH METHODS IN VEGETABLE CROPS (Agriculture; Vegetable Crops 501).** Spring. Credit four hours. Given in alternate years. Primarily for graduate students. Prerequisite, Vegetable Crops 401. It is recommended that Plant Breeding 510 and 511 pre-

cede or accompany this course. Professor KELLY and Associate Professor OYER.

A study of research techniques peculiar to vegetable crops. *Not given in 1965.*]

## FOOD PREPARATION

**MEATS, POULTRY, AND FISH** (*Hotel Administration 206*). Credit three hours. Professor WANDERSTOCK.

Deals with the major phases of meats, poultry, and fish from the hotel, restaurant, club, and institutional standpoint; nutritive value, structure and composition, sanitation, selection and purchasing, cutting, freezing, cooking, carving, and miscellaneous topics. Required three-day field trip to visit purveyors in New York City included. Estimated cost for this trip ranges between \$30 and \$40.

**MEAT AND MEAT PRODUCTS** (*Agriculture; Animal Husbandry 290*). Fall or spring. Credit three hours. Animal Husbandry 100 is recommended before registering for this course. Lecture, T 8. Morrison 82. Laboratory, M W or T Th 2-4:30. Morrison 63. Registration limited to sixteen students in each section. Associate Professor STOUFFER.

Livestock slaughtering, retail meat cutting, live animals and carcass relationships, and the storage and preservation of meat and meat products. A one-day field trip to packing plants will be taken.

## BACTERIOLOGY

**GENERAL BACTERIOLOGY** (*Agriculture; Bacteriology 101*). Fall. Credit five hours. Prerequisite, Chemistry 104 or 108. Lectures, M W F 11. Stocking 218. Laboratory practice, M W or T Th 8-10:30, T Th 2-4:30. Stocking 301. Professor H. W. SEELEY and assistants.

An introductory course; general survey of the field of bacteriology, with the fundamentals essential to further work in the subject.

**GENERAL BACTERIOLOGY** (*Agriculture; Bacteriology 102*). Fall. Credit three hours. Prerequisite, Chemistry 104 or 108. Not open to undergraduate students in the College of Agriculture. Lectures, M W F 11. Stocking 218. Professor H. W. SEELEY. The same as the lecture part of Bacteriology 101. By special permission, this course may be elected by graduate students and advanced students in certain professional courses.

**DAIRY AND FOOD MICROBIOLOGY** (*Agriculture; Bacteriology 201*). Spring. Credit four hours. Prerequisite, Bacteriology 101. Lectures, M W 12. Stocking 119. Laboratory, M W 1:30-4:30. Stocking 301. Professor NAYLOR and assistant.

A study of the microorganisms of importance in foods, with laboratory practice in the use of standard methods for microbiological testing and control of food products.

[**ADVANCED BACTERIOLOGY** (*Agriculture; Bacteriology 403*). Spring. Credit four hours. Given in alternate years. Prerequisites, Bacteriology 101 and organic chemistry. Associate Professor MACDONALD and assistants.

A study of the comparative physiological and ecological relationships among the bacteria. Such subjects as bacterial anatomy, cell growth, ecology, nutrition, and autotrophy are covered. Some of the more complex groups of bacteria, such as the photosynthetic bacteria, are studied in detail. Laboratory emphasis is on techniques for the isolation, cultivation, and rigorous study of these and other groups. *Not given in 1965.*]

**ADVANCED MICROBIOLOGY** (*Agriculture; Bacteriology 404*). Fall. For upperclassmen and graduate students. Credit two hours. Prerequisites, Bacteriology 101 and organic chemistry. Lectures and laboratory practice, T Th 1:40-4:30. Stocking 119. Assistant Professor ZAHNER and assistant.

A study of a variety of biological phenomena among viruses, bacteria, yeasts, and molds. Genetics, radiation effects, and metabolic control mechanisms will be among the topics included.

**PHYSIOLOGY OF BACTERIA** (*Agriculture; Bacteriology 310*). Spring. Credit two hours. Prerequisites, Bacteriology 101 and at least one additional course in bacteriology and one in organic chemistry. Organic chemistry may be taken concurrently. Lectures, T Th 10. Stocking 120. Professor DELWICHE.

The physiology of bacteria and the biochemistry of microbic processes.

**APPLIED AND INDUSTRIAL MICROBIOLOGY** (*Agriculture; Bacteriology 212*). Fall. Credit three hours. May be taken for two

hours' credit with permission. Given in alternate years. Prerequisite, Bacteriology 101. Staff.

A survey of the microbiology of food, water, sewage, and industrial fermentations.

**MORPHOLOGY AND CYTOLOGY OF BACTERIA** (*Agriculture; Bacteriology 413*). Fall. Credit three hours. For seniors and graduate students. Lectures, T Th S 9. Stocking 119. Professor KNAYSIL.

The morphology, cytology, and microchemistry of microorganisms.

**CHEMISTRY OF BACTERIAL PROCESSES** (*Agriculture; Bacteriology 415*). Spring. Credit two hours. For seniors and graduate students. Lectures, M W 11. Stocking 119. Professor DELWICHE.

The chemistry of metabolism, fermentation, and biosynthetic processes of microorganisms.

## BIOCHEMISTRY

**PRINCIPLES OF BIOCHEMISTRY, LECTURES** (*Agriculture; Biochemistry 400*). Fall. Credit four hours. Prerequisite, Organic Chemistry 353-355 or the equivalent. For undergraduate and graduate students. M T Th S 8. Plant Science 233. Professor DANIEL.

A basic course dealing with the chemistry of biological substances and their transformations in living organisms.

**PRINCIPLES OF BIOCHEMISTRY, LABORATORY** (*Agriculture; Biochemistry 401*). Fall. Credit two hours. Prerequisite, quantitative analysis, or permission of the instructor. Must be taken with or after Biochemistry 400. M W or T Th 2-4:20. Savage 230. Preliminary examinations will be held twice during the semester at 7:30 p.m. Professor DANIEL, Associate Professor NEAL, and assistants.

Laboratory practice with biochemical substances and experiments designed to illustrate chemical reactions which may occur in biological systems.

**NUTRITIONAL BIOCHEMISTRY** (*School of Nutrition 160*). Spring. Credit three hours. Prerequisites, Biochemistry 400 or the equivalent and a beginning course in nutrition, e.g., Animal Husbandry 410, Poultry Husbandry 310, or Food and Nutrition 324. Lectures, T Th S 8. Savage 100. Professors R. H. BARNES and WRIGHT and Associate Professors GAYLOR and McCORMICK.\*

The biological bases of processes related to nutrition in the intact animal will be discussed. Emphasis will be placed on the integration of physiological and biochemical mechanisms in digestion, absorption, transport, and metabolism and will include comparative aspects of the normal and pathologic states.

**FOOD BIOCHEMISTRY** (*Agriculture; Biochemistry 502*). Spring. Credit three hours. Prerequisite, Biochemistry 501. Lectures, M W F 11. Savage 100. Associate Professor SHALLENBERGER and staff members from the

Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.†

A discussion of some of the important non-microbial changes in foods, such as denaturation and the Maillard browning reaction. Emphasis is placed on the occurrence, significance, and prevention or control of the changes as they affect the color, odor, flavor, texture, or nutritive value of foods.

**BIOCHEMISTRY AND NUTRITION OF THE VITAMINS** (*Agriculture; Biochemistry 510*). Spring. Credit two hours. Offered in alternate years. Prerequisite, Chemistry 355 and Biochemistry 400, or their equivalent. Lectures, T Th 10. Savage 100. Professor DANIEL.\*†

The chemical, physiological and nutritional aspects of the vitamins.

**GENERAL BIOCHEMISTRY, LECTURES** (*Agriculture; Biochemistry 500-501*). Throughout the year. Credit four hours per term. Prerequisites, quantitative analysis, Organic Chemistry 358 or the equivalent, and Physical Chemistry 390 or the equivalent, or permission of the instructor. M W F S 9. Savage 100. Professor HOLLEY with Associate Professors GAYLOR and McCORMICK, and Assistant Professor CALVO.

An integrated treatment of the fundamentals of biochemistry.

**GENERAL BIOCHEMISTRY, LABORATORY** (*Agriculture; Biochemistry 502*). Spring. Credit three hours. Must be taken with or following Biochemistry 501, or the student must have had the equivalent. Registration by permission of the instructor before November 1. M W or T Th 1:40 to 4:30 and additional periods by appointment. Savage 230. Professor NELSON and assistants.

Selected experiments on carbohydrates, lipids, proteins, and amino acids, nucleic acids and metabolism (cellular particulates, kinetics, general enzymology) will be given to illustrate

## CHEMISTRY AND PHYSICS

basic biochemical principles. The quantitative aspects rather than qualitative identifications will be emphasized.

**ADVANCED BIOCHEMISTRY** (*Agriculture; Biochemistry 520-521*). Throughout the year. Credit one or two hours per term. Prerequisite, Biochemistry 501. Lectures T Th 9. Savage 100. Advanced lectures will be divided into four sections of one-hour credit each. Students may take one or more sections of the course for one to four hours of credit, as each section may be taken without having taken a preceding section.\*

*Fall term (520)*. Carbohydrates and lipids, one hour, Associate Professor GAYLOR; proteins and enzymes, one hour, Professor HESS.

*[Spring term (521)*. Nucleic acids and control mechanisms, one hour, Assistant Professor CALVO; plant biochemistry, one hour, Professor ———. *Not offered in spring term, 1965*].

**BIOCHEMISTRY SEMINAR** (*Agriculture; Biochemistry 600*). Fall and spring. Required of graduate students majoring in biochemistry and open to all who are interested. F 4:15. Savage 100.

**NUTRITION SEMINAR** (*School of Nutrition 292*). Spring term. Credit one hour. Registration by permission. M 4:15. Savage 100. Professor R. H. BARNES and staff.

**FOOD BIOCHEMISTRY SEMINAR** (*School of Nutrition 294*). Fall. Credit one hour. Registration by permission. M 4:30. Savage 130. Professor BARNES, Associate Professor SHALLENBERGER, and staff members from the Department of Food Science and Technology, New York State Agricultural Experiment Station, Geneva, New York.

Assignments and discussions of literature pertaining to the biochemical aspects of foods and food processing.

## CHEMISTRY AND PHYSICS

**INTRODUCTORY PHYSICAL CHEMISTRY** (*Arts and Sciences; Chemistry 285-286*). Throughout the year. Credit five hours a term. Prerequisites, Chemistry 108 or 116, Mathematics 192, Physics 123, or consent of instructor. For students in engineering, Lectures, M W F 9. Laboratory lecture, F 12. Laboratories: fall term, M 1:40-4:30 and T 10-12:50 or W Th 1:40-4:30; spring term, M T 1:40-4:30 or W Th 1:40-4:30. Assistant Professor LIND, Professor ——— and assistants.

The lectures will give a systematic treatment of the fundamental principles of physical chemistry; the laboratory will deal with the experimental aspects of the subject and also develop the needed skills in quantitative chemical analysis.

**INTRODUCTORY PHYSICAL CHEMISTRY** (*Arts and Sciences; Chemistry 387-388*). Throughout the year. Credit five hours a term. Prerequisites, Chemistry 236. Mathematics 113 or 221, Physics 208, or consent of instructor. Chemistry 387 is prerequisite for Chemistry 388. Required of candidates for the degree of A.B. with a major in chemistry. Lectures, M W F 10. Laboratory: fall term, T 1:40-4:30 or F 1:40-4:30; spring term, M T 1:40-4:30 or W F 1:40-4:30 or S 8-1. Laboratory lecture (fall term only), Th 12. Examinations, Th 7:30 p.m. Professor BAUER.

A study of the more fundamental principles of physical chemistry from the standpoint of the laws of thermodynamics and of the kinetic

theory. The laboratory will consist of experiments illustrating laboratory techniques as well as experiments in classical and modern physical chemistry.

**CHEMISTRY OF NATURAL PRODUCTS** (*Arts and Sciences; Chemistry 574*). Spring. Credit three hours. Prerequisites, Chemistry 456 or 457, and 465-466. Primarily for graduate students. Lecture, T Th 9 and discussion period M 4:30. Professor JOHNSON and Assistant Professor GOLDSTEIN.

Particular attention will be devoted to methods of structure determination and synthesis as applied to selected terpenes, steroids, alkaloids, and antibiotics.

**PHYSICAL CHEMISTRY OF PROTEINS** (*Arts and Sciences; Chemistry 586*). Spring. Credit four hours. Prerequisite, Chemistry 286 or 388. Primarily for graduate students. Lectures, M W F 8 and fourth hour to be arranged. Professor SCHERAGA.

Chemical constitution, molecular weight, and structural basis of proteins; thermodynamic, hydrodynamic, optical, and electrical properties; protein and enzyme reactions.

**PHYSICS FOR STUDENTS OF BIOLOGY** (*Arts and Sciences; Physics 200*). Either term. Credit four hours. Prerequisites, Physics 101-102, six credit hours of college work in chemistry, and six in biological science. Students having a grade below 70 in either Physics

101 or 102 may not register for the course without permission of the instructor. Lectures, T-Th 12. Laboratory, T or F 2-4. One discussion period per week to be arranged. Professor L. L. BARNES and staff.

Lectures, laboratory experiments, and small discussion groups, dealing with selected topics related to the study of biology. Topics selected from the properties of matter, electricity, electromagnetic radiation, and nuclear physics.

## ECONOMICS

**FOOD ECONOMICS** (*School of Nutrition 159*). Spring. Credit three hours. Lecture and discussion, M W F 8. Savage 100. Associate Professor CALL†

Designed for students who are interested in any aspect of the food industry. Emphasis is placed on the economics of food production, processing, marketing, and consumption. Attention is given to both United States and international food problems in a systematic treatment of economic principles applicable to the food sector of any economy.

**MARKETING** (*Agriculture; Agricultural Economics 240*). Fall or spring. Credit three hours. Lectures, M W F 11 except when field trips are taken, then M F lectures only. Warren 45. Field trips, T W or Th 1:30-5:30. Professor DARRAH.

A study of how farm products are marketed. Special attention is given to the consumption of farm products, the factors that affect consumption, market channels, operation of different marketing agencies, storage, transportation, packaging, product identification, advertising and promotion, buying, selling, and costs. One all-day and two half-day trips are taken to visit marketing agencies.

**SEMINAR IN WORLD PROBLEMS OF FOOD AND POPULATION** (*School of Nutrition 250*). Spring. Credit two hours. Open only to graduate students. Registration by permission. W 7:30 p.m. Savage 130. Professor VAN VEEN and Associate Professor CALL†

Demographic behavior, population and food supply, comparative agriculture.

**SURVEY OF INDUSTRIAL AND LABOR RELATIONS** (*Industrial and Labor Relations 250*). Credit three hours. Either term. Profes-

sors CARPENTER, WINDMULLER, or Assistant Professor POLISAR.

A survey for students in other divisions of the University. An analysis of the major problems in industrial and labor relations: labor union history, organization, and operation; labor market analysis and employment practices; industrial and labor legislation and social security; personnel management and human relations in industry; collective bargaining; mediation and arbitration; the rights and responsibilities of employers and employees; the major governmental agencies concerned with industrial and labor relations.

**ADVANCED ORGANIZATION AND MANAGEMENT** (*Home Economics; Institution Management 425*). Spring. Credit two hours. Instructor's signature required for preregistration. T-Th 2. Van Rensselaer G-62. Associate Professor —.

Analysis and interpretation of major administrative problems in the operation of a dietary department. Scientific application of business management, budgetary and production control principles are studied in relation to quantity meal service.

**ECONOMICS OF AGRICULTURAL DEVELOPMENT** (*Agriculture; Economics of Agricultural Development 364*). Spring. Credit three hours. Instructor's consent required. Lectures, T-Th S 9. Warren 345. Associate Professor MELLOR.

A discussion of the special problems of agricultural development, in low per-capita income areas and countries. Attention will be devoted to the relationship between development in agriculture and in other sectors of the economy, capital and capital formation, the role of land and land reform, increasing efficiency in resource use, coordination problems in agricultural development, and the like.

## MATHEMATICS

**CALCULUS** (*Arts and Sciences; Mathematics 111*). Either term. Credit three hours. Fall

term: lectures, M W F 10, 11; T-Th S 10, 11 plus one hour to be arranged. Spring term:



M W F 8, 9, 10; T Th S 8, 11, 12. Preliminary examinations will be held at 7 p.m. on Oct. 27, Dec. 1, and Jan. 12.

Plane analytic geometry, differentiation and integration of algebraic and trigonometric functions, applications. In the fall term, one of the three lectures each week will be of a special character, devoted to a more rigorous approach to the calculus.

**CALCULUS (Arts and Sciences; Mathematics 112).** Either term. Credit three hours. Prerequisite, Mathematics 111. Fall: M W F 9, 10; T Th S 9, 10. Spring: M W 10, 11; T Th 10, plus one hour to be arranged.

Differentiation and integration of elementary transcendental functions, the technique of integration, conic sections, polar coordinates, infinite series.

**STATISTICAL METHODS I<sup>1</sup> (Agriculture; Plant Breeding 510).** Fall. Credit one, three, or four hours. Prerequisite, graduate standing or permission of instructor. T Th S 10. Warren 345. Laboratory to be arranged. Assistant Professor BALAAM.

The distributions of statistics encountered in biological and other fields are considered from the point of view of elementary probability notions and by sampling from known populations. The results, with principles of experi-

mentation, are applied to the conducting of experiments and interpretation of results. The nature and validity of experimental error are treated. Topics include point and interval estimation, tests of hypotheses, the simpler experimental designs and their analyses of variance, linear regression and correlation.

An additional hour per week is devoted to algebraic derivations and manipulations associated with the statistical techniques and computational procedures of the lectures. The purpose is to give the student a better understanding of statistics and to improve his background for further work in statistics, such as that in Course 513. This optional hour carries one hour credit and may be taken with or without the regular three hours credit.

**STATISTICAL METHODS II<sup>1</sup> (Agriculture; Plant Breeding 511).** Spring. Credit one, three, or four hours. Prerequisite, Plant Breeding 510 or the equivalent. T Th S 10. Warren 345. Laboratory to be arranged. Assistant Professor BALAAM.

The work of Plant Breeding 510 is continued. Topics include factorial experiments, individual degrees of freedom, analysis of covariance, analysis of variance of two-way classifications with disproportionate numbers, multiple and curvilinear regression, curve fitting, the treatment of discrete data, some recent developments in statistics.

## PHYSIOLOGY AND HISTOLOGY

**PHYSIOLOGY (Veterinary; Physiology 12).** Spring. Credit three hours. Prerequisites, Physiology 11, Anatomy 1 and 2, or Anatomy 9 or Zoology 211-212 and Biochemistry 401. T Th S 8. Professor SELLERS and Associate Professors BERGMAN, NANGERONI, and STEVENS.

Lectures and demonstrations on blood and lymph, circulation, respiration, digestion, and absorption.

**PHYSIOLOGY (Veterinary; Physiology 13).** Fall. Credit three hours. Prerequisite, Physiology 12. T Th S 8. Professor SELLERS and Associate Professors BERGMAN, NANGERONI, and STEVENS.

Lectures and demonstrations on the muscular and nervous systems. Special senses, excretion,

metabolism, temperature regulation, endocrine organs, and reproduction.

**EXPERIMENTAL PHYSIOLOGY FOR GRADUATE STUDENTS (Veterinary; Physiology 20).** Spring. Credit three hours. Given in alternate years. Prerequisites as for Physiology 12, coregistration in Physiology 13. Laboratory, W F 1-4. Registration limited. Consent of instructor required. Associate Professor NANGERONI.

**GENERAL AND COMPARATIVE PHYSIOLOGY, LECTURES (Arts and Sciences; Zoology 441).** Fall. Credit three hours. Prerequisites, one year of biology or zoology and college courses in chemistry. Organic chemistry desirable. Lectures, M W F 10. Assistant Professor MCFARLAND.

<sup>1</sup> An additional hour each week is devoted to algebraic derivations and manipulations associated with the statistical techniques and computational procedures of the lectures and laboratory. The purpose is to give the student a better understanding of statistics and to improve his background for further work in statistics, such as Plant Breeding 213. This additional hour carries one hour credit and may be taken with or without the regular three hours credit.

The principal physiological functions of both vertebrates and invertebrates, including muscle contraction, nerve action, respiration, metabolism, digestion, circulation, excretion, and physiological regulation.

**GENERAL AND COMPARATIVE PHYSIOLOGY, LABORATORY** (*Arts and Sciences; Zoology 443*). Fall. Credit one hour. Must be taken with Zoology 441. Limited to 96 students, 12 per section. Individual sections meet in alternate weeks; a total of seven lectures in alternate weeks. Lecture, W 2. Laboratory, T 8-11, M T F 1:40-4:30. Assistant Professor McFARLAND and assistants.

**CELLULAR PHYSIOLOGY LECTURES** (*Arts and Sciences; Zoology 541*). Fall term. Credit two hours. Prerequisites, animal or plant physiology, organic chemistry, physics, and consent of the instructor. Lectures, M W 11. Assistant Professor REEVES.

An introduction to basic problems of cellular function including structural and functional organization of cells, role of nucleic acids, permeability and active transport, contractility, excitability, metabolism, growth and cellular interactions.

**CELLULAR PHYSIOLOGY LABORATORY** (*Arts and Sciences; Zoology 543*). Fall term. Credit two hours. Enrollment is limited. Laboratory, W or Th 1:40-4:30. Assistant Professor REEVES and assistant.

The laboratory emphasizes a number of biophysical approaches to cellular activities.

**EXPERIMENTAL ENDOCRINOLOGY** (*Arts and Sciences; Zoology 540*). Spring. Credit two or three hours. Prerequisites, a year of zoology, organic chemistry, physiology, and consent of the instructor. Primarily for graduate students; open to undergraduates for two credits. Lectures, M F 11. Laboratory, M 2-4:30. Professor LEONARD.

Lectures on anatomy, physiology of the vertebrate endocrine glands, glandular interrelationships; chemical and physiological properties of hormones, assay methods. Laboratory, small-animal surgery and microtechnique for the endocrines, illustrative experiments on the effects of hormones.

**PHYSIOLOGY OF REPRODUCTION** (*Agriculture; Animal Husbandry 425*). Spring. Credit two hours. Prerequisite, a course in human or veterinary physiology. Lectures, M W 10. Morrison 342. Professor ASDELL.

An advanced course in reproduction, principally in mammals.

**FUNDAMENTALS OF ENDOCRINOLOGY** (*Agriculture; Animal Husbandry 427*). Fall. Credit three hours. Lectures, T Th 10. Morrison 38. Laboratory to be arranged. Professor HANSEL.

A general course in the physiology of the endocrine glands, and the roles played by each hormone in the regulation of normal body processes. The laboratory work consists of a series of projects designed to illustrate the basic principles of endocrinology and their applications to more efficient production in all classes of livestock.

**HISTOLOGY: THE BIOLOGY AND DEVELOPMENT OF THE TISSUES** (*Arts and Sciences; Zoology 325*). Fall. Credit four hours. Prerequisites, Zoology 101-102, or 103-104, and 321-322. Lectures, T Th 11. Laboratory, T Th 8-10:30 or 2-4:30. Professor WIMSATT and assistants.

A survey of the structure, functions, and development of the tissues. The treatment is general, designed to provide students of biology with a basis for the understanding of normal and abnormal structure of the vertebrates. Each student will make for his own use a series of typical microscopic preparations.

**SPECIAL HISTOLOGY: THE BIOLOGY OF THE ORGANS** (*Arts and Sciences; Zoology 426*). Spring. Credit four hours. Prerequisite, Zoology 325. Enrollment limited to 20 students. Lectures, W F 9. Laboratory, W F 2-4:30. Professor WIMSATT and assistants.

A continuation of Zoology 325. Zoology 325 and 426 together give the fundamental facts of the microscopic structure and function of the body. Opportunity to gain knowledge of technique in the fixing, embedding, and sectioning of selected organs is also offered.

## PATHOLOGY AND BACTERIOLOGY

**PATHOLOGY OF NUTRITIONAL DISEASES** (*Veterinary; Pathology and Bacteriology 155*). Spring. Credit three hours. Lecture and laboratory. Hours to be arranged. De-

signed primarily for graduate students of nutrition. Prerequisites, Pathology and Bacteriology 40 and 40a. Associate Professor KROOK.\*

## PHYSICAL BIOLOGY

**RADIOISOTOPES IN BIOLOGICAL RESEARCH—PRINCIPLES AND PRACTICE** (*Veterinary; Physical Biology 100*). Spring. Credit four hours. Lectures, T Th 11. Laboratory, M T or W 1:30-5. Prerequisites, a course in quantitative chemistry and permission of instructor. Professor COMAR and staff.

Lectures, demonstrations, and laboratory on the fundamentals of atomic energy procedures and applications to biological research.

**BIOLOGICAL EFFECTS OF RADIATION** (*Veterinary; Physical Biology 104*). Fall. Credit three hours. Lectures, T Th 10; laboratory, Th 1:30-5. Assistant Professor CASARETT.

Lectures, demonstrations and laboratories on radiation physics, radiation chemistry, radia-

tion effects at the cellular level, and short- and long-term effects on multicellular organisms.

**BIOLOGICAL MEMBRANES AND NUTRIENT TRANSFER** (*Veterinary; Physical Biology 108*). Spring. Credit two hours. Lectures, (times to be designated). Prerequisites, animal or plant physiology, quantitative and organic chemistry, physics, and consent of instructor. Cellular physiology and elementary physical chemistry desirable. Professor WASSERMAN.

Lectures and demonstrations on biophysical properties of biological membranes, theoretical aspects of permeability and transport, and mechanism of transfer of inorganic and organic substances across intestine, placenta, kidney, erythrocytes, bacteria and other biological systems. *Not offered in 1965.*]

## SOCIAL STUDIES

**THE SOCIOLOGY OF WORK** (*Agriculture; Rural Sociology 324*). Fall. Credit three hours. Not open to freshmen or sophomores. Prerequisite, Rural Sociology 100 or equivalent. Lectures and discussions, M W F 9. Warren 232. Professor TAFTZ.

The following topics are covered: (1) the function of work for society and the individual; (2) bureaucratic structure and specialization; (3) the development of occupational norms and identification; (4) occupational status; (5) the process of occupational selection; (6) dynamics of occupational change—horizontal and vertical mobility; (7) a case study of an occupation: trends in the professionalization of social work.

**PSYCHODYNAMICS OF PERSONALITY** (*Home Economics; Child Development and Family Relationships 360*). Fall. Credit three hours. Graduate students admitted by permission of the instructor. M W F 11. Van Rensselaer 117. Professor DALTON.

Psychological influences in the development and functioning of persons. Special attention will be given to basic determinants of personality; structure of the personality; personality in social and cultural context; the influence of conscious and unconscious processes in behavior.

**RURAL COMMUNITY ORGANIZATION** (*Agriculture; Rural Sociology 411*). Fall. Credit three hours. Prerequisite, Rural Sociology 100 or 210 or permission of the instructor. T Th 11-12:30. Warren 31. Associate Professor REEDER.

A consideration of the problems involved in helping people and organizations in a community work together to meet their common needs.

There are two major emphases: (1) analysis of communities from the perspective of the community development worker as a change agent. (2) consideration of the problems which confront community development workers and the processes and methods by which they carry out their various community development tasks. Projects in nearby communities provide field laboratory experiences.

**CULTURAL ANTHROPOLOGY** (*Arts and Sciences; Anthropology 301*).<sup>2</sup> Fall. Credit four hours. M W F 12. Professor SHARP and Assistant Professor B. LAMBERT.

A study and comparison of the types of learned, shared, and transmitted behavior patterns and ideas by means of which men of various periods and places have dealt with their environment, worked out their social relations with their fellow men, and defined their place in the cosmos. An inquiry into human nature and its expression in man's institutional and intellectual creations.

**CULTURE AND PERSONALITY** (*Arts and Sciences; Anthropology 312*).<sup>2</sup> Spring. Credit four hours. Prerequisite, one course at the 100 or 200 level in anthropology, sociology, psychology, or zoology. M W F 10. Professors LAMBERT and OPLER.

The study of the individual in his society, emphasizing the relationship between social

structure, cultural context, and human behavior. Attention is given largely to the study of personality, "normal" and "abnormal," in non-Western societies.

**COMPARATIVE SOCIAL ORGANIZATION** (*Arts and Sciences; Anthropology 321*).<sup>2</sup> Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. M W F 3. Professor SHARP and Assistant Professor B. LAMBERT.

The varied organization of human relations in selected non-Western societies; case studies of territorial, sex, age, kinship, clique, club, class, and caste bases of interaction and association; the ordering of social roles into systems of conduct; the relations of conduct to technology and world view.

**[ETHNOLOGY OF NORTH AMERICA** (*Arts and Sciences; Anthropology 331*).<sup>2</sup> Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. M W F 3. Professor ROBERTS.

A general survey of the ethnography of North America, with emphasis on problems and topics to which the North American materials are most relevant. Selected cultures will be considered in some detail. *Not given in 1965.*

**ETHNOLOGY OF MIDDLE AND SOUTH AMERICA** (*Arts and Sciences; Anthropology 332*).<sup>2</sup> Spring. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. M W F 9. Professor HOLMBERG.

A descriptive and analytical survey of contemporary native cultures of Middle and South America in terms of economic, social, political, and religious organization. Representative groups from all cultural areas are considered, ranging from such marginal peoples as the Tierra del Fuegians to such complex civilizations as the Inca.

**[ETHNOLOGY OF SOUTHEAST ASIA AND OCEANIA** (*Arts and Sciences; Anthropology 334*).<sup>2</sup> Spring. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of instructor. T Th 2-2:30. Visiting Professor WARD.

The development and distribution of major culture types in mainland and island Southeast Asia and their extension into Oceania. Discussion of selected groups and of the fate of traditional cultural characteristics following the expansion of Chinese, Indian, Moslem, and Western civilizations into these areas. *Not given in 1965.*

**[ETHNOLOGY OF THE CIRCUMPOLAR AREA** (*Arts and Sciences; Anthropology 336*).<sup>2</sup> Spring. Credit four hours. Prerequisite, An-

thropology 101 or 301, or consent of instructor. M W F 2. Assistant Professor PELTO.

A survey of native cultures of the North in the New and Old Worlds, dealing with problems of ethnohistory, social structure and cultural organization, aspects of ethnopsychiatry, and change in the modern world. *Not given in 1965.*

**ETHNOLOGY OF AFRICA** (*Arts and Sciences; Anthropology 337*).<sup>2</sup> Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of the instructor. T Th S 9. Professor TURNER.

A social and cultural survey of representative African peoples. Stress is laid on the comparative study of political institutions and local descent groups. Ritual beliefs and practices are considered in relation to repetitive and radical change.

**[CULTURE AND SOCIETY IN INDIA AND SOUTH ASIA** (*Arts and Sciences; Anthropology 341*).<sup>2</sup> Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of the instructor. M W F 9. Professor OPLER. *Not given in 1965.*

**THEORY OF CULTURE CHANGE** (*Arts and Sciences; Anthropology 413*).<sup>2</sup> Fall. Credit four hours. Prerequisite, Anthropology 101 or 301, or consent of the instructor. M W F 11. Professor HOLMBERG.

A study of the various theories of cultural change and their relevance to the on-going social process; an analysis of such concepts as innovations, diffusion, and acculturation in relation to culture change theory; a consideration of factors involved in maintaining stability or stimulating change in nonindustrialized cultures.

**SEMINAR: APPLIED ANTHROPOLOGY** (*Arts and Sciences; Anthropology 482*).<sup>2</sup> Spring. Credit four hours. Prerequisite, consent of instructor. M 2-4. Mr. DOBYNS.

The principles of anthropology applied to planned programs of change. Designed not only for students of the humanities and different societies but also for natural scientists concerned with social and cultural problems involved in technological change, community development, native administration, and modernization in various regions of the world. The seminar is designed especially to prepare advanced undergraduate and graduate students for technical missions abroad.

<sup>2</sup> See the Announcement of the College of Arts and Sciences for further offerings in this area.

## RESEARCH

**SPECIAL PROBLEM** (*School of Nutrition 199*). Report of individual problem under direction of any member of the faculty of the

Graduate School of Nutrition. See page 10 for details.

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