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How To Use This Bulletin

This bulletin is the basic source of information about the offerings in agriculture in the College of Agriculture, Forestry, and Home Economics. You should keep it at hand for ready reference. The Index in the back of the bulletin will refer you to information on specific points.

- Page 3 Section I contains general information describing objectives of the programs in agriculture, admission requirements, scholarships and other financial aids, the registration process and regulations pertaining to class attendance, etc., degrees offered, requirements for all students, use of elective credits, and use in the Graduate School of credits earned while an undergraduate.
- Page 14 Section II contains descriptions of the curricula in agriculture.
- Page 50 Section III presents descriptions of course offerings in agriculture.
- Page 90 Section IV contains special information pertaining to scholarship requirements, classification, student personnel services, student government, and ROTC programs.
- Page 97 Section V — List of faculty.
- Page 101 Section VI — Index.

In addition to this bulletin and any other you may need for program planning, you will be supplied at the time of registration with a copy of the *Class Schedule*. This is published just prior to each quarter and lists courses offered during the quarter, with time and place of class meetings.

Explanation of Symbols and Course Numbers

Courses primarily for freshmen and sophomores are numbered 1 through 49; for juniors and seniors, 50 through 99; for juniors, seniors, and graduate students, 100 through 199. Courses numbered 200 or above are restricted to students registered in the Graduate School.

If no prerequisites are listed, there are none, except insofar as the course number indicates a minimum class standing requirement.

The following symbols are used throughout this bulletin.

◦ Graduate students may prepare Plan B papers.

† To receive credit, all courses listed before the single dagger must be completed.

‡ Students may enter sequence course in any quarter which precedes the double dagger.

§ No credit is granted if credit was received for equivalent course listed after section mark.

¶ Concurrent registration is allowed with the course listed after paragraph mark.

* Consent of instructor is required.

△ Consent of department or school offering course is required.

x After a course number indicates course is offered more than 1 quarter.

When no abbreviated departmental prefix precedes the course number listed as a prerequisite, that prerequisite is in the same department as the course being described. Therefore, a prerequisite reading "6 cr" means 6 credits in courses offered by the "same" department.

UNIVERSITY OF MINNESOTA BULLETIN

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Directory of Departments

- Agricultural Economics** — Vernon W. Ruttan, Ph.D., *head*
220 Haecker Hall
- Agricultural Education** — Milo J. Peterson, Ph.D., *chairman*
208 Horticulture Building
- Agricultural Engineering** — Landis L. Boyd, Ph.D., *head*
200 Agricultural Engineering Building
- Agronomy and Plant Genetics** — Herbert W. Johnson, Ph.D., *head*
301 Agronomy Building
- Animal Science** — William F. Hueg, Jr., Ph.D., *acting head*
120 Peters Hall
- Biometrics** — Hugo H. John, Ph.D.
28 North Hall
- Entomology, Fisheries, and Wildlife** — Alexander C. Hodson, Ph.D., *head*
219 Entomology Building
- Food Science and Industries** — Samuel T. Coulter, Ph.D., *head*
225 Food Science Building
- Horticultural Science** — Leon C. Snyder, Ph.D., *head*
111 Horticulture Building
- Information and Agricultural Journalism** — Harold B. Swanson, Ph.D.,
head
107 Coffey Hall
- Plant Pathology** — Milton F. Kernkamp, Ph.D., *head*
304 Plant Pathology Building
- Rhetoric** — Ralph G. Nichols, Ph.D., *head*
230 Agricultural Engineering Building
- Soil Science** — William P. Martin, Ph.D., *head*
120 Soils Building

Agriculture

College of Agriculture, Forestry, and Home Economics**

SECTION I

GENERAL INFORMATION

Objectives of the Programs in Agriculture and of the College

The College of Agriculture, Forestry, and Home Economics is a professional college with focused interests. Undergraduate instruction in agriculture is considered important in assuring agriculture's maximum contribution to the development of the nation's economy, in improving the diets, health, and well-being of people, in aiding rural populations in adjusting to change, in providing ideas and information needed to develop sound public policy relating to agriculture and natural resources, and in helping meet educational needs in world affairs and international relations as they relate to agriculture.

The faculty through the curricula in agriculture seeks to serve the student in several ways:

1. To enable the student to develop an understanding of the fundamentals of the biological, physical, and social sciences which are a part of the fabric of modern agriculture.
2. To assure the student an opportunity to explore those areas of human experience and understanding that will enable him to enjoy a rich personal life and to contribute in an effective manner to the welfare of the greater community.
3. To bring the student to a level of competence in one of the specialized areas of the college that will support responsible professional activity in the agricultural or business community.
4. To provide a foundation for highly specialized studies in the departmental disciplines at the graduate level.

Information on the college other than that contained in this bulletin may be obtained from the College Office, College of Agriculture, Forestry, and Home Economics, 215 Coffey Hall, University of Minnesota, St. Paul, Minnesota 55101.

** For information regarding forestry or home economics programs, see the forestry or home economics bulletins.

Admission to Programs in Agriculture

How Application Is Made

To be admitted to a program in agriculture in the College of AFHE you must make application to the Office of Admissions and Records on the St. Paul Campus. Listed below are requirements for admission to the programs in agriculture and pre-veterinary medicine. Other requirements and procedures having to do with nonresident admission, admission with advanced standing, adult special admission, and admission by examination appear in the *General Information Bulletin*.

High School Graduates — High school graduates in the upper 60 percent of their classes may enter if they have completed 12 units in grades 10-12. Nine of these should be chosen from high school offerings in English, social studies and history, mathematics, natural science, and foreign languages. At least one of these units must be in natural science or agriculture.

• Prior to admission applicants must have completed 3 units in mathematics, including 1 unit in elementary algebra, 1 unit in plane geometry, and 1 unit in higher algebra or its equivalent.

Participation in high school vocational agriculture is recognized as excellent preparation for the study of agriculture at the collegiate level. However, rural background and experience is not required for admission.

Students wishing to prepare for the College of Veterinary Medicine should apply for admission to the College of Agriculture, Forestry, and Home Economics.

Exceptions to the specific requirements listed above may be made when additional information presented by the applicant indicates promise of academic success.

Graduates of the Schools of Agriculture — If you are a graduate in the upper 60 percent of one of the University of Minnesota Schools of Agriculture and meet the distribution requirements noted above, you will be admitted to a program in agriculture in the College of AFHE.

Adult Special Students — You may be admitted as a special student if you are a mature person (24 years of age or older) and wish to register for particular courses to meet special needs. Normally, an adult special student will not be in residence for an extended period of time, but only so long as it is necessary to secure the information that is specifically desired.

Students who enter the College of Agriculture, Forestry, and Home Economics with the intention to transfer later to the Graduate School should be aware that a student admitted to the Graduate School may petition to transfer to his graduate record only the credits earned in his first academic quarter or summer as an adult or summer special student. Such work must be of graduate caliber and taught by a member of the graduate faculty. If his petition is approved, the student will be granted both residence and credit on his graduate record.

Non-High School Graduates — Write the Office of Admissions and Records for information about entering the University by examination. Also, see the *General Information Bulletin*.

Admission with Advanced Standing — Credits from other accredited colleges and universities and from other colleges of the University of Minnesota which are appropriate for a student's course of study can be transferred to the College of AFHE. These will be evaluated by the Office of Admissions and Records and will be designated as either required or elective credit. A course that is applied toward required credit is considered the equivalent of a specific course required in a curriculum here. Experience has shown that transfer credits for courses taken in agriculture are frequently not applicable to courses offered in the junior and senior years, i.e., to courses numbered 50 or over, in the College of AFHE. You will be expected to complete all required courses here and all area requirements regardless of the number of excess elective credits you may have.

Therefore it is important, in transferring to the College of AFHE, to have planned your earlier programs carefully in order that your credits may apply with the greatest efficiency to the particular curriculum you desire to enter. If you are beginning your work in an institution other than the College of AFHE, and plan to transfer at a later date, refer to the appropriate program section of this bulletin. There you will find descriptions of the curricula and a listing of the required courses for each. You should note especially the requirements for the freshman and sophomore years. Your college adviser will help you select courses that will meet specific curricular requirements, and if you need further help you may write directly to the Office of Admissions and Records on the St. Paul Campus.

Transfer of Credit in Agricultural Courses Taken at Minnesota Non-Land Grant Colleges — Blanket approval will not be given for transfer of credit in agricultural courses from non-land grant institutions. Rather, transfer of credit will be considered on an individual basis.

Recommendation on transfer of credit will be made by the appropriate department of the University of Minnesota to the Student Scholastic Standing Committee of the College of AFHE.

Appraisal of the accomplishment of the student shall be based upon information concerning the course, including course outline and objectives, to be secured from the offering institution, personal contact with the student, and a review of the course examinations written by the student. When the information at hand does not permit the department to make a judgment with respect to the level and quality of preparation of the student, validating examinations may be administered.

Transfer of credit in courses in agriculture taken in non-land grant institutions shall be limited to introductory courses, or those representative of the first courses in a departmental offering. The special examination for credit will be utilized by students seeking credit in areas covered by advanced courses in agriculture.

Transfer of Credit from General Extension Division — Transfer of credits and grades for courses taken through the programs of the General Extension

General Information

Division of the University of Minnesota to your permanent record may be accomplished through submission of a petition requesting such action to the College of AFHE Student Scholastic Standing Committee.

Examination upon Entrance — If you are a new student you are expected to have completed the American College Testing program and the Minnesota High School Statewide Testing program. These may be taken at the time of registration if not completed previously. Other examinations given at entrance will test your aptitude and achievement in English. Your admission to the University will not depend upon the results of these examinations if you are otherwise qualified.

Human Rights — The University of Minnesota is guided by the principle that there shall be no differences in the treatment of persons because of race, creed, color, or national origin and that equal opportunity and access to facilities shall be available to all. This principle is particularly applicable in the admission of students in all colleges, and in their academic pursuits. It is also applicable in University-owned or University-approved housing, in food services, student unions, extracurricular activities, and all other student services. It is a guiding policy in the employment of students either by the University or by outsiders through the University and in the employment of faculty and civil service staff.

Scholarships and Other Financial Aids

Students entering as freshmen in the College of AFHE may apply for all University freshman scholarships, and also for scholarships specific to the college or to certain curricula in the college. All applications are submitted on an application for financial aid to be sent to the Office of Student Financial Aid, 107 Armory, University of Minnesota, Minneapolis, Minnesota 55455. The University of Minnesota scholarship program is coordinated through the College Scholarship Service with headquarters in Princeton, New Jersey; consequently the parents of each applicant must submit the Parents' Confidential Statement. The forms referred to are available at the high school principal's or counselor's office. Scholarship information is sent to all Minnesota high schools in early October of each year, and prospective students should consult with their high school principals concerning them, or correspond directly with the Office of Student Financial Aid (Minneapolis Campus), or with the College Office, College of AFHE, 215 Coffey Hall, University of Minnesota, St. Paul, Minnesota 55101. Applicants should note the need for early submission of applications and conform to the established deadline date. (Generally the deadline is December 15 for scholarships that will be available the following fall.)

Additional scholarships or awards are distributed periodically to students in residence on the basis of specified criteria.

Selection of recipients for most scholarships is based upon academic aptitude, vocational promise, personal attributes, leadership, and, for most but not all of the scholarships, upon financial need.

The Registration Process

Working with Your Faculty Adviser — Upon entry into the college you will be assigned a faculty adviser on the basis of the curriculum you choose from among the several offered in agriculture. He will interpret the curriculum to you, will guide you in planning your program each quarter, and will be concerned about your general progress. Before you see your adviser at registration time, you should study curriculum requirements, course listings, and descriptions, and develop a tentative program with the aid of the *Class Schedule*.

Curriculum and Departmental Relationships — The curricula in agricultural science and industries, biological and physical sciences in agriculture, and resource and community development are interdepartmental offerings. In each of these curricula you may select one of several majors and areas of emphasis at the time you qualify for junior classification.

Attention to Curriculum Requirements — It is your responsibility to know and meet all requirements prescribed for graduation in the curriculum you select. This includes the all-college, major, and, where applicable, the area of emphasis requirements. If you have questions relative to any requirements, consult your faculty adviser.

Declaring the Major and Specialization or Area of Emphasis — In your sophomore year, after you have completed the equivalent of 5 quarters of residence, you are required to submit to the Office of Admissions and Records a specialization form (available from your adviser or the Office of Admissions and Records) which has been approved and signed by your adviser. On this form you will indicate your choice of a major and specialization or area of emphasis where applicable, or one of the outlined curricula. If this specialization form is not filed at the designated time, your registration may be withheld.

The major and specialization or area of emphasis sequence or the outlined curriculum, as indicated on your specialization form, becomes your curriculum required for graduation. Copies of the approved curriculum are sent to you, to your adviser, and to the Student Scholastic Standing Committee. Should the major be changed to a different field of work, a new adviser must be selected and your specialization form resubmitted, after obtaining approval of your adviser.

Registration and Class Attendance

Fees — For information about fees, see the *General Information Bulletin*.

Quantity of Work — The normal load of work for each quarter is 14 to 18 credit hours. A credit hour requires on the average 3 hours each week. These may be distributed as follows: 1 hour of lecture or recitation requiring 2 hours of preparation; 2 laboratory periods requiring 1 hour of preparation; or 3 laboratory periods requiring no outside preparation. Student programs in the College of AFHE may vary in load according to the student's ability or circumstance. To carry more than 18 hours of credit, you must have a C average (that is, a total grade point average of not less than 2.00). To carry more than 21 hours, you must have a B average in work of the previous

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quarter and must secure permission from the Student Scholastic Standing Committee. An undergraduate must carry 12 credits each quarter in order to be considered a full-time student.

Auditors — The approval of the Student Scholastic Standing Committee, your adviser, and the instructor is necessary if you wish to register for a course as an auditor. An auditor must enroll officially for a course and must pay the same fee that is charged in regular membership in the class. He does not take the final examination and is not given a grade or credit for the course.

Changes in Registration — To change your registration you must obtain change of registration forms from the Office of Admissions and Records. Changes should be made only when necessary or highly desirable and they should be made as early as possible in a quarter.

During the first 6 weeks you may cancel a course without grade and with only your adviser's approval. After the sixth calendar week you are required to have the approval of your adviser, the instructor, and the Student Scholastic Standing Committee. However, withdrawal from a course after the sixth calendar week of the quarter is strongly discouraged unless extenuating circumstances exist. *Cancellations within the last 2 weeks prior to the beginning of the quarterly final exam period will seldom be approved.* The instructor must indicate your grade at the time of cancellation. If the grade is passing, you will be permitted to cancel with W on your report, or without grade. If it is failing, this is indicated by a grade of F. *A student who is doing failing work and discontinues attending class after the sixth week but does not officially cancel will also receive a grade of F.*

During the first 3 days of the quarter you may add a course with the approval of your adviser only. After the first 3 days you must have the approval of your adviser, the instructor, and the Student Scholastic Standing Committee.

Cancellation of Entire Registration — If you leave college before the end of the quarter, you should cancel your registration at the time you discontinue attending class. Cancellation within the first 6 weeks entitles you to a refund proportional to the amount of time you attended class. If you do not attend classes at all, you are entitled to a full refund.

Credit by Special Examination or Through Reading Courses — If you wish to secure full credit for a course for which you have adequate training and preparation, you may apply for permission to take a special examination. It may be taken during the first quarter in residence without fee; after that time a fee of \$5 is required. Special examinations in which a grade of C or better is earned are recorded with credit and grade, as part of the student's college record.

You may register for a course as a reading course (individual work) during the quarter in which the course is regularly offered, with the approval of your adviser, the instructor in the course, and the Student Scholastic Standing Committee, under the following conditions:

1. When a course normally offered is canceled because of inadequate registration.

Registration and Class Attendance

2. When, because of conflicts, the student finds it impossible to schedule the course at the time it is offered.

It is assumed that you will complete the work of the course during the quarter in which you are registered for it and take the final examination at the regularly scheduled time.

Credit and Grade Arrangements for Courses Repeated — College of AFHE students may repeat courses in which they have received passing grades. The student who has a grade point deficiency may find that repeating courses in which he has received D grades advantageous, in that the grade and credit for the previous experience are deleted and the grade and credit received upon completion of the course the second time become the record for that course.

Class Attendance — Attendance is compulsory in the College of AFHE for certain classes only, because of the nature of such classes. If you miss class for good reasons beyond your control, you have the privilege of requesting the instructor's assistance in making up the class work you miss. The instructor is under no obligation, however, to give assistance if you wilfully absent yourself from class, although there are situations in which he may properly wish to do so.

The following situations will be accepted by instructors as reasons that would justify absence from class and a request for assistance in making up work: (a) illness certified by the Health Service or by the family physician; (b) emergencies caused by a death or serious illness in the immediate family; (c) absences approved by the Student Scholastic Standing Committee; and (d) participation in University-approved, cocurricular activities (certification that a student was absent from class because he was engaged in such activities will be made by the dean of students).

If you wish to make up work, you should confer directly with the instructor in regard to the justification for your absence and the possibility and ways of making up the class work. The Student Scholastic Standing Committee will enter into the situation only when special emergencies (items b and c above) are involved and as an appeal agency.

Quality Credits — The number of free elective credits required for graduation may be decreased by 1 for each 5 grade points in excess of those required to reach an average of 2.70. Free electives are those you may choose without regard to curricular or all-College requirements. Not more than one-twelfth of the total number of credits required for graduation may be gained through excess grade points.

Mathematics Placement — Initial registration for courses in mathematics will be based on courses taken in high school, the quality of this work, and results on the mathematics section of the American College Test (ACT). A refresher course at extra cost will be required of those students whose background in elementary and higher algebra proves insufficient to permit them to move into advanced courses.

In those programs requiring trigonometry, students with acceptable performance in high school trigonometry will not need to take Math T, Trigonometry, at the college level.

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General Information

Degrees Offered and Their Requirements

Degrees — The college offers curricula leading to degrees as follows: (a) 4-year programs in agriculture leading to the degree of bachelor of science, (b) 4-year bachelor of science degree programs offered jointly with the College of Education (Agricultural Education) and the Institute of Technology (Agricultural Engineering), (c) a 4-year bachelor of agriculture/business administration degree program offered jointly with the School of Business Administration, and (d) a fifth-year program leading to the master of education degree in agricultural education.

Requirements for Graduation

For Bachelor's Degrees — Candidates will be recommended for graduation after completing the following requirements: (a) the prescribed curriculum, including required and elective credits to make the total number of credits required; (b) the Council on Liberal Education (C.L.E.) requirements; (c) an average of 2 grade points per credit — i.e., the cumulative grade point average must be 2.00 or more ($2.00 = C$); for additional quality requirements, see statements of prescribed curricula; (d) requirements for all students as noted (see below); (e) residence and other general University requirements for graduation (see *General Information Bulletin*).

Application for graduation should be made during the third quarter of the junior year in the Office of Admissions and Records.

Graduation with Honors — Undergraduate degrees may be awarded "with distinction" or "with high distinction." If you should fail to meet in full the requirements stated below, your case will be referred to the Student Scholastic Standing Committee for individual consideration.

The degree is granted "with distinction" if you attain a minimum grade point average of 3.00 for the entire curriculum. If you are a transfer student with less than 2 years of work in this college you will not be eligible for graduation with distinction. However, if you complete in this college one-half the number of credits required for graduation in your curriculum, you will satisfy the 2-year residence requirements. Recommendations to the faculty for the degree "with distinction" are made through the Student Scholastic Standing Committee on the basis of scholarship and other evidence of satisfactory achievement and advancement in the course pursued.

Your degree will be granted "with high distinction" if you attain a minimum grade point average of 3.50 for the entire curriculum. The same conditions for residence and recommendation apply as for the degree "with distinction."

If you are completing the curriculum in agricultural education or home economics education, you will be checked for your standing in student teaching as well as for the requirements stated in the curriculum listing.

Requirements for All Students

In addition to the specific requirements of each curriculum, the University of Minnesota believes that all of its students, whatever their area of specializa-

Requirements for All Students

tion or their vocational goals, should hold in common the search for a liberal education. In the broadest sense a liberal education is one which frees us from the limitations placed by ignorance on our powers of judgment and choice. More specifically, a liberal education asks of us that we seek control over the general intellectual instruments for acquiring and communicating knowledge, primarily the instruments of language and number; that we seek understanding of the ways in which scientists contribute to man's knowledge of himself and his environment; that we seek historical and philosophic perspective on the nature of our own lives and the world in which we live; and that we seek appreciation of the creative insights into life and nature provided by literature and the arts.

Rapid and dynamic changes and innovations are constantly occurring in all professions. Only those persons with wide horizons, and with sensitivity and perspective will be able to make the wise value judgments and adjustments required by these changes. By encouraging a liberal education the college hopes to prepare a student to be poised, articulate, and able to communicate his ideas, and to have an appreciation of the value of interpersonal relationships. The college believes that these goals can be encouraged and sought concurrently with the development of technical professional competence in depth in the student's specialty.

To help students achieve the goals of liberal education, the College of Agriculture, Forestry, and Home Economics expects every student to distribute a part of his course work in each of the four categories listed below.

- I. Communication, Language, Symbolic Systems — 18 credits**
 - A. English and Foreign Language Communication Skills
 - B. Linguistics, Rhetoric, Logic, and Philosophic Analysis
 - C. Mathematics
- II. The Physical and Biological Sciences — 15 credits**
 - A. The Physical Universe
 - B. The Biological Universe
- III. Man and Society — 15 credits**
 - A. Analysis of Human Behavior and Institutions
 - B. Development of Civilization: Historical and Philosophical Studies
- IV. Artistic Expression — 9 credits**
 - A. Literature
 - B. The Arts

In category I, students will be expected to take a minimum of 9 credits of freshman communication. This includes Communication I, II, and III (9 credits). Transfer students from other colleges with less than 9 credits in freshman communication or the equivalent will be placed in Communication I, II, or III depending upon their needs as revealed by the diagnostic testing program.

Public speaking and exposition (6 credits) will also be taken by all students. Most students register for Rhet 22, Public Speaking, as sophomores, and for Rhet 51, Exposition, during their junior or senior year. An exemption examination for Rhet 51 is available to students of above-average competence in communication skills. This examination is given once each quarter at a time specified by the Department of Rhetoric. A course in advanced composition taken at some other college cannot be used to satisfy the Rhet 51 requirement.

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Credit from some courses is divided between two categories. For example, credit earned in humanities will be applied one-third to category IIIB and two-thirds to category IVA.

In category III students must have at least 3 credits in subcategory B. Not more than 6 credits in any one discipline (i.e., history, economics, psychology) may be counted toward the category III requirement.

Council on Liberal Education Course List — Following is the list of courses which are particularly suitable for fulfilling the All-University Council on Liberal Education requirements in category III (Man and Society) and category IV (Artistic Expression).

III. Man and Society

A. Analysis of Human Behavior and Institutions

AgEc 1, 2, 3
Anth 1A, 2A, 80, 100, 101, 150, 165
CPsy 80, 81
Econ 1, 2, 20
FamS 1, 1A, 25
Geog 1, 4, 41, 67, 78, 162
Spch 61
Jour 3, 90, 109
Pol A, B, 1, 2, 25, 26, 30
Psy 1, 2
SSci 1, 2, 3, or 51, 52, 53
Soc 1, 1D, 2, 3, 14, 14A, 53

B. Development of Civilization: Historical and Philosophic Studies

Anth 90
Clas 122, 123
History — all courses not requiring prerequisites (Hist 14A-16A)
Languages: Fren 60-61-62, Ital 60-61-62, and Span 60-61-62; Heb 74, 75;
Ortl 76-77
NSci 171-172-173
Pol 40, 60, 61
Phil 3, 50-51-52, 53

IV. Artistic Expression

A. Literature

Clas 1, 2, 3, 4-5-6, 42, 46
Engl 21-22-23, 37-38-39, 52-53-54, 55, 56, 66, 67, 72-73, 74
Foreign language literature courses
Hist 14A-15A-16A
Hum 1-2-3, 4, 1A-2A-3A, 11, 12, 13, 21-22-23, 51-52, 53, 54, 61, 62, 63, 71-72-73
Rhet 31, 32, 33, 34, 35-36-37, 41, 42, 43, 41A, 42A, 43A, 61, 62, 63, 64, 71, 73, 74
Spch 81

B. The Arts

Anth 166
Arch 1, 51, 52, 53
ArtH 1, 2, 3, 4, 5, 47, 50, 56, 57, 58
ArtS 10, 11, 20, 23, 24, 25, 32, 33, 40, 41, 45
Mus 1, 2, 3, 4, 31-32-33, 34-35-36, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49
(see also 11 through 30 for individual instruments)

HEc 20, 21, 120
Spch 3
Th 11, 12, 21, 22, 23

Use of Elective Credits

Withholding Elective Credit from Courses Offered for Graduation— You should consult with your adviser as to your choice of electives. Electives taken by students registered in the College of AFHE may, upon approval of adviser and the Student Scholastic Standing Committee, be omitted from the courses offered for graduation. These electives, in amounts not to exceed 10 credits, may be withheld (from the list of courses counted toward a degree) to raise the grade point average only in instances relating to the securing of junior classification or in meeting the graduation requirement of 2.00. After a course has been withheld from the undergraduate record as authorized above, it shall not be reinstated other than by special examination or through repeating the course.

Limitations on Use of Elective Credit in Physical Education and Music— Students in agriculture are not required to take courses in physical education. Not more than 9 credits in physical education may be counted toward graduation.

A maximum of 9 credits in music may be used as elective credits toward graduation, with not more than 6 of these in Mus 43, 44, 45 or in Concert Band.

Use in the Graduate School of Credits Earned While an Undergraduate

Credits for advanced courses earned while you are an undergraduate, even though in excess of those required for the baccalaureate degree, can be transferred to the Graduate School only under the following conditions:

1. If you lack not more than 9 credits of undergraduate work, taking into account required and sequence courses, you may carry a **limited** amount of graduate work (approved courses **numbered** 100 or above) for graduate credit, such courses not to be applied toward an undergraduate degree. The conditions as stated apply to the beginning of the quarter in which you are taking the courses for graduate credit. In order to hold these credits available for use at the graduate level, a petition must be submitted to the AFHE Student Scholastic Standing Committee at the time of registration for the last quarter, requesting that these specified credits be withheld from the undergraduate transcript. Transfer of credit must be arranged by petition to the Graduate School.
2. If you lack not more than 9 credits for graduation, you may register in the Graduate School.

SECTION II

CURRICULAR PROGRAMS

Students in agriculture in the College of Agriculture, Forestry, and Home Economics possess a wide variety of personal and professional goals. The curricular programs that follow are designed to provide routes toward these different objectives. Each program has identifying characteristics, yet each has much in common with the others. The present all-College requirements in the social sciences and the humanities are included in each curriculum outline, in form appropriate to that recommended by the All-University Council on Liberal Education. Professional content varies with program objectives, and the considerations upon which each program is organized are noted in the material introductory to that program.

The curricula which lead to the bachelor of science degree and the minimum credit requirements are:

1. Agricultural Business Administration — 192 credits
2. Agricultural Science and Industries — 192 credits
With majors in:
 - Agricultural Economics
 - Agricultural Education
 - Animal Science
 - Mechanized Agriculture
 - Plant and Animal Protection
 - Plant and Soil Science
3. Biological and Physical Sciences in Agriculture — 186 credits
With majors in:
 - Animal Science
 - Entomology
 - Food Science
 - Plant and Soil Science
4. Fisheries and Wildlife — 198 credits
5. Food Science and Industries — 186 credits
With areas of emphasis in:
 - Chemistry
 - Industrial Engineering
 - Management
 - Public Health
6. Resource and Community Development — 192 credits
With majors in:
 - Landscape Design and Environmental Planning
 - Recreation Resource Management
 - Resource Economics
 - Soil and Water Resource Management

"Major" designations are listed for Agricultural Science and Industries, Biological and Physical Sciences in Agriculture, and Resource and Community Development Programs. In addition "specialization" designations are listed for Agricultural Science and Industries. The Biological and Physical Sciences in Agriculture, Resource and Community Development, and the Food Science and Industries curricula list "area of emphasis" designations. Since these terms may carry several meanings, the following definitions are provided:

Major — That subject matter grouping at the Upper Division level which, within a program, denotes the general interest area of the student. The major may be developed from courses drawn from one or several departments, with criteria for course selection mainly that the courses utilized in the major relate to each other in meaningful ways and contribute to the achievement of the program objectives.

Specialization or Area of Emphasis — Used to designate that department or area most closely identified with the core interest of the student. The major adviser at the Upper Division level will usually be working in the specialization or area of emphasis. This designation aids in describing the nature of the student's program formulation and will be useful to placement contacts. Certain of the majors at the Upper Division level are not subdivided into specializations or areas of emphasis, while others are.

A. PROGRAMS IN AGRICULTURE

1. Agricultural Business Administration

This program is offered jointly with the School of Business Administration. It is designed to prepare students for employment as managers, administrators, or managerial-related positions in agri-business. Examples of such employment areas are finance, management, marketing, sales management, administration, public and industrial relations, production management, economic and statistical analysis, operations research and reporting, managerial accounting, and transportation analysis. Students may seek employment in the above areas upon receiving the baccalaureate degree or may use this training as preparatory to graduate study leading to research, teaching, and continuing education positions in academic institutions, research agencies, and industry.

The major emphasis is on economic analysis and the business organization and management principles as they relate to agricultural businesses and industries involved in the manufacturing and supplying of inputs to farm production (feed, seed, fertilizers, machinery, equipment, pharmaceuticals), and the assembling, processing, and distribution of food and fiber products. The program includes a professional balance between agricultural economics and business administration with a limited amount of agricultural science. Opportunity exists to elect a variety of courses in the Upper Division to accommodate the varied interests and needs of students as suggested by the range in employment areas outlined above.

Curricular Programs

In the first 2 years students register and pay fees in the College of AFHE. In the last 2 years they register in AFHE and in the School of Business Administration and pay the fees of the latter. At least 90 credits and a grade point average of 2.00 are required for admission to the Upper Division and for joint registration. Students must meet the all-College requirements for graduation from the College of AFHE. Students completing the program, which totals 192 credits, will receive the degree of bachelor of agricultural business administration.

Program Requirements and Suggested Courses for AGRICULTURAL BUSINESS ADMINISTRATION

- A. Communication, Language, Symbolic Systems — 28 credits**
English, Communication (9)
Rhet 1, 2, 3
Public Speaking (3)
Rhet 22
Exposition (6)
Rhet 51 plus 3 credits to be chosen from among 52, 54, 56
Mathematics (10)
College Algebra and Analytic Geometry (5)
Math 10A or Math 15
Introduction to Calculus (5)
Math 40A or Math 42-43
- B. Physical and Biological Sciences — 20-21 credits**
Credits to be selected from the following: BioC 1-2, Biol 1-2, Chem 4-5, Geo 1, MicB 53, Phys 1-2
- C. Man and Society — 15 credits**
Sociology (3)
Soc 1, 1A, 14 or 14A
Psychology (6)
Psy 1, 2
Plus 6 credits in social science areas
Anthropology, history, geography, political science, etc.
- D. Artistic Expression — 9 credits**
Rhet 41, 42, and 43, or courses from complete C.L.E. list of suggested courses
- E. Economic and Accounting Principles — 18 credits**
AgEc 1, 2, 3 (9)
Acct 24, 25, 26 (9)
- F. Quantitative Analysis — 9 credits**
QA 52, 53, 54
- G. Agricultural Science — 20 credits**
Credits to be selected from among at least three departments or two major agricultural science areas other than agricultural economics. These

Agricultural Science and Industries

courses should preferably be general (service) type courses offered specifically for nonmajors in that department or that area.

H. Economic Theory — 9 credits

Econ 65, Econ 66 plus 3 credits to be chosen from among Econ 68, 69, 103A or 104A (67 may be taken by finance oriented students)

I. Agricultural Economics — 27 credits

AgEc 30, 40, 50, 71, plus 6 credits in other agricultural economics

J. Business Administration — 21 credits

BLaw 58, Tran 54, Mgmt 70, ILR 52 plus 9 credits from among the following: Mktg 57, Ins 53, IR 62, BFin 56, Prod 50, Mgmt 60 (Mgmt 60 may be chosen as an elective only if students have taken BFin 56 and Prod 50)

K. Free Electives — 15-16 credits

Recommended electives: PubH 3 or 50, Rhet 52, 54, or 56, selected courses from the C.L.E. general education list of courses, other courses from agricultural economics, economics, and School of Business Administration

TOTAL CREDITS — 192

2. Agricultural Science and Industries

The curriculum in Agricultural Science and Industries includes agricultural and related sciences which serve as preparation for careers in the production, processing, marketing, and distribution of agricultural and horticultural commodities. Most graduates of this program enter some type of commercial employment in agricultural production and related phases of business upon receipt of the bachelor of science degree. The program provides an excellent background for farm operation or farm management.

Some positions illustrative of career opportunities available to graduates of this program include those of field men for agricultural production concerns, landscape and nurserymen, florists, technical sales representatives, information specialists in power machinery and farm structures, agricultural extension, vocational agriculture instruction, regulatory and control activities, various U.S. government services, marketing and distribution specialists, farm managers, and positions in the agricultural credit and finance fields.

Students enrolling in this program will establish a foundation in the biological and physical sciences. This training will permit them to adapt and apply biological, physical, and economic principles to problems encountered in agricultural production and the management of allied industries. Graduates of the Agricultural Science and Industries program can move into graduate study if a wise selection of their electives is made. However, students following this program and deciding late in their undergraduate careers to continue in advanced study may need to take additional course work in selected areas before being admitted to a full graduate program.

Curricular Programs

LOWER DIVISION

Major emphasis in the initial 2 years is directed toward obtaining the background in biological and physical sciences and the skills in communication that are essential to specialized study in agriculture. Additional requirements taken during these 2 years serve to broaden the educational background of the student. The Lower Division years provide the student with an opportunity to evaluate the resources of the Institute of Agriculture with a view to selecting an area of emphasis in the Upper Division. Considerable flexibility in programming is provided in order to accommodate differing levels of preparation, aptitudes, and interests of incoming students.

The courses listed below are considered to be fundamental and necessary to training in agricultural science and must be completed prior to admission to the Upper Division. Some modification in the requirements may be permitted when the student has a definite objective for which substitutions for certain required courses appear desirable.

Program Requirements and Suggested Courses for AGRICULTURAL SCIENCE AND INDUSTRIES (Lower Division)

A. Communication, Language, Symbolic Systems — 17 credits

English, Communication (9)

Rhet 1, 2, 3

Public Speaking (3)

Rhet 22

College Algebra and Analytic Geometry (5)

Math 10

B. Physical and Biological Sciences — 35 credits

General Chemistry (10)

GeCh 4, 5

Organic Chemistry (5) (may be taken in Upper Division)

BioC 1

Biochemistry (4) (may be taken in Upper Division)

BioC 2

Physics (6)

Phys 1, 2

Biology (10)

Biol 1, 2

C. Man and Society — 9 credits

Economics (6)

AgEc 1, 2

Plus a minimum of 3 credits to be taken in Lower Division

See complete C.L.E. list of suggested courses

D. Artistic Expression — 3 credits

See complete C.L.E. list of suggested courses

E. Electives — 26 credits

TOTAL CREDITS — 90

Agricultural Science and Industries

UPPER DIVISION

The Upper Division provides a student the opportunity to specialize in an area of particular interest. At the same time flexibility in programming permits attainment of skills and experience which should better equip the student to make his contribution to society and to his personal well-being once the degree is attained.

Program Requirements and Suggested Courses for
AGRICULTURAL SCIENCE AND INDUSTRIES
(Upper Division)

- A. **Communication, Language, Symbolic Systems — 3 credits**
 - Exposition (3)
 - Rhet 51
 - B. **Physical and Biological Sciences — 5 credits**
 - Microbiology (5)
 - MicB 53
 - C. **Man and Society — 6 credits (3 of these credits must be taken in Lower Division)**
 - See complete C.L.E. list of suggested courses
 - D. **Artistic Expression — 6 credits**
 - See complete C.L.E. list of suggested courses
- TOTAL CREDITS FOR PROGRAM — 192**

THE MAJOR

In addition to the general and specific requirements previously listed for the Lower Division and Upper Division, a student will complete a major in an area of his interest. A minimum of 36 credits is required for a major. The pattern of study developed to achieve this minimum requirement may be made up of courses selected from separate disciplines, but must clearly form a coherent program contributory to a balanced training in the student's chosen area of interest. A random assortment of courses originating in several disciplines would not meet this requirement. Majors may be selected from among the fields described below. Areas of emphasis within the major permit greater concentration of study in specialized disciplines.

Agricultural Economics

Students who plan to work in areas of agricultural production or processing where a rather extensive knowledge of the technical phases of the work is involved, but who expect to work on economic or business management aspects will find a concentration in agricultural economics to be useful. (Students who expect that the major part of their employment will involve business management and who need little more training in technical agriculture will find that the curriculum in Agricultural Business Administration will be more suitable. Either program will be suitable for students who plan to pursue graduate work in agricultural economics.) No areas of emphasis are designated

Curricular Programs

within the major of agricultural economics; the variations in interests and needs of different students can be met by changes in courses scheduled for the major. The requirements for the program will be developed largely for the individual student. In general, however, the program of work should include at least 9 credits in principles of economics, 6 credits in prices and marketing, 3 credits in accounting, 3 credits in statistics, and in addition, at least 27 credits in agricultural science to be selected from among at least three departments or major agricultural science areas other than agricultural economics.

Agricultural Education

The agricultural education major, offered jointly with the College of Education, is designed for students who plan to teach agriculture or horticulture in public schools, area vocational technical schools, and junior colleges in the communities of Minnesota. Agricultural extension workers and others preparing for professional careers in agriculture or for farming, may find the agricultural education major appropriate to their needs. Agricultural education provides comprehensive training in technical agriculture and permits emphasis in such fields as animal science, agronomy, agricultural economics, horticulture, soils, and mechanized agriculture. In addition, it offers the special training in education needed to qualify students for certification as agriculture or horticulture instructors.

In the third quarter of the sophomore year, students should make application for joint registration in the combined curricula of the College of Education and the College of Agriculture, Forestry, and Home Economics. To be eligible for joint registration a student must have a GPA in technical agriculture courses of 2.30 and an over-all GPA of 2.00. In addition to grade requirements, speech, health, and psychological clearances must be obtained and a satisfactory recommendation received from the student's adviser and others.

Students wishing to major in agricultural education must:

1. Have satisfactory agricultural or horticultural background.
2. Complete the student teaching requirement.
3. Earn a minimum of 204 credits for graduation (200 credits for the horticultural specialization). A minimum of 80 credits must be in technical agriculture.
4. Complete the following courses (students may wish to take exemption examinations or special examinations for credit in certain of the listed required courses) in addition to the minimum C.L.E. requirements listed for the Agricultural Science and Industries Curriculum.

COMMON REQUIREMENTS FOR ALL AGRICULTURAL EDUCATION SPECIALIZATIONS

Education and Related Courses

Psy 1, 2 — General Psychology
Ed 55B — Introduction to Secondary
School Teaching

PubH 5 (or 50) — Individual, Public
Health

AgEd 1 — Introduction to Agricultural
Education

Agricultural Science and Industries

AgEd 20 — Rural Education, Community Leadership
AgEd 56 — Rural Education Through Extension Methods
AgEd 81 — Teaching Agriculture in Public Schools
AgEd 91 — Student Teaching
AgEd 104 — Planning Programs

Technical Agriculture Courses

Soil 19 — Introduction to Soil Science
PIPa 1 (or 51) — Introduction to Plant Pathology
Hort 1 — General Horticulture
Ent 5 — Economic Entomology

SPECIFIC REQUIREMENTS FOR HORTICULTURAL EDUCATION SPECIALIZATION

Education and Related Courses

EdCI 104 (or AgEd 103) — Adult Education Student teaching may be arranged from 6-10 credits

Technical Agriculture

PIPh 91, 91A — Survey of Plant Physiology
Ent 56 (may be substituted for Ent 5) — Forest Entomology

MeAg 45 — Engines and Tractors
Hort 16 — Greenhouse Management
Hort 36 — Plant Propagation
18 additional credits in horticulture

Recommended Electives:

MeAg 3, 12, 42, 55, 64, 84, 130
AgEc 40
Mktg 57

For admission to the College of Education the student must have an overall GPA of at least 2.00 and a 2.30 GPA in technical agriculture courses in the following areas: entomology, forestry, horticulture, mechanized agriculture, plant pathology, agricultural economics, and soils.

Students must have had adequate experience in horticulture prior to enrollment or they must be employed the equivalent of 3 months full time in an appropriate occupation before receiving the B.S. degree.

SPECIAL REQUIREMENTS FOR AGRICULTURAL EDUCATION SPECIALIZATION

Education and Related Courses

AgEd 101 — Young Farmer Education in Agriculture
AgEd 103 — Adult Education in Agriculture

Technical Agriculture Courses

AnSc 1 — Introduction to Animal Science
AnSc 30 — Milk Production
AnSc 44 — Principles of Livestock Management
Agro 19 — Principles of Agronomy
Horticulture (may substitute Hort 6 or 32 for Hort 1)
MeAg 4 — Agricultural Shop — Metalwork
MeAg 130 — Instructional Methods in Farm Mechanics
9 credits selected from:
MeAg 7 — Farm Building Construction
MeAg 12 & 12A — Agricultural Machinery
MeAg 45 & 45A — Engines, Tractors

MeAg 55 — Electricity in Agriculture
MeAg 64 — Rural Sanitation, Water Supply
MeAg 65 — Materials Handling on the Farmstead
MeAg 84 — Hydrology, Erosion Control

Recommended electives

Soils: 51, 53, 54, 123, 132
Agronomy: 51, 52, 53, 101, 135
Horticulture: 10, 16, 21, 22, 23, 24, 36, 41, 74, 91, 142
Animal Science: 2, 20, 31, 32, 33, 45, 50, 53, 54, 56, 111, 163, 164, 165, 166, 167
Veterinary Medicine: 52
Agricultural Economics: 30, 40, 50, 56, 71, 144
Food Science: 10
Forestry: 10
Agricultural Journalism: 53

To be admitted to the College of Education the student must achieve a GPA of at least 2.30 in technical agriculture courses in the following areas: agricultural economics, agronomy, animal science, entomology, food science,

Curricular Programs

forestry, horticulture, agricultural journalism, mechanized agriculture, plant pathology, soils, and veterinary medicine.

Other Specific Requirements — As a requirement for student teaching and as a minimum qualification for graduation a student must achieve a GPA of 2.30 in courses taken in the areas identified as technical agriculture for purposes of admission to the College of Education.

Students in the *agricultural education* specialization must have 204 credits to graduate; those in the *horticultural education* specialization must have at least 200. A minimum overall GPA of 2.00 is required for graduation.

Supporting Fields in Agriculture for Agricultural Education Majors — Students majoring in agricultural education may choose to concentrate in supporting courses in an agriculture department. Such a supporting field consists of 18 credits exclusive of introductory courses. For courses approved as supporting fields in agriculture, consult the various agriculture departments. For minors in high school teaching subjects, see the *College of Education Bulletin*.

A Supporting Field in Agricultural Education for College of AFHE Students — A supporting field in agricultural education is open to students majoring in the Agricultural Science and Industries curriculum. Students selecting a supporting field in agricultural education will not obtain a pattern of courses that will permit their being recommended for a teaching certificate.

It is recommended that Psy 1 and 2 be completed before entering the supporting sequence. A minimum of 18 credits may be selected from the following: AgEd 20, 56, 81, 101, 103, 104, 121, 141, 144, 145, 171. Other courses may be supported and approved by the adviser in agricultural education.

Animal Science

Students electing animal science as a major may choose a broad program or a program closely related to a single subject matter area. Beginning professional courses emphasize principles of nutrition, physiology, genetics, and management that apply to all species. Courses required of all majors are: AnSc 1, 32, 45, 52, 53 or 54, 56, 130 and one 3-credit production course.

Mechanized Agriculture

The mechanized agriculture program provides education and training in a field which encompasses the utilization of machines, structures, and equipment in the management of water, soils, plants, and animals for the production, processing, storage, and marketing of agricultural products. The program is a combination of management and agricultural technology, and draws upon the fields of agricultural engineering, plant and soil science, agricultural economics, and animal science to provide a broad training for the student. Because of the broad scope of the field, a student should consult with his adviser as soon as possible to plan a program of study.

In consultation with his adviser, each student will plan a program of study to suit his individual needs and interests. The area of emphasis for one's program may be (a) agricultural power and machinery, (b) soil and water manage-

Biological and Physical Sciences in Agriculture

ment, (c) agricultural structures and processing or (d) a combined subject matter area drawing from two or more of the preceding areas.

Each student in mechanized agriculture will complete a program of 30 or more credits within his area of emphasis, including related courses in other departments. The program must include 12 or more credits of Upper Division mechanized agriculture courses. Also, it must include at least 6 credits of plant and soil science, 6 credits of animal science, and 6 credits of agricultural economics beyond the general requirements of AgEc 1 and 2.

Plant and Animal Protection

Students interested in studies emphasizing problems relating to insects, weeds, and diseases in plant and animal production may elect plant and animal protection as their major. No areas of emphasis will be designated within this major. Changes in courses scheduled for the major will be made to accommodate student needs and interests. Courses required by all students in this major include: plant pathology (6 credits); entomology (17 credits); veterinary medicine (5 credits); agronomy (3 credits); and soil science (3 credits).

Plant and Soil Science

Students whose major interests lie in the production, management, and improvement of field and horticultural crops and/or in the area of soil and water management, conservation, fertility, or morphology and mapping should elect plant and soil science as their major. Required courses in this area are designed to give students a broad basic understanding of plant and soil science. A course in genetics, soil science, plant physiology, biometrics, and plant pathology is required of all students in this major. Students should select an area of specialization from among the following in which to pursue their studies: agronomy and plant genetics, horticultural science, soil science.

3. Biological and Physical Sciences in Agriculture

This program is designed to provide a thorough preparation in biological and physical sciences for professional opportunities that are available at the Bachelor's degree level, to provide a broad and fundamental scientific base, to prepare a student for graduate studies, and to provide a sound base for appreciation of cultural, socio-economic, and international problems involving science in agriculture.

A student in this program will have opportunity to explore the several specialized disciplines in agricultural biology and physical science. He will acquire a scientific base sufficiently sound as to permit him to adjust to many professional pursuits if he chooses to terminate his education with a Bachelor's degree. This program will enable the graduate to perform as a laboratory or field technician and junior scientist. It will also orient him to the technical aspects of products should he choose, for example, technical sales or development work with agricultural chemicals, feeds, fertilizers, and/or other products.

Curricular Programs

This program has a central objective of preparing a student for graduate work. Its emphasis upon the biological and physical sciences will permit the student to move immediately from the B.S. degree into a graduate program in plant science, soil science, animal science, food technology, biochemistry, biometrics, genetics, microbiology, nutrition, and other areas. The undergraduate program does, therefore, give emphasis to mathematics, physics, chemistry, botany, zoology, microbiology, and genetics.

The program desires to provide the graduate with an awareness of the impact of agriculture on human activities. Hence the general education aspects of the curriculum are considered to be of basic importance in achieving curriculum objectives.

Program Requirements and Suggested Courses for BIOLOGICAL AND PHYSICAL SCIENCES IN AGRICULTURE (Lower Division)

A. Communication, Language, Symbolic Systems — 22 credits

English, Communication (9)

Rhet 1, 2, 3

Public Speaking (3)

Rhet 22

Mathematics

College Algebra (5)

Math 15

Introduction to Calculus (5)

Math 40A

B. Physical and Biological Sciences — 54-55 credits

General Chemistry (14)

GeCh 4, 5, 6

Organic Chemistry (10)

OrCh 61, 62

Biology (10)

Biol 1, 2

Physiology (select 1 of the following):

Introduction to Plant Physiology (5)

PIPh 91, 91A

Systemic Physiology (6)

AnSc 45 (VPP 45)

Physics (15)

Phys 4, 5, 6

C. Man and Society — 9 credits

Economics (6)

AgEc 1, 2

Plus at least 3 credits in social science areas

Anthropology, history, geography, political science, etc.

Biological and Physical Sciences in Agriculture

D. Artistic Expression — 6 credits

Humanities (6)
Rhet 41, 42, 43

Pre-veterinary medicine students who plan to complete the minimum requirements for admission to the College of Veterinary Medicine in 2 years should follow the Lower Division requirements with the following modifications:

1. Add AnCh 57A and B (5 credits).
2. Add 3 credits of artistic expression to make a total of 9 credits.
3. Delete Math 40A, PIPh 91, 91A, (additional math is encouraged but not required).
4. May substitute Phys 1, 1A, 2, 2A, 3, 3A for Phys 4, 5, 6.

Program Requirements and Suggested Courses for BIOLOGICAL AND PHYSICAL SCIENCES IN AGRICULTURE (Upper Division)

A. Communication, Language, Symbolic Systems — 22 credits

Exposition (3)
Rhet 51

Foreign Language (9) (optional but highly recommended)
Any foreign language at the beginning or intermediate level

Mathematics (select one of the following sequences):

Analytic Geometry and Calculus (10)
Math 43, 44¹

Statistical Analysis (10)
Biom 100, 101

B. Physical and Biological Sciences — 25 credits

General Microbiology (5)
MicB 53

Genetics (3)
Gen 66

General Physiology (5)
Biol 110, 111

Biochemistry (8)
BioC 51, 52²

Introductory Soil Science (4)
Soil 19

¹ Students planning to enter the Graduate School should take Math 43, 44.

² Students who plan to take biochemistry as a minor in graduate programs are advised to substitute analytical chemistry, physical chemistry, or additional organic chemistry for BioC 51-52.

Curricular Programs

C. Man and Society — 6 credits

(See C.L.E. list of suggested courses)

D. Artistic Expression — 3 credits

(Completion of Rhet 41, 42, 43 sequence)

E. Technical Electives — 39-40 credits

The technical electives must be used to satisfy the requirements of the major and areas of emphasis (animal science, plant and soil science, or food science) as developed in consultation with department adviser.

TOTAL CREDITS FOR PROGRAM — 186

4. Fisheries and Wildlife

The fisheries and wildlife majors are designed to provide the student with essential basic training in the biological and physical sciences and related disciplines which provide the broad background necessary for work in the respective professional fields. The student should recognize that completion of these curricula satisfies only the minimum requirement for professional career employment in fisheries and/or wildlife. The Master's degree, requiring additional graduate study, is desired if not required for many management or administrative and for most research positions. Further graduate study leading to the doctor of philosophy (Ph.D.) degree may be required for some research positions and is essential for teaching at the college level. The qualified student is advised to include at least some graduate-level study in his basic educational program.

REQUIREMENTS

Credit and Course Requirements — These curricula require 198 credits for graduation. Course requirements are basically the same for both majors in the Lower Division (freshman and sophomore years), but all students must complete the courses listed for the desired major, *either fisheries or wildlife*, in the Upper Division (junior and senior years). A Graduate Study Preparation Option is available in fisheries (see page 30). Courses should be taken as scheduled according to class year as closely as possible.

College *Man and Society* Requirement — 15 credits in the social sciences, not more than 6 credits in any one discipline to be applied. See *Man and Society* requirement.

College *Artistic Expression* Requirement — 9 credits in humanities, literature, and the arts. The Rhet 41, 42, 43 sequence, offered on the St. Paul Campus, will satisfy this requirement. See *Artistic Expression* requirement.

Summer Field Requirement — A summer field activity is required, usually between the junior and senior years. This may consist of attendance at a field biological station (such as the Lake Itasca Forestry and Biological Session), a summer job with a conservation or fish and wildlife agency, or equivalent.

Program Requirements and Required Courses for
FISHERIES AND WILDLIFE
(Lower Division)

A. Communication, Language, Symbolic Systems — 22 credits

English, Communication (9)

Rhet 1, 2, 3

Public Speaking (3)

Rhet 22

College Algebra (5)

Math 10

Calculus (5)

Math 40A or 42

B. Physical and Biological Sciences — 52 credits

Fisheries and Wildlife Orientation (0)

FW 1

Biology (10)

Biol 1, 2

General Chemistry (10)

GeCh 4, 5

Geology (5)

Geo 1

Physics (12)

Phys 1-1A, 2-2A, 3-3A

Soils (4)

Soil 19

Genetics (3)

GCB 66

Ecology (3)

Ecol 50

Anatomy (5)

VAna 20 or 120

C. Man and Society — 12 credits

Economics (6)

AgEc 1, 2

American Government, Politics (6)

Pol 1, 2

D. Artistic Expression — 6 credits

See complete C.L.E. list of suggested courses

TOTAL CREDITS — 92

Program Requirements and Required Courses for
FISHERIES
(Upper Division)

A. Communication, Language, Symbolic Systems — 8 credits

Exposition (3)

Rhet 51

Curricular Programs

Statistics (5)
Biom 100

B. Physical and Biological Sciences — 55-56 credits

Advanced Chemistry (9)
GeCh 6
AnCh 57A, 57B

Algae (5)
Bot 150 or 155¹

Limnology (4-5)
Ecol 128 or 119¹

Entomology (5)
Ent 74 or 59¹

Invertebrate Biology (5)
Zool 71 or 72¹ or Ent 129¹

Ichthyology (3)
Zool 121

Microbiology (5)
MicB 53

Animal Physiology (6)
AnSc 45

Fisheries and Wildlife (13)
FW 151, 152, 153, 178

C. Man and Society — 3 credits

See complete C.L.E. list of suggested courses

D. Artistic Expression — 3 credits

See complete C.L.E. list of suggested courses

E. Other requirements — 7 credits

Technical Drawing (3)
MeAg 3

Surveying (4)
MeAg 42

F. Electives — 29-30 credits

Recommended elective courses in fisheries: Biol 82 (Field Biology); Biom 110 (Computers); Bot 91, 91A (Plant Physiology); Bot 112¹ (Aquatic Plants); Bot 131 (Ecosystems); Bot 152¹ (Ecology of Algae); FW 180 (Seminar); For 116 (Recreation Design); For 143 (Recreation Management); GCB 67 (Genetics Lab); MeAg 64 (Sanitation, Water Supply); MeAg 84 (Hydrology, Water Control); MeAg 127 (Radioisotope Measurements); OrCh 61, 62 or BioC 1, 2 (Organic Chemistry, Biochemistry); PIPa 160¹ (Aquatic Fungi); Zool 93 (Animal Parasitology); Zool 116 (Population Dynamics).

¹ Course offered at Lake Itasca Forestry and Biological Station during Summer Session.

Program Requirements and Required Courses for
WILDLIFE
(Upper Division)

A. Communication, Language, Symbolic Systems — 8 credits

- Exposition (3)
Rhet 51
- Statistics (5)
Biom 100

B. Physical and Biological Sciences — 57-62 credits

- Advanced Chemistry (9-10)
OrCh 61, 62 or BioC 1, 2
- Plant Taxonomy (7-8)
Bot 52
Bot 115 or 112¹ or 116¹
- Plant Physiology (3)
Bot 91
- Animal Physiology (6)
AnSc 45
- Mammalogy (4)
FW 77
- Ornithology (5-6)
Zool 75, 76 or Zool 135¹
- Plant Ecology (5)
Ecol 130 or 135¹
- Animal Ecology (3-5)
Ent 118 or Ecol 162¹
- Wildlife Diseases, Parasites (3)
VPaP 103
- Fisheries and Wildlife (12)
FW 161, 162, 178

C. Man and Society — 3 credits

See complete C.L.E. list for suggested courses

D. Artistic Expression — 3 credits

See complete C.L.E. list for suggested courses

E. Other requirements — 4 credits

- Air Photo Interpretation (3)
For 109
- Seminar: Fisheries and Wildlife (1)
FW 180

F. Electives — 26-31 credits

Recommended elective courses in wildlife: AnSc 52 (Animal Nutrition);
AnSc 111 (Physiology of Reproduction); Biol 82 (Field Biology);

¹ Course offered at Lake Itasca Forestry and Biological Station during Summer Session.

Curricular Programs

Biom 110 (Computers); Bot 91A (Plant Physiology Lab); Ecol 128 or 119¹ (Limnology); Ecol 131 (Ecosystems); Ecol 133 (Plant Geography); Ent 74 or 59¹ (Entomology); FW 151 (Fish Populations); For 49 (Dendrology); For 53 or Geog 151 (Climatology); For 100 (Forest Fire); For 105 (Range Management); For 116 (Recreation Design); For 143 (Management of Recreational Lands); GCB 67 (Genetics Lab); Ger 1A, 2A² (Beginning German); Math 43, 44² (Analytic Geometry, Calculus); MeAg 3 (Technical Drawing); MeAg 42 (Surveying); VAna 150 (Embryology); Zool 71 or 72² (Invertebrate); Zool 116 (Population Dynamics); Zool 121 (Ichthyology).

TOTAL CREDITS — 198

GRADUATE STUDY PREPARATION OPTION IN FISHERIES

Students with high competence and whose educational objective is toward research or university teaching may, after completing the Lower Division requirements with a B average, elect the following option in the Upper Division of the fisheries major, intended as preparation for later graduate work leading to the M.S. or Ph.D. degrees. In addition to the specific courses listed below will be a group of supporting courses, the selection of which will be dependent on the student's area of interest and will be determined in consultation with an adviser. The student must satisfy the requirements of either the regular curriculum or the following option, but not a combination of both.

The research problem (FW 193, 194, 195, 196) will consist of: (a) introduction to the scientific method, (b) library literature research, (c) formulation of a hypothesis and experiment design, (d) field work consisting of collection of biological materials and environmental measurements, (e) laboratory analysis of materials or experiment, (f) treatment and presentation of data, and (g) writing a report in a form suitable for publication. The report will be reviewed by a committee consisting of two members of the fisheries faculty and one from another area.

Program Requirements and Required Courses for FISHERIES-GRADUATE STUDY PREPARATION OPTION (Upper Division)

A. Communication, Language, Symbolic Systems — 28 credits

- Exposition (3)
 - Rhet 51
- Statistics (5)
 - Biom 100
- Language (10)
 - Ger 1A, 2A or Russ 1, 2
- Calculus (10)
 - Math 43, 44

¹ Course offered at Lake Itasca Forestry and Biological Station during Summer Session.

² Recommended for students planning to continue with graduate study.

Food Science and Industries

B. Physical and Biological Sciences — 38-39 credits

- Organic Chemistry (10)
OrCh 61, 62
- Microbiology (5)
MicB 53
- Animal Physiology (6)
AnSc 45
- Limnology (4-5)
Ecol 128 or Ecol 119¹
- Fisheries and Wildlife (13)
FW 151, 152, 153, 178

C. Man and Society — 3 credits

See complete C.L.E. list for suggested courses

D. Artistic Expression — 3 credits

See complete C.L.E. list for suggested courses

E. Other Requirements — 11 credits

- Seminar: Fisheries and Wildlife (1)
FW 180
- Research Project (10)
FW 193, 194, 195, 196 in combination

F. Supporting Courses — 22-23 credits

To be planned with the help of adviser. Supporting courses are selected to form an integrated program of course work that directly supports the major of fisheries. Courses may include such subjects as analytic chemistry, aquatic ecology, ichthyology, algae and aquatic plants, entomology, etc.

TOTAL CREDITS — 198

5. Food Science and Industries

Food science and technology is defined by the Institute of Food Technologists as "the application of modern science and engineering to the manufacturing and distribution of food." This necessitates an understanding of the basic principles and techniques of chemistry, nutrition, business, economics, agriculture, engineering, microbiology, public health, and physics, as well as the ability to apply such principles to the processing, storage, and marketing of foods. The food scientist and technologist is concerned with both the theoretical and practical aspects of the food industry from the point of production of the raw material to the ultimate utilization of the finished product by the consumer. Therefore, a curriculum designed to train food scientists and technologists at the college level must strike a balance between theoretical aspects and useful applications of theoretical principles. The former provides

¹ Course offered at Lake Itasca Forestry and Biological Station during Summer Session.

Curricular Programs

a base upon which a graduate builds competence with experience; the latter permits him to enter various fields of employment with a useful orientation to processing problems.

The majority of graduates of this curriculum will accept employment after attaining the B.S. degree. The program will permit superior students to continue into graduate study.

The curriculum has as its basic objective that of providing the student with a liberal and professional education which will lead to a career in one of the many different areas involved in the food industry. Typical placement outlets include industrial food plant management, technical sales and sales management, advertising, quality control, product process research and development, education, public health government regulatory work and work related to foods and nutrition with international agencies. Thus, in addition to a general education, the goal is to provide the student with attitudes, knowledge, and skill essential for an understanding of the scientific, business, and engineering principles involved in the various aspects of food science and the food industry.

The student will acquire the ability to recognize and make a critical analysis of problems of the food industry and to arrive at intelligent solutions to these through the application of the principles of science, engineering, and business. He will be enabled to apply the basic principles involved in food science and technology in one or more of the following commodity areas: cereals, dairy products, fruits and vegetables, meats and poultry products, and possibly others. He will develop a competence in a professional discipline related to the food industry through choosing supplementary courses in such areas as business administration, chemistry, engineering, microbiology, and public health.

Program Requirements and Suggested Courses for FOOD SCIENCE AND INDUSTRIES

A. Communication, Language, Symbolic Systems — 20-25 credits

- English, Communication (9)
 - Rhet 1, 2, 3
- Public Speaking (3)
 - Rhet 22
- Exposition (3)
 - Rhet 51
- College Algebra and Analytic Geometry (5)
 - Math 10
- (and/or) Introduction to Calculus (5)
 - Math 40A

B. Physical and Biological Sciences — 40-47 credits

- General Chemistry (10)
 - GeCh 4, 5
- Organic Chemistry (5)
 - BioC 1
- Biochemistry (4)
 - BioC 2

- Physics (6-10)
Phys 1, 2 or 4, 5
- Biology (7-10)
Biol 1, 2
- General Microbiology (5)
MicB 53
- Public Health (3)
PubH 50

C. Man and Society — 15 credits

See complete C.L.E. list of suggested courses

D. Artistic Expression — 9 credits

See complete C.L.E. list of suggested courses

Most of the courses under categories A and B, except Rhet 51, should be taken during the freshman and sophomore years. Courses referred to under categories C and D should be distributed over all 4 years.

MAJOR COURSE REQUIREMENTS

Students majoring in food science and industries take the following courses:

- | | |
|---|--|
| FScI 50 — Dairy and Food Microbiology (3-5) | FScI 53 — Food Process Engineering (3) |
| FScI 51 — Food Process Chemistry (3-5) | FScI 100 — Seminar: Food Industries Literature (2) |
| FScI 52 — Food Physics (3) | FScI 110 — Sanitation Microbiology (3) |

In addition to the above core courses, a minimum of 15 credits from among the following courses:

- | | |
|---|--|
| FScI 10 — Man's Food (3) | FScI 133 — Meat Chemistry and Processing (4) |
| FScI 22 — Freshman-Sophomore Seminar (0) | FScI 136 — Muscle Chemistry and Physiology (3) |
| FScI 30 — Milk Production (3) | FScI 170 — Special Problems in Food Manufacturing (1-3) |
| FScI 32 — Meat Science (4) | FScI 180 — Special Problems in Dairy and Food Microbiology (1-3) |
| FScI 101 — Principles of Dairy Processing I (4) | FScI 181 — Advanced Dairy and Food Microbiology (3) |
| FScI 102 — Principles of Dairy Processing II (3) | FScI 182 — Advanced Food Chemistry Topics (3) |
| FScI 103 — Principles of Food Dehydration (3) | FScI 190 — International Food Technology (3) |
| FScI 104 — Food Packaging (3) | BioC 53 — Dairy Biochemistry (3) |
| FScI 105 — Sensory Testing of Foods: Theory and Methodology (2) | BioC 63 — Dairy Biochemistry Laboratory (2) |
| FScI 106 — Supervised Industry Practice (3) | |
| FScI 108 — Judging Dairy Products (1) | |
| FScI 121 — Industrial Processing of Fruits and Vegetables (3) | |

AREAS OF EMPHASIS

In addition to the previously defined course requirements, each student must select one of the following areas as well as sufficient electives to meet the 186-credit requirement for graduation.

Curricular Programs

Chemistry

This area of emphasis is designed for the student seeking a more basic and fundamental approach to the chemistry of foods and food processes. The following courses are to be taken in addition to the previously listed requirements:

- GeCh 6 — Principles of Solution Chemistry (4)
OrCh 61, 62 — Elementary Organic Chemistry (10) (replaces BioC 1 and 2 [9])
Math 40A — Calculus (5)
- At least 20 credits to be selected from course offerings in analytical chemistry, physical chemistry, organic chemistry, or biochemistry.

Industrial Engineering

The food industrial engineer is concerned with the application to the food industry of quality control, production programming, inventory control, work simplification, time and motion studies, plant location and layout, technical management, decision-making, and computer use. This area of emphasis is designed for the student with competence and interest in this facet of the food industry. The following courses are to be taken in addition to the previously listed requirements:

- Math 40A — Calculus (5)
Me 99 — Introduction to Engineering Analysis (3)
Stat 90 — Introduction to Probability and Statistics (3)
- At least 20 credits from the industrial engineering courses described in the *Institute of Technology Bulletin*.

Management

This area of emphasis is designed for the student wishing training to meet the problem of the business and economic phases of the various food industries. The following courses are to be taken in addition to the previously listed requirements:

- AgEc 1, 2, 3 — Introduction to Economics, Principles of Macro-Economics, Principles of Micro-Economics (9)
(or) Econ 1, 2 — Principles of Macro-Economics, Principles of Micro-Economics (7)
- Statistics (3-4)
At least 20 credits from course offerings in agricultural economics, economics and business administration.

Public Health

This area of emphasis provides the necessary background for the variety of activities of the sanitarian in either government or industrial employ related to the regulatory and quality control of raw materials and finished products in the food field. At least 20 credits to be selected from offerings of the School of Public Health.

Other Areas

The courses presented for the four areas above may not satisfy the needs of every student. With the aid of his adviser, a student may set up a course of study designed to meet specific requirements in another area of emphasis. Examples include mechanical engineering, microbiology, nutrition, and sales.

6. Resource and Community Development

The program in Resource and Community Development prepares students for careers in resource development: community development; public land use; rural and urban zoning; conservation; recreation; resource economics and sociology; environmental design; and related discipline areas.

Students completing majors in the program are equipped to function in positions with federal, state, county, and local planning, administrative and management agencies. Private planning, banking, recreation, and research organizations also offer career opportunities for graduates. The preparation offered by the different majors also prepares students for continued study at the graduate level.

The program is offered at the institute level, relying on interdisciplinary effort, in an endeavor to focus the complementary discipline areas of agriculture and forestry on planning and administrative training. This relates the traditional specialties of applied resource development and management as well as the social and economic specialties to expanding contemporary needs. In addition to a selected specialty, students acquire a broad background in supporting areas.

In certain cases the specific programs may not meet the needs of the student. In this event, the student in consultation with his adviser may develop a program of special interest in combination with supporting areas such as rural sociology, soil science, or agricultural engineering. Other circumstances may dictate an even broader program where no specialty is selected in which a coherent program in administration and/or planning may be developed on an individual basis.

Landscape Design and Environmental Planning

This curriculum is for students preparing to enter one of the landscape planning professions. Students learn basic concepts of planning and developing outdoor space and natural resources for maximum human utilization. Emphasis is placed on developing a designer sensitive to the biological, ecological, and socio-economic aspects of environmental planning. In addition to the academic program, 6 months' practical experience in landscape design or execution is required for graduation.

Special emphasis is given to the design and development of recreation resources such as national, state, and county parks, national and state forest recreation areas and privately developed recreation facilities. As an integral part of the Resource and Community Development curriculum this program also provides a foundation for employment or advanced studies in community planning and rural development.

Graduates of this program are employed in government agencies, private landscape architecture firms, planning offices, and landscape nurseries. Certain agencies employ them as beginning landscape architects. Because of the increasingly complex demands placed upon the landscape architect in modern society, students completing a 4-year degree program are urged to continue their studies toward a professional landscape architecture degree, either the bachelor of landscape architecture or the master of landscape architecture

Curricular Programs

degree. Graduates in Landscape Design and Environmental Planning seeking the professional degree, bachelor of landscape architecture, may do so by completing 1 additional year of study in the Institute of Technology. Prospective landscape architecture students should know that the professional degree, B.L.A., offered by the Institute of Technology, may be approached by one of three different routes, depending on the interest of the student. These three approaches are through the Institute of Agriculture, the College of Liberal Arts, or the Institute of Technology.

Program Requirements and Suggested Courses for LANDSCAPE DESIGN AND ENVIRONMENTAL PLANNING (Lower Division)

A. Communication, Language, Symbolic Systems — 20 credits

English, Communication (9)

Rhet 1, 2, 3

Public Speaking (3)

Rhet 22

College Algebra and Analytic Geometry (5)

Math 10

Trigonometry (3)

Math T

B. Physical and Biological Sciences — 26 credits

General Chemistry (10)

GeCh 4, 5

Physics (6)

Phys 1, 2

Biology (10)

Biol 1, 2

C. Man and Society — 9 credits

Economics (6)

AgEc 1, 2

Man and Society (3)

See complete C.L.E. list of suggested courses

D. Artistic Expression — 9 credits

Art or Related Art (6)

ArtS 23A, 24A

Landscape Design (3)

Hort 24

E. Agricultural Science — 10 credits

Soils (4)

Soil 19

Horticultural Science (6)

Hort 21, 22

F. Technical Courses — 7 credits

Technical Drawing (3)

MeAg 3

Resource and Community Development

Surveying (4)
MeAg 42

G. Electives — 15 credits

TOTAL LOWER DIVISION CREDITS — 96

(Upper Division)

A. Communication, Language, Symbolic Systems — 3 credits

Exposition (3)
Rhet 51

B. Physical and Biological Sciences — 3 credits

Ecology (3)
Ecol 50

C. Man and Society — 6 credits

Soc 162 or 140

D. Artistic Expression — 12 credits

Humanities (3)
Art or Related Art (6)
Landscape Design (3)
Hort 25

E. Landscape Design — 28 credits

Hort 91, 92, 93, 112, 116, LA 111

F. Landscape Construction — 8 credits

LA 71, Hort 75

G. Agricultural Science — 9 credits

Plant Pathology (4)
PIPa 51
Horticultural Science (5)
Hort 99, 74

H. Resource and Community Development — 10 credits

AgEc 61, RCD 100, 101

I. Electives — 17 credits

AgEc 160, 162, 163; Arch 1; BA 24; BLaw 28; For 11, 143; PIPa 141; Psy 1, 2; Soc 106; Geo 1; MeAg 84; Hort 36, 43, 53, 142, 143, 144; Soil 55, 138; Ent 56; Biom 40; CE 63A

TOTAL UPPER DIVISION CREDITS — 96

TOTAL CREDITS FOR PROGRAM — 192

Recreation Resource Management

The recreation resource management major is designed to train recreation specialists for the broad area of recreation resource planning and management involving land and water areas. The program provides the background neces-

Curricular Programs

sary for participation in the expanding county, regional, state, and federal resource-oriented recreation programs. Students who complete this program may elect graduate study in more specialized training areas.

Program Requirements and Suggested Courses for RECREATION RESOURCE MANAGEMENT (Lower Division)

A. Communication, Language, Symbolic Systems — 17 credits

- English (9)
 - Rhet 1, 2, 3
- Public Speaking (3)
 - Rhet 22
- Mathematics (5)
 - Math 10

B. Physical and Biological Sciences — 44 credits

- Chemistry (10)
 - GeCh 4 and 5
- Biology (10)
 - Biol 1 and 2
- Physics (8)
 - Phys 1, 1A, 2, 2A
- Geology (5)
 - Geo 1
- Soils (4)
 - Soil 19
- Forestry (7)
 - For 11, 49

C. Man and Society — 20 credits

- Sociology (6)
 - Soc 1 or 1A, 2, 3, or Pol 40
- Agricultural Economics or Economics (9)
 - AgEc 1, 2, 3 (or Econ 1, 2, and 65)
- Geography (5)
 - Geog 1 or 4
- Sociology (3)
 - Soc 1

D. Artistic Expression — 12 credits

- Horticultural Science (3)
 - Hort 24
- Other Courses (9)
 - See complete C.L.E. list of suggested courses

E. Technical Drawing — 3 credits

- MeAg 3

TOTAL LOWER DIVISION CREDITS — 96

Resource and Community Development

(Upper Division)

A. Communication, Language, Symbolic Systems — 14 credits

- Exposition (6)
Rhet 51 plus 52, 54, or 56
- Statistics (3)
Biom 40
- Mathematics (5)
Math 40A or 42

B. Physical and Biological Sciences — 8 credits

- Plant Ecology (8)
Ecol 50 and Ecol 130

C. Recreation Resource Management — 22 credits

- Forestry (9)
For 143, and 157, or 161
- Horticultural Science (10)
Hort 22, 91, 116 (Hort-Forestry)
- Fisheries and Wildlife (3)
FW 50

D. Technical Background — 10 credits

- Surveying (4)
MeAg 42
- Aerial Photogrammetry (3)
For 109
- Hydrology (3)
MeAg 84

E. Man and Society — 12 credits

- Psychology (6)
Psy 1, 2
- Recreation (3)
Rec 49
- Sociology (3)
Soc 120

F. Resource and Community Development — 10 credits

- AgEc 61, Soc 162 or 140
- RCD 100, 101

G. Recommended Electives — 20 credits

- AgEc 160, 162, 163; EdCI 105; Jour 112, 131; Phil 151; PubH 75;
Pol 167; Rec 23; For 53, 105, 129, 160; Soc 106; Econ 66; Biom 100;
Zool 119; Ent 162; Soil 55

TOTAL UPPER DIVISION CREDITS — 96

TOTAL CREDITS FOR PROGRAM — 192

Curricular Programs

Resource Economics

The objectives of this program are to provide a curriculum of basic natural and social sciences along with useful analytic technique as preparation for employment on planning commissions, extension services, Soil Conservation Service, and other public and private agencies involved with resource and community development activities. Program participants may also enter graduate programs in agricultural economics, resource development, regional economics, or planning.

Program Requirements and Suggested Courses for RESOURCE ECONOMICS (Lower Division)

A. Communication, Language, Symbolic Systems — 22 credits

- English (9)
Rhet 1, 2, 3
- Public Speaking (3)
Rhet 22
- Mathematics (10)
Math 10A, 40A (or) Math 42, 43

B. Physical and Biological Sciences — 28-29 credits

- Chemistry (10)
GeCh 4 and 5
- Biology (10)
Biol 1 and 2
- Physics, or Geology and Soils (8-9)
Phys 1, 1A, 2, 2A, (or) Geo 1 and Soil 19

C. Man and Society — 18 credits

- Sociology (3)
Soc 1, 1A, 14 or 14A
- Agricultural Economics (9)
AgEc 1, 2, 3
- Other Social Sciences (6)
Social science courses other than in sociology, agricultural economics, or economics

D. Artistic Expression — 9 credits

See complete C.L.E. list of suggested courses

E. Electives — 12-13 credits

TOTAL LOWER DIVISION CREDITS — 90

(Upper Division)

A. Communication, Language, Symbolic Systems — 6 credits

- Exposition (6)
Rhet 51 plus 52 or 54

Resource and Community Development

B. Physical and Biological Sciences — 8 credits

Ecology (8)
Ecol 50, Ecol 130

C. Resource Economics — 36 credits

Agricultural Economics (18)
In agricultural economics, AgEc 25 and 101 may not count toward this requirement; no more than one marketing course beyond AgEc 40 will count toward this requirement; AgEc 162 and 163 are strongly recommended for those who qualify

Economics (15)
Econ 65, 66, 68 and two other courses
Planning (3)
Soc 106

D. Techniques of Analysis — 18 credits

Statistics (9)
QA 52, 53, 54

Other (9)
Choose from among Geog 70, 73, 138, 139, 140; AgEn 42; Law 106; ChEn 113; AgEc 25, 101; Biom 171, 181; Math 43, 44; Phil 2

E. Resource and Community Development — 10 credits

AgEc 61; Soc 162 or 140
RCD 100, 101

F. Electives — 24 credits

Recommended courses: Soc 124, 140, 160, 162; Pol 115, 116, 117, 118; Geog 78, 165, 167, 168, 171, 175; PA 120, 121, 124, 127, 135; PubH 75, 100A, 102; For 11, 109, 123, 129, 131; MeAg 84; Ent 64; Geo 1; Soil 19, 55; Ecol 50; other courses in agricultural economics, mathematics, economics, and statistics.

TOTAL UPPER DIVISION CREDITS — 102

TOTAL CREDITS REGISTERED FOR GRADUATES — 192

Soil and Water Resource Management

The objectives of this program are to prepare students for careers in the management of soil and water resources. The student is trained in the use of these physical resources. Employment possibilities exist for soil and water specialists in rural, urban, and recreational planning; in conservation; in land appraisal; and in other positions involving interpretation and use of soil and water information. Students in this option may be advised in either the Department of Soil Science or Department of Agricultural Engineering.

Program Requirements and Suggested Courses for
SOIL AND WATER RESOURCE MANAGEMENT
(Lower Division)

A. Communication, Language, Symbolic Systems — 22 credits

English, Communication (9)
Rhet 1, 2, 3

Curricular Programs

- Public Speaking (3)
Rhet 22
- Mathematics (10)
Math 10 and 40A or 42

B. Physical and Biological Sciences — 41 credits

- Chemistry (10)
GeCh 4, 5
- Biology (10)
Biol 1, 2
- Physics (12)
Phys 1, 1A, 2, 2A, 3, 3A
- Geology (5)
Geo 1
- Soils (4)
Soil 19

C. Man and Society — 17 credits

- Economics (9)
AgEc 1, 2, 3
- Geography (5)
Geog 1
- Social Science (3)
Soc 1, 14 or 14A

D. Artistic Expression — 6 credits

See complete C.L.E. list of suggested courses

E. Specialized Courses — 7 credits

- Drawing (3)
MeAg 3
- Surveying (4)
MeAg 42

TOTAL LOWER DIVISION CREDITS — 93

(Upper Division)

A. Communication, Language, Symbolic Systems — 3 credits

- Exposition (3)
Rhet 51

B. Physical and Biological Sciences — 5 credits

- Microbiology (5)
MicB 53

C. Artistic Expression — 3 credits

See complete C.L.E. list of suggested courses

D. Resource and Community Development — 10 credits

- AgEc 61, Soc 162 or 140
RCD 100, 101

E. Specialized Courses — 38 credits

Mechanized Agriculture (12)
MeAg 64, 84, 115, 134

Soil Science (17)
Soil 53, 55, 125, 126, 133, 138

Forestry (9)
For 11, 109, 143

F. Recommended Electives — 40 credits

Geo 2, 116; Geog 41, 71, 175; For 148, 157; Biom 40, 100, 101;
AgJo 53; Hort 112; MeAg 174; Ecol 50; CE 53, 164; Ent 64, 65;
AgEc 82, 113, 160, 162, 163; Soc 106; Pol 1, 2, 81, 118; PA 120

TOTAL UPPER DIVISION CREDITS — 99

TOTAL CREDITS FOR PROGRAM — 192

B. CURRICULA RELATING TO AGRICULTURE

(Offered Jointly with Other Colleges and in Which Students Register in Other Colleges)

Agricultural Engineering

Professional 4-Year Curriculum

A professional 4-year curriculum leading to the degree of bachelor of agricultural engineering, B.Ag.E., is offered jointly with the Institute of Technology. Students register in the Institute of Technology. This curriculum has the same basic requirements in the physical sciences as other engineering curricula. However, biological sciences also are included, together with specific agricultural engineering topics, because agricultural engineers develop machines, structures, and practices used primarily with living things.

Additional information can be obtained by writing or visiting the Department of Agricultural Engineering in room 200 Agricultural Engineering Building on the St. Paul Campus.

Curriculum and course details are given in the *Institute of Technology Bulletin*.

Agricultural Journalism

This curriculum is offered jointly by the College of AFHE and the School of Journalism of the College of Liberal Arts. It is intended for those who wish to prepare for any branch of journalism that relates to agriculture or industries closely related to agriculture, such as staff positions on agricultural magazines, newspapers, trade papers, and house organs; editing and writing publications for state and federal departments of agriculture and for experiment stations;

Curricular Programs

serving on public relations and promotion staffs in industry and government; acting as farm service directors for radio and TV stations; and serving on advertising and marketing staffs of mass media agencies or industry.

The student takes general courses in agricultural science, but the emphasis is upon preparation for technical journalism. Stress is laid also upon economic aspects of agriculture.

Students majoring in agricultural journalism usually register in the College of AFHE. Ordinarily they will transfer to the College of Liberal Arts during their senior year. They must have their programs of agricultural subjects approved by the adviser in agricultural journalism for the College of AFHE.

The curriculum requires 180 credits for graduation and leads to the degree of bachelor of arts. Two different programs are available. They are: (1) news-editorial sequence, and (2) advertising sequence. In addition, students may adapt their programs to specialize in science writing, broadcasting, photography, and public relations.

LOWER DIVISION

(Freshman, Sophomore)

General

AgEc 1 — Introduction to Economics (3)
(and) AgEc 2 — Principles of Macroeconomics (3) (and) AgEc 3 — Principles of MicroEconomics (3)

(or) Econ 1-2 — Principles of Economics (8)

Rhet 1-2-3 (9) or Comm 1-2-3 (12) or Engl 1, 2, 3 (9) — Freshman English (Rhet 22 recommended)

Comp 27 or Rhet 51

Hist 23-24 — American History (8)

(or) Hist 80-81 — United States in 20th Century (6)

(or) other suitable American history courses

Pol 1-2 — American Government and Politics (6)

Soc 14 — Rural Sociology (3)

Jour 1 — Introduction to Mass Communication (3)

Jour 5 — Visual Communication (3)

For News-Editorial Sequence

Jour 14 — Reporting (3)

Jour 16 — Mass Communication Law (2)

For Advertising Sequence

Jour 18 — Principles of Advertising (3)

Jour 41 — Publications Editing (3)

Psy 1-2 — General Psychology

Electives in College of AFHE to total 15 credits in addition to AgEc 1-2-3 and Soc 14

Electives to meet College of Liberal Arts distribution and language requirements

UPPER DIVISION

(Junior, Senior)

News-Editorial Sequence

Jour 50 — Interpretive Reporting (3)

AgJo 53 — Publicity (3)

Jour 51 — News Editing (3)

Jour 55 — Newspaper Editing (2) (and)

Jour 56 — Design Typography: Editorial (3)

(or) Jour 60 — Graphic Arts: Processes (3)

Jour 71 — Business and Industrial Journalism (3)

(or) Jour 73 — Magazine Writing (3)

Jour 109 — History of Journalism (3)

(or) Jour 111 — Development of American Broadcasting (3)

Jour 112 — Communication and Public Opinion (3)

Jour 140 — Interpretation of Contemporary Affairs (3)

Advertising Sequence

Jour 57 — Design and Typography; Advertising (3)

(or) Jour 60 — Graphic Arts: Processes (3)

AgJo 53 — Publicity (3)

(or) Jour 78 — Public Relations Methods (3)

Jour 79 — Advertising Copy Writing (5)

Jour 95 — Newspaper Management (3)

Jour 161 — Advertising: Print Media (3)

Jour 162 — Advertising: Radio and Television Media (3)

Jour 164 — Current Advertising Developments and Problems (3)

Enrichment Program in International Affairs

Each of these sequences should include 9 additional elective Upper Division credits in journalism from among the following:

Jour 93 — Community Newspaper (3)	Jour 114 — Mass Communication Theory (3)
AgJo 134 — Rural Communication Media and Media Behavior (3)	Jour 121 — Mass Media in a Dynamic Society (3)
AgJo 135 — Communication in International Agricultural Development (3)	Jour 131 — Public Opinion and Persuasion (3)
Jour 101 — Reporting Public Affairs (3)	(or) others in consultation with adviser
Jour 102 — Science Communication (3)	

Each student must have a minor or enrichment program — 18 credits in agricultural or forestry field of specialization or 9 credits in each of two fields.

Minor or Enrichment Program in Journalism

Students with a specialization in the College of AFHE may select one of several minors or enrichment programs in journalism. The program must be approved by an adviser in agricultural journalism in the College of AFHE. Among the programs are:

Advertising Minor — Jour 1, 18, 41, 57 or 60, AgJo 53 or 78, 79, 161, 162

News-Editorial Minor — 11, 41, 71, or 73, AgJo 53, plus two or more electives in courses in journalism or agricultural journalism. One of these courses should be numbered above 100.

Other specialized enrichment programs are available in science writing, broadcasting, magazine journalism, photography, public relations, and other fields.

Enrichment Program in International Affairs

Many students now preparing themselves for professional careers in agriculture will find themselves employed in the world-wide battle against hunger. Such employment requires sound preparation in a professional field and an understanding of the world. A special curriculum enrichment program is available for students interested in expanding their intellectual horizons in preparation for their professional careers.

A special certificate in international affairs may be earned through selection of appropriate elective courses so as to complete 18 credits in addition to the major and all-college requirements. Your faculty adviser will help you plan a program which will qualify you for the certificate. You should select three areas in each of which you will complete a minimum of 5 credits. One area should be a field in agriculture outside the major field and judged by the adviser to be useful in work abroad. Two other areas should be selected to give a broad international understanding. Courses used to fulfill C.L.E. requirements may be used to satisfy international enrichment requirements if appropriate. The two areas other than agriculture should be selected from among the following: sociology, economics, history, geography, Latin-American studies, Asian studies, a foreign language, business administration, anthropology, and political science.

C. PREVETERINARY MEDICINE

Preparing for a Career in Veterinary Medicine — Preparation for a career in veterinary medicine requires completion of the minimum course requirements of the preprofessional curriculum and the 4-year professional curriculum for the doctor of veterinary medicine (D.V.M.) degree granted by the College of Veterinary Medicine. The preprofessional curriculum can be completed in the College of AFHE with faculty advising provided by the office of the dean of the College of Veterinary Medicine. The preprofessional requirements may also be completed at any accredited college that offers the required courses.

Veterinary medicine is modern medical science applied to animals. The study of veterinary medicine is concerned with gaining a thorough knowledge of the fundamental biological and physical sciences relating to animal functions in health and disease. In the clinical years one correlates and applies this knowledge to the many areas of professional service. With this broad biological knowledge and clinical training, the veterinarian may choose from among many challenging and interesting career opportunities following graduation. Individuals interested in animals and biology can find a position in veterinary medicine that will bring them satisfaction and a rewarding career.

Private Practice of Veterinary Medicine — Of the several fields of work available to veterinarians, private practice is one of the most popular. Following licensing and accreditation, the veterinarian may elect to enter general practice, meaning that all types of animals are cared for, or he may enter a more specialized type of practice and work with only one or two species of animals. In the latter category, veterinarians may be concerned primarily with a special area such as large animal or small animal practice, dairy cattle practice, poultry practice, equine practice, zoo animals, etc.

Public Service and Industry — Almost unlimited opportunities are open to veterinarians as professional specialists, research scientists, and administrators in industry and government.

Veterinary medical knowledge and skill are necessary in the advancement of science and the protection and maintenance of the health of animals and man by such agencies as the Public Health Service, the Department of Agriculture, the Atomic Energy Commission, and the Food and Drug Administration.

All the veterinary medical specialties are needed in programs ranging from space medicine and radiological health to the control of production and use of vaccines and drugs. These programs include the control and eradication of costly animal diseases; the supervision of food processing to provide people with wholesome meat, poultry, and other foods; the investigation and control of diseases, such as rabies, that are transmitted from animal to man; and studies of the comparative medical aspects of diseases. Many opportunities are also available for veterinarians in the rapidly expanding field of laboratory animal medicine.

Industries, particularly pharmaceutical companies, are employing an increasing number of veterinarians to serve as research and development scientists, field specialists, consultants, and executives.

If you would enjoy working with others as a member of a team contribu-

ting to the health and welfare of animals and man, you might consider a veterinary medical career in public service or industry.

An increasing number of veterinarians are taking advantage of graduate study for advanced degrees. On completion of these programs they devote their lives to teaching and research. Research opportunities embrace all of the fields of medical science. There is a growing demand for veterinarians in public and private institutions which support both fundamental and applied research.

Opportunities in the Future — The demand for veterinarians far exceeds the supply. New areas of service are constantly developing and expanding, such as space biomedical programs, comparative medical research, and public health. With the tremendous growth in population, more food-producing animals are needed and the expansion in size of herds and flocks offers new challenges and opportunities.

More families and more children mean a greater number of household pets which will need veterinary medical care. It has been estimated that we will need to increase the number of veterinarians from 22,000 to 47,000 in the United States by the year 1980.

ADMISSION REQUIREMENTS AND SUGGESTED PREPARATION

1. The student must meet the general requirements for admission to the College of AFHE as listed in the *General Information Bulletin*. The following high school units are required for admission: 3 units in English, 3 units in mathematics (1 unit elementary algebra, 1 unit plane geometry and 1 unit higher algebra) and 1 or more units in natural science or agriculture.

2. Completion of trigonometry while in high school is recommended as the student with an acceptable performance will not be required to take trigonometry at the college level.

3. Prospective students are encouraged to include biology, chemistry, and physics in their high school programs.

PREVETERINARY CURRICULUM

A minimum of 90 quarter-credit hours of college level course work is required of all students prior to entrance into the College of Veterinary Medicine. The required areas of study for admission to the College of Veterinary Medicine with the suggested preveterinary courses in the College of AFHE are as follows:

A. Communication, Language, Symbolic Systems — 17-20 credits

English, Communication (9)

Rhet 1, 2, 3

Public Speaking (3)

Rhet 22

Curricular Programs

Mathematics (5-8)

Trigonometry, College Algebra, or equivalent
(number of credits will depend on high school math background)
Math T, 10

B. Physical and Biological Sciences — 51 credits

Chemistry (25-30): General inorganic and qualitative, and organic (not terminal); all courses must include laboratory

General Inorganic (10)

GeCh 4-5

Solution (4)

GeCh 6

Quantitative Analysis (5)

AnCh 57A, 57B

Organic (10)

OrCh 61-62

Physics (12)

Mechanics, Heat, Electricity, Sound, Light (with laboratory)

Phys 1-1A, 2-2A, 3-3A

Biology (10)

General Biology, Zoology, Zoology and Botany (with laboratory)

Biol 1-2

C. Man and Society — 9 or more credits

May be selected from the following areas: agricultural economics or economics, anthropology, geography, history, political science, psychology, social science, or sociology

D. Artistic Expression — 9 or more credits

May be selected from the following areas: art, literature, or music

E. Electives

Sufficient additional electives should be chosen to total 90 quarter credits of college work. These electives may be selected on the basis of the student's interest in a broad educational program. Students planning a career in academic or research fields are encouraged to take additional courses in chemistry, physics, and mathematics. Students lacking experience with farm animals may wish to elect courses in the animal sciences.

HOW TO APPLY FOR ADMISSION TO COLLEGE OF VETERINARY MEDICINE

Application materials are available at the St. Paul Campus Office of Admissions and Records and the application form should be returned to the Office of Admissions and Records not later than November 15 preceding the fall quarter you wish to enter (approximately 1 year before you desire to enter veterinary medicine). The minimum admission requirements may be satisfied before or during the academic year in which the student makes application.

Students applying for admission to the College of Veterinary Medicine compete for the limited number of positions available in the first-year class on the basis of scholastic achievement in the required preveterinary courses,

performance on tests required for admission as well as their interest, character, and personal fitness for a career in the veterinary medical profession.

For more detailed information concerning procedures leading to admission to the professional curriculum, criteria for selection, the facilities of the College of Veterinary Medicine, and the degrees offered by the College of Veterinary Medicine, consult the *College of Veterinary Medicine Bulletin*, or write to the Office of the Dean, College of Veterinary Medicine, University of Minnesota, St. Paul, Minnesota 55101.

SECTION III

COURSE OFFERINGS

Courses in Agriculture

Agricultural Economics (AgEc)

- 1 (1-010). **Introduction to Economics.** The organization and development of our economic system; basic economic concepts in price determination; background for macro-economics. (3 cr)
- 2 (1-020). **Principles of Macro-Economics.** Determinants of national income and employment levels; prices and money; the banking system; monetary and fiscal policy; economic growth and development; the role of government in the economy. (3 cr; prereq 1)
- 3 (1-030). **Principles of Micro-Economics.** Economics of the firm and household; factor and product price determination; theory of production, consumption, and distribution; supply and demand analysis; equilibrium analysis. (3 cr; prereq 2)
- 25 (1-250). **Principles of Accounting.** Fundamentals of business accounting; basic finance concepts; use of accounting data for income tax and managerial decision making. (4 cr; for AFHE students only; prereq soph)
- 30 (1-300). **Agricultural Prices.** Factors determining prices and price trends of agricultural commodities; the demand for and supply of agricultural products; price support and stabilization policies. (3 cr; prereq 3)
- 40 (1-400). **Agricultural Marketing.** Economics of agricultural marketing; organization of markets and marketing enterprises; marketing policy. (3 cr; prereq 3)
- 50 (3-500). **Agricultural Finance.** The elements of money and banking with emphasis on financing the production and marketing of agricultural products; description and analysis of agricultural credit institutions and agencies. (5 cr; prereq 3)
- 56 (3-560). **Micro-Economics of Consumption.** Factors determining the consumption patterns of individuals and families; the contribution of economics and other social sciences to the study of consumer behavior; the use of consumer surveys in market studies. (3 cr; prereq 2)
- 61 (3-610). **Community Resource Development.** Basic concepts of resource use including physical and economic classifications; physical and economic feasibility; benefits and costs; external effects; cost sharing; selected resource use problems. Economic areas and units for planning and development; generating alternative program elements and developing consequences; problems in choosing elements for an optimum resource development program. (3 cr; prereq 3 or #)
- 71 (3-710). **Agricultural Policy.** The application of economic analysis to agricultural policy problems; the allocation of resources within agriculture and between agriculture and the rest of the economy; income distribution in agriculture; historical highlights in U.S. farm policy and the political process. (3 cr; prereq 30 and 40 or Econ 65 and Econ 66 or #)

Agricultural Economics

- 80 (3-800). **Farm Records and Business Analysis.** Analysis of farm records and their role in management of the farm business; types of farm records; calculation of farm earnings by various measures. (4 cr; prereq 3)
- 82 (3-820). **Farm Management Economics.** The use of cost and production theory in farm management; the nature and process of management. (4 cr; prereq 3)
- 95 (1-950). **Undergraduate Seminar: Agricultural Economics.** A survey of current issues in agricultural economics; current research activities. (1 cr; prereq 3 and 3rd qtr soph; offered only on P-N basis)
- 98 (3-980). **Current Issues in Agricultural Economics.** Discussion and analysis of important and timely problems in agricultural economics; primarily for undergraduate AFEA debate preparation. (1-3 cr; prereq #)
- 99 (3-990). **Problems or Independent Study.** Independent study, supervised reading, or research on agricultural economics problems not covered in regularly offered courses. (Cr ar; prereq #)
- 101 (5-010). **Statistical Methods for Social Science.** Application of statistical methods to research in the social sciences; time series analysis, index numbers, multiple regression and correlation, elementary sampling procedures, analysis of variance and covariance. (4 cr; prereq Biom 100 or QA 53 or equiv)
- 111 (5-110). **Agricultural Economic Analysis.** The economic behavior of households, firms, and industries with special applications to agriculture; competition and monopoly power; factors affecting pricing and production decisions. (3 cr; not available to students majoring in agricultural economics; prereq #)
- 112 (5-120). **Agribusiness Management and Marketing.** Business management and marketing problems in the firms and industries serving agriculture; economic interrelationships among industries supplying agriculture and those processing and distributing farm products. (3 cr; not available to students majoring in agricultural economics; prereq 111 or #)
- 113 (5-130). **Land Resource Use.** Land as a factor of production; rural and urban utilization; rents and land values; land classification, taxation, exchange; public land management. (3 cr; not available to students majoring in agricultural economics; prereq 111 or #)
- 128 (5-280). **Marketing Accounting.** Accounting methods of agricultural marketing organizations including cooperatives; preparation, interpretation, and analysis of statements and accounts; use of accounting data by management. (4 cr; prereq 25 or equiv)
- 141 (5-410). **Dairy Marketing.** Principles and problems in milk and dairy product marketing; market institutions and government activities in the dairy sector. (3 cr; prereq 40)
- 142 (5-420). **Fruit and Vegetable Marketing.** (2 cr; prereq 40)
- 143 (5-430). **Grain-Livestock Marketing.** Economic relationships in the feed-livestock-meat sector; institutions and policy problems in the marketing of these closely related commodities. (3 cr; prereq 40)
- 144 (5-440). **Cooperative Organization.** Development of cooperatives in agriculture in the United States and elsewhere; analysis of economic problems of cooperatives, especially marketing cooperatives. (3 cr; prereq 40)
- 148 (5-480). **Commodity Markets and Futures Trading.** Economics of cash and futures trading on organized markets; futures trading theory; hedging and speculation. (3 cr; prereq Econ 65 or #)

Course Offerings

- 151 (5-510). **Agricultural Capital Markets.** Analysis of capital accumulation in agriculture; finance and credit institutions; farm appraisal and agricultural credit policies. (3 cr; prereq 50 or 82 or Econ 65)
- 156 (5-560). **Micro-Economics of Consumption.** Offered jointly with AgEc 56. (3 cr; prereq 2 or #, agricultural economics grads by # only)
- 157 (5-570). **Macro-Economics of Consumption and Distribution.** Trends in U.S. and foreign consumption of food by areas and population groups; market research procedures; concepts and framework for consumption and distribution analysis; food industries and the public. (3 cr; prereq 40 or Econ 66)
- 160 (5-600). **Land Economics.** Land as a factor of production; land use, classification, and value; sale and rental markets for land; domestic and foreign land policies. (3 cr; prereq Econ 65 and 66 or #)
- 162 (5-620). **Regional Economic Analysis.** Basic concepts and theories used and problems encountered in economic study of subregions, including those applicable to space and planning, population and employment change, income estimation and social accounting, industrial location, identification of the planning region, intraregional and interregional analyses, planning goals, and national and regional planning programs. (3 cr; prereq Econ 65)
- 163 (5-630). **Regional Development Systems.** Regional subsystems in resource productivity cycle. Public service delivery subsystems. Public intervention strategies in environmental management. Settlement planning and resource development. (3 cr; prereq 162 or #)
- 171 (5-710). **Agricultural Policy.** Offered jointly with AgEc 71. (3 cr; prereq 30 and 40 or Econ 65 and 66 or #, agricultural economics grads by # only)
- 172 (5-720). **Economics of World Agriculture.** Distribution, quality, and utilization of agricultural resources, agricultural organization and structure; location of agricultural activity; national and international agricultural policies. (3 cr; prereq Econ 65 and 66 or #)
- 175 (5-750). **Agricultural Trade and Commercial Policy.** Patterns of trade in agricultural products; trade policies and practices of export and import nations; commodity agreements; agricultural trade policies of common market areas; negotiations and potential trade developments. (3 cr; prereq Econ 65 and 66)
- 179 (5-790). **Seminar: World Food Supply Problems.** (Same as PIPa 170, Soc 264, VM 150, and HE 172). A multidisciplinary approach will examine the social, economic, and technical problems of feeding the world's growing population. Principles will be sought from the social and economic sciences, the plant sciences, and the animal sciences for their application to food problems. (3 cr; prereq major in agriculture, veterinary medicine, social science field or #, agricultural economics grad by # only)
- 180 (5-800). **Farm Records and Business Analysis.** Same as AgEc 80 plus a special problem. (4 cr; prereq #)
- 183 (5-830). **Farm Planning.** Special problems in farm planning. (3 cr; prereq 82 or #)
- 186 (5-860). **Economics of Agricultural Production.** Production economics applied to agriculture, profitable combination of production factors; comparative advantage and location production. (3 cr; primarily for grad students; prereq 21 cr in economics or agricultural economics)

For Graduate Students Only

- 200-201-202 (8-200/8-201/8-202). **General Seminar: Agricultural Economics**
- 205 (8-205). **Research Methodology in Agricultural Economics**
- 231 (8-231). **Agricultural Prices**
- 245 (8-245). **Agricultural Marketing Economics**
- 264 (8-264). **Resource Economics**
- 273 (8-273). **Agricultural Policy**
- 278 (8-278). **Agricultural and Economic Development**
- 287 (8-287). **Production Economics I**
- 288 (8-288). **Production Economics II**
- 335 (8-335). **Seminar: Price Analysis**
- 344 (8-344). **Seminar: Cooperative Marketing**
- 345 (8-345). **Seminar: Agricultural Marketing**
- 346 (8-346). **Seminar: Law and Agricultural Economics**
- 356 (8-356). **Seminar: Consumption Economics**
- 360 (8-360). **Seminar: Land Economics and Tenure**
- 364 (8-364). **Seminar: Resource and Regional Economics**
- 373 (8-373). **Seminar: Agricultural Policy**
- 378 (8-378). **Seminar: Agricultural Development**
- 382 (8-382). **Seminar: Farm Management and Production Economics**

Agricultural Education (AgEd)

- 1 (1-001). **Introduction to Agricultural Education.** Orientation to employment and service in agricultural education. Qualifications of teachers, survey of preparatory offerings, and an overview of the program of agricultural education in Minnesota. (1 cr; prereq #)
- 20 (1-010). **Rural Education and Community Leadership.** Appraisal of community educational agencies; process of and responsibilities for community leadership; role of the school in the rural community; coordination of the school with nonschool educational agencies. (3 cr)
- 56 (3-020). **Rural Education Through Extension Methods.** Role of the Extension Service in rural education; methods and techniques of instruction in nonschool educational programs. (3 cr; prereq soph)
- 81 (3-030). **Teaching Agriculture in the Secondary School.** Fundamentals of teaching agriculture to high school students; use of the home, farm, and community in structuring courses of study; Future Farmers of America; Vo-Ag Planning and Summary Book; building and utilizing teaching units. (4 cr; prereq Ed 55B or ¶Ed 55B)
- 91 (3-031). **Student Teaching.** Supervised experience in work of agriculture instructor. Includes instruction in development of individual farming programs, contacting parents, program analysis of community needs, conducting classes, com-

Course Offerings

- community activities, Future Farmers, and case studies. (6 cr; prereq sr, 81, Ed 55B, and #)
- 101 (5-040). **Young Farmer Education in Agriculture.** Developing and organizing a continuing program of educational activities for farm youth not in school and not established in an occupation. Coordinating community resources, determining needs, deriving goals and individual plans of procedure for establishment in farming and related occupations. Observation of young farmer programs. (4 cr; prereq sr)
- 103 (5-050). **Adult Education in Agriculture.** Systematic instruction for established farmers. Analysis of the agricultural situation with special emphasis on adoption of appropriate management practices. Determining needs in production, marketing, credit, conservation, etc. Developing a continuing program. Observation of adult education programs. (4 cr; prereq sr)
- 104 (5-060). **Planning Programs.** Developing a program of agricultural education in a community school. Integration with total school program. Administrative relationships and professional improvement. (3 cr; prereq last qtr undergrad regis or #)
- 120° (5-010). **Rural Education and Community Leadership.** Same as AgEd 20, with additional reading and special problem required. (3 cr; prereq grad or #)
- 121 (5-051). **Enterprise Analysis.** Analyzing the farm business as a basis for identifying problems. Planning learning experiences to improve farm management at the high school, young farmer, and adult levels. (3 cr; prereq sr, or #)
- 141 (5-070). **Supervised Farm Practice in Vocational Agriculture.** Selection, planning, supervising, and summarizing of individual farming programs. Adaptation to meet needs of high school F.F.A. students, young farmers, and adults. (3 cr per qtr [total 9 cr]; prereq grad or #, 10 cr in education or #)
- 144 (5-071). **Supervised Occupational Experiences in Agriculture.** The organization and administration of an occupation experience program in agriculture for high schools and area schools. (3 cr)
- 145 (5-032). **The High School Curriculum in Agriculture.** Philosophy, organization, and administration of instruction in agriculture departments in secondary schools. (3 cr; prereq sr, 10 cr in education)
- 156° (5-021). **Rural Education Through Extension Methods.** Same as AgEd 56 with additional reading and special problems required. (3 cr; prereq grad or #)
- 170 (5-090). **Independent Study.** Topics may be chosen to permit study of areas within education or to supplement areas of inquiry not provided in the regular course structure. (1-3 cr; prereq sr or #)
- 171 (5-034). **Procedures in Teaching Agriculture.** Study of new developments in methodology in teaching agriculture. To assess innovations and procedures. Includes consideration of various levels of instruction. (3 cr; prereq #)
- 173 (5-052). **Farm Business Management Education.** Administration, organization, and operation of farm business management education for adults. Development and utilization of curriculum materials based on farm business record data. (3 cr; prereq 103 or #)

For Graduate Students Only

221x (8-091). **Field Problems**

232x (8-001). **Research in Agricultural Education**

250x (8-081). Supervision of Vocational Agriculture

283x (8-082). Organization and Administration of Educational Programs in Agriculture

286 (8-010). Current Issues in Agricultural Education

291x (8-020). Seminar: Agricultural Education

Agricultural Engineering

Students may major in *mechanized agriculture* through either the Agricultural Science and Industries program or the Resource and Community Development program. This curriculum encompasses the utilization of machines, structures, and equipment in the management of water, soils, plants, and animals in the production, processing, storage, and marketing of agricultural products. Students should consult with their advisers during their freshman year to plan the remainder of their program.

A professional 4-year program in *agricultural engineering* is offered jointly with the Institute of Technology. Detailed information on this program is given in the *Institute of Technology Bulletin*. Students normally seek admission to this program through the Institute of Technology, but may enter through the Biological and Physical Sciences in Agriculture program and transfer later to the Institute of Technology.

Mechanized Agriculture (MeAg)

1 (1-000). **Slide Rule Computation.** Basic operations: multiplication, division, square roots, and cube roots. Techniques of computations, powers of 10, and location of decimal points. Use of sine, tangent, and log scales. (1 cr; prereq Math 10 or #; 1 hr per wk)

3 (1-010). **Technical Drawing.** Drafting instruments and their uses. Lettering, scale reading, conventional symbols, tracings, and reproductions. Multiview drawings, pictorial drawings, plats of surveys, and contour maps. (3 cr; 6 lab hrs per wk)

4 (1-020). **Agricultural Shop — Metalwork.** Arc and oxyacetylene welding, soldering, use and conditioning of metalworking tools, and the identification and characteristics of metals used in farm machinery. (4 cr; prereq GeCh 4 or #; 2 lect and 6 lab hrs per wk)

37 (1-600). **Building Construction.** Materials and techniques for construction of light frame buildings. Construction details. Site selection, building layout. (3 cr; prereq Math 10; 2 lect and 3 lab hrs per wk)

42 (1-400). **Surveying.** Use of steel tape, engineers' level, hand level, transit, and plane table for field measurements. Application to topographic surveying and mapping, area determination, and road layout. (4 cr; prereq 3, Math T; 2 lect and 6 lab hrs per wk)

51 (3-200). **Machinery in Agricultural Production.** Principles of machinery selection, operation, performance, components, processes, functions, and management for optimum utilization in agricultural crop production. (3 cr; prereq Phys 1, Math 10, 3 lect hrs per wk)

Course Offerings

- 51A (3-201). Machinery in Agricultural Production Laboratory.** Laboratory problems in principles of machinery selection, operation, performance, processes, functions, and management for optimum utilization in agricultural crop production. (1 cr; prereq 51 or ¶51; 3 lab hrs per wk)
- 57 (3-600). Building Design.** Functional requirements of buildings for livestock production, crop storage, and processing. Ventilation and insulation. Farmstead layout and planning. (3 cr; prereq Phys 2, Math 10; 3 lect hrs per wk)
- 64 (3-400). Rural Sanitation and Water Supply.** Wells, pumps, water supply, and treatment. Water supply and waste disposal systems for homes, farmsteads, resorts, and recreational areas. (3 cr; prereq Phys 1, GeCh 5; 3 lect hrs per wk)
- 67 (3-610). Electricity in Agriculture.** Elementary theory of electricity, circuits, and instruments. Electric motors, heating, and controls. Selection and maintenance of electrical equipment. Electrical safety. (3 cr; prereq Phys 2, Math 10; 2 lect and 2 lab hrs per wk)
- 71 (3-210). Engines and Tractors.** Tractor engines and chassis. Engine cycles, elementary thermodynamics, combustion, fuels, and lubricants. Accessory systems. Chassis mechanics. Traction. (3 cr; prereq Phys 2; 3 lect hrs per wk)
- 71A (3-211). Engines and Tractor Laboratory.** Selected laboratory exercises relating to operating characteristics of engines, fuel properties, and chassis mechanics. (1 cr; prereq 71 or ¶71; 3 lab hrs per wk)
- 84 (3-410). Hydrology, Water Control.** The hydrologic cycle-precipitation, infiltration and runoff. Uniform flow in channels, flow measurement. Estimating peak runoff. Terraces and grass waterways for erosion and sediment control. Water resources and problems. Water control on a watershed basis. (3 cr; prereq Phys 1, Math 10, Soil 18 or 19; 3 lect hrs per wk)
- 106 (5-010). Agricultural Waste Management.** Characteristics of various animal manures, plant materials, and processing wastes. Sanitary collection, storage, treatment, and utilization or disposal of liquid and solid agricultural waste. (3 cr; prereq Phys 1, GeCh 5, Biol 1; 3 lect hrs per wk)
- 115 (5-400). Drainage and Irrigation.** Soil moisture excesses and deficiencies. Theory and design of tile drainage, surface drainage, and sprinkler irrigation systems. Development of irrigation water supplies. Selection of pumps and power units for drainage and irrigation. Economic feasibility. Legal problems and procedures. (3 cr; prereq Phys 1, Math 10, Soil 18 or 19; 3 lect hrs per wk)
- 117 (5-600). Materials Handling.** Planning farmstead material handling systems and components; conveying equipment, metering devices, collection and distribution methods. (3 cr; prereq 3, Phys 1, Math 10; 2 lect hrs and 3 lab hrs per wk)
- 124° (5-200). Agricultural Machinery and Mechanical Power Management.** Machinery and power management and use, and its cost as a factor in agricultural production. Lectures and special problems. (3 cr; prereq 12, 45; hrs ar)
- 127 (5-000). Principles of Radioisotope Measurements.** Theory and technique of radioisotope measurements including atomic and nuclear structure; properties of alpha, beta, and gamma rays; interaction of radiation with matter. Geiger-Muller proportional and scintillation counters. (3 cr; prereq sr, 1 yr physics, Math T; 2 lect and 3 lab hrs per wk)
- 130 (5-020). Program Planning and Instructional Methods in Agricultural Mechanics.** Planning and designing high school vocational agriculture facilities,

Agricultural Engineering

organizing equipment, tools, supplies, and storage as demanded by the instructional program. Administering the agricultural mechanics program. Developing teaching techniques and program planning as related to the student-supervised study programs in mechanized agriculture. (3 cr; prereq 10 cr in mechanized agriculture, AgEd 91, or ¶AgEd 91)

- 131A-B-C-D-E-F (5-030/5-031/5-032/5-033/5-034/5-035).** **Problems and Field Studies in Advanced Agricultural Mechanics.** Principles and practices pertaining to the implementation of instructional programs in agricultural mechanics. Selection, application, operation, service, and maintenance of equipment used in agricultural mechanics as pertaining to the specific instructional program. A: Agricultural Tractor and Engine Power. B: Agricultural Machinery and Mechanization. C: Electrical Power and Processing. D: Farm Buildings and Environment Control. E: Natural Resources Development and Management. F: Metal Fabrication Materials and Techniques. (3 cr per qtr [max 9 cr]; prereq 130 or #)
- 132 (5-040).** **Advanced Methods for Teaching Agricultural Mechanics.** Trends and the role of agricultural mechanics in the mechanization of agriculture. Organization of instructional areas, selection of tools, supplies, reference materials, and facilities. Preparation of instructional materials and methods of effective teaching. Development of teaching demonstrations and procedures. (3 cr; prereq #; 2 lect and 3 lab hrs per wk, off-campus [f, s], campus [1st term SS])
- 134 (5-410).** **Soil and Water Engineering Design Procedures.** Erosion control and water control structures. Field layout and studies of terraces, grass waterways, tile and surface drains, irrigation systems. (3 cr; prereq 42 or ¶42, 84, 115; 1 lect and 6 lab hrs per wk)
- 137° (5-610).** **Special Problems in Farm Buildings.** Individual problems, studies and applications based on work given in prerequisite courses. (2-4 cr; prereq 3, 37 and 57 or #; hrs ar)
- 150 (5-050).** **Analog Computer Techniques.** The principles of analog computers. Emphasis placed on the usefulness to solution of biological problems. Selection of computing technique (analog, digital, and/or hybrid) dependent upon the nature of the problem. Laboratory experience in use is given. (2 cr; lect 1, lab 3; prereq #)
- 171 (5-210).** **Problems in Power and Machinery.** Individual problems in agricultural power and machinery based on work given in prerequisite courses. (2-4 cr; prereq 12 or 45 and #; hrs ar)
- 174° (5-420).** **Problems in Soil and Water Management.** Individual problems in engineering phases of soil and water management, based on work given in prerequisite courses. (2-4 cr; prereq 134; hrs ar)

Agricultural Engineering (AgEn)

The following courses are offered in the Institute of Technology and are open to students in the professional 4-year curriculum and to those having the prerequisite courses. For descriptions of courses see the *Institute of Technology Bulletin*.

- 20. **Introductory Agricultural Engineering.** (3 cr)
- 90. **Soils Engineering.** (3 cr)
- 91. **Design and Management of Agricultural Machinery.** (3 cr)

Course Offerings

- 94. Erosion Control Engineering. (3 cr)
- 97. Agricultural Structures Design. (3 cr)
- 100. Employment Evaluation. (1 cr)
- 121. Agricultural Tractors. (3 cr)
- 124. Drainage and Irrigation Engineering. (3 cr)
- 127. Agricultural Process Engineering. (3 cr)
- 141. Design of Agricultural Machinery. (3 cr)
- 144. Agricultural Structures and Animal Environment. (3 cr)
- 160. Agricultural Engineering Instrumentation. (3 cr)
- 161. Agriculture Machine Analysis. (3 cr)
- 164. Advanced Soil and Water Engineering. (4 cr)
- 165. Watershed Engineering. (3 cr)
- 167. Advanced Agricultural Structures. (3 cr)
- 180. Radioisotope Measurements. (3 cr)
- 181. Problems in Agricultural Engineering: Power and Machinery. (2-4 cr)
- 184. Problems in Agricultural Engineering: Soil and Water. (2-4 cr)
- 187. Problems in Agricultural Engineering: Structures and Processing. (2-4 cr)

For Graduate Students Only

- 200. Seminar
- 211-212-213. Advanced Problems and Research
- 230. Agricultural Engineering Similitude
- 254. Hydrology Modeling — Small Watersheds
- 257. Moisture and Heat Transfer

Agricultural Journalism (AgJo)

- 53 (3-530). **Publicity.** For students planning careers in agriculture, forestry, and home economics, or veterinary medicine or some allied industry in which the cooperation of mass media will be needed. Covers mass media relationships, news and direct mail writing, radio and TV broadcasting, and preparation of visuals. (3 cr; prereq rhet comm req)
- 134 (5-340). **Rural Communication Media and Media Behavior.** Mass media behavior in rural communities; theoretical approaches relevant to problems of rural mass media behavior; analysis of research aimed at adult education efforts through mass media. (3 cr; prereq 53, Psy 2, Soc 14, or #)
- 135 (5-350). **Communications in International Agricultural Development.** For United States and foreign students. Analyzes United States and foreign rural communications as developing tools. Develops ability to plan and execute communication programs in developing nations. (3 cr; prereq 53, or Jour 1 and 14, or #)

Agronomy and Plant Genetics (Agro)

Students whose major interests are in the production, management, or improvement of field crops should elect agronomy as their specialization in a plant and soil science major. Studies in agronomy will prepare students for careers in the production, processing, marketing, and distribution of field crops. Some positions illustrative of career opportunities available to agronomists include those of field men for agricultural chemical, seed, and production companies, technical sales representatives, agricultural extension, crop regulatory and control activities, U.S. government services, and positions in foreign service.

Students enrolling in agronomy will establish a firm background in biological and physical sciences. This training will permit them to adapt and apply biological and physical principles to problems encountered in agronomy. Specific courses of study for a specialization in agronomy will be developed in consultation with an adviser in the Department of Agronomy and Plant Genetics. Technical courses required of all students in agronomy include a course in genetics, soil science, plant physiology, biometrics, and plant pathology.

- 19 (1-010). Principles of Agronomy.** Principles and practices of plant and related sciences as they apply to increasing productivity and improvement of field crops. Emphasis will be placed on selection and improvement through breeding of crop varieties, seeds and seeding, crop growth and development, crop production hazards, and harvest and storage of field crops. Lecture and demonstration. (3 cr)
- 25 (1-020). Special Problems.** Original research or studies in depth in agronomy. This course is intended for students who wish to pursue aspects of agronomy in greater depth than that offered in formal courses, or who wish to investigate areas not presently offered in courses. Tutorial instruction under the guidance of the staff. (1-3 cr; prereq 4)
- 44 (1-100). Morphology and Identification of Crops and Weeds.** The developmental morphology of seeds, seedlings, and plants and the utilization of morphological features of seeds and plants in keys to aid in the identification of crops and weeds of major economic importance in the world. Lecture and laboratory. (3 cr)
- 45 (1-110). Seed Analysis and Grain Grading.** Principles and practice in the evaluation of field crop seeds for purity and quality and in the grading of grain. Lecture and laboratory. (3 cr; prereq 44, or #)
- 50 (3-150). Advanced Seed and Grain Evaluation.** Laboratory practice in identification of crops, weeds, and diseases, and in grain grading and seed analysis. Members of the Intercollegiate Crops Team are selected from this class. (4 cr; prereq 44, 45 recommended, or #)
- 51 (3-010). Adaptation, Distribution, and Selection of Field Crops.** The relationship between crop production and world food supply. Environmental, ecological, and evolutionary factors underlying the adaptation and distribution of major field crops. The improvement of field crops through plant breeding and the production and distribution of seed of improved crop varieties. Field plot technique and data interpretation in relation to evaluation of crop productivity. (3 cr; prereq Biol 2)
- 52 (3-020). Growth, Development, and Protection of Field Crops.** Principles of growth and development of field crops and their regulation to achieve maximum

Course Offerings

- crop productivity. Emphasis will be placed on seeds and seeding, physiological basis of growth and development, growth regulation, effects of environment on growth and development, and crop protection from hazards of weeds, diseases, and insects. Lecture and laboratory. (4 cr; prereq Biol 2, GeCh 5)
- 53 (3-030). **Maturation, Harvest, Storage, and Utilization of Field Crops.** Development of plant organs of economic importance including the synthesis and accumulation of organic constituents in these organs. Harvest of crop plants, estimation of crop maturity, optimum stage of crop development for harvest, and pre- and post-harvest treatments. Crop storage and preservation in moist or dry storage. Crop utilization and marketing. Lecture and laboratory. (4 cr; prereq Biol 2, GeCh 5)
- 77 (3-200). **Seminar.** Investigation through literature review and group discussion of selected topics in agronomy. Major emphasis will be placed on recent advances in agronomy. (1 cr; prereq jr or sr and #)
- 101 (5-010). **Pasture and Grassland Crops.** Interrelationships between plants and animals as they relate to pasture and grassland crops. Nature and extent of grasslands, productivity measurements of natural grasslands, theory and concepts of range management, pasture renovation, systems of grazing management, animal toxicities peculiar to forage crops. Lecture and laboratory. (3 cr)
- 132 (5-020). **Introduction to Plant Breeding.** An introductory course in the application of genetic principles to the improvement of crop plants. (3 cr; prereq Gen 66 or equiv)
- 135 (5-030). **Weed Control.** Survey of the magnitude of the weed problem. Discussion of regulatory aspects of weed control and herbicide usage. Outline of principles and methods of weed control. (3 cr; prereq 19 or #)
- 136 (5-040). **Physiological Basis of Herbicidal Action.** Principles of selectivity and mode of action of herbicides. (3 cr; prereq Biol 2, a course in organic chemistry, in plant physiology or #)
- 175 (5-050). **Physiology of Field Crops.** Physiological and ecological principles as they are applicable to growing field crops, doing field research, and to developing new varieties or cultural practices to take best advantage of the micro-environment in which plants grow. (3 cr; prereq Bot 91, Phys 2 or #)
- PIPh 91 (3-091). **Survey of Plant Physiology.** Physiological principles underlying processes that occur in living plants; emphasis on higher plants. Growth and development, mineral nutrition, water relations and solute metabolism, respiration, and photosynthesis. (3 cr; prereq Biol 2 or 51, GeCh 5 or 25)
- PIPh 91A (3-092). **Plant Physiology Laboratory.** To accompany Bot 91. (2 cr; prereq 91 or #91)
- PIPh 182f (5-182). **Plant Physiology.** The plant cell and its organelles, metabolism including photosynthesis, and genetic control of physiological processes; dynamic aspects of these processes. (3 cr; prereq a course in biochemistry)
- PIPh 183w (5-183). **Plant Physiology.** Membrane phenomena, water relations, mineral metabolism, and translocation in plants. (3 cr; prereq Biol 2 or 51, OrCh 42 or 62, physics)
- PIPh 184s (5-184). **Plant Physiology.** Growth of higher plants, including regulation by hormones, light, and temperature. (3 cr; prereq Biol 2 or 51, OrCh 62, physics)
- PIPh 186A,B,C (5-701, 5-702, 5-703). **Measurement of Plant-Environment Interactions.** A laboratory course dealing with measurements using intact plants,

including water balance, plant-radiation interactions, and gas exchange between plants and the environment. (1-5 cr; prereq PCh 90 and #)

186A. Energy Transfer and Plant Temperature (2 cr)

186B. Gas Exchange (1 cr)

186C. Internal Water Stress (2 cr)

PIPh 188f,w,s (5-188). Research Perspectives in Plant Physiology. A laboratory course in which the student undertakes a well-defined research problem of limited scope. (1-4 cr; prereq AnCh 57, 8 cr in biochemistry and #)

For Graduate Students Only

201° (8-010). Research in Farm Crops

202° (8-020). Seminar: Farm Crops

204 (8-100). Pasture and Forage Research Techniques

233 (8-200). Principles of Plant Breeding I

234 (8-210). Principles of Plant Breeding II

241 (8-330). Research in Plant Genetics

242 (8-270). Seminar: Plant Breeding

244° (8-310). Laboratory Methods in Plant Breeding

245 (8-280). Current Topics in Plant Breeding

248 (8-380). Applied Statistics

251 (8-390). Special Problems in Application of Statistics

252 (8-230). Cytogenetics

253 (8-320). Methods in Plant Genetics

255 (8-290). Current Topics in Plant Genetics

263 (8-220). Application of Quantitative Genetics to Plant Breeding

PIPh 280. Radioisotope Techniques Applied to Biology

PIPh 251. Seminar: Plant Physiology

Animal Science (AnSc)

Students majoring in animal science plan a program suited to their needs in consultation with an adviser in the department. Those whose vocational goals may include employment in various business enterprises related to agriculture, extension service, or farming usually follow the curriculum in agricultural sciences and industries. Students who plan to continue their studies at the graduate level in preparation for teaching and research at the college level or for research in industry are advised to follow the curriculum in biological and physical sciences in agriculture. Animal science is a broad field including many areas of interest. Therefore, students may elect a broad program of courses or they may select an area of emphasis in genetics, management, meats, nutrition, or physiology. Courses required for all majors are: AnSc 1, 32, 45, 52, 53 or 54, 56, 130, and one of the following: AnSc 163, 164, 165, 166, or 167.

Course Offerings

- 1 (1-100). **Introductory Animal Science.** An introduction to animal science with emphasis on fundamental concepts of physiology, nutrition, animal breeding, and management as they apply to livestock and poultry. (5 cr)
- 2 (1-105). **Animal Care.** Discussion, demonstration, and practice of elementary management techniques, involving care, feeding, handling, training, record keeping, and sanitation of livestock and poultry. For students without livestock or poultry experience. (1 cr)
- 20 (0-700). **Opportunities Seminar.** Presentations by faculty and leaders in industry on areas of current emphasis in genetics, nutrition, physiology, management, and marketing. Open to all interested students. (No cr)
- 30 (1-520). **Milk Production.** (Same as FSci 30) Production and management concepts and their application to dairy farm planning and the production and marketing of high quality milk. (3 cr; prereq 1 or #)
- 31 (1-110). **Dairy Cattle Evaluation.** Evaluation of dairy animals on the basis of anatomy, production performance, and breeding. Visits to one or more herds in the area. (2 cr)
- 32 (1-500). **Meat Science.** (Same as FSci 32) Fundamental properties and composition of animal tissues and their conversion to meat. Influence of age, sex, heredity, and environment on muscle meat properties. The anatomy and function of muscle in the animal in relation to the cutting and merchandising of meat. Principles of inspection, quality evaluation, and grading. Field trips to meat and poultry packing and processing plants. (4 cr; prereq soph)
- 33 (1-120). **Livestock and Meat Evaluation.** Observation and evaluation of domestic meat animals alive, followed by objective and subjective evaluation of conformation, quality, and finish of carcasses and cuts. Principles of judging and grading of meat. (4 cr; prereq 1...32 recommended)
- 40 (1-600). **Horse Production.** Breed type, show classification, feeding, management, and color inheritance of light horses. Demonstrations of equitation, tack, and farriery. (3 cr)
- 44 (1-400). **Principles of Livestock Feeding.** Characteristics of nutrients, digestion, and utilization of feedstuffs, nutrient requirements of livestock and poultry, nutrient composition of feedstuffs, and formulation of rations. For students whose major emphasis is not in animal science. (5 cr; prereq soph)
- 45 (1-300). **Systemic Physiology.** (Same as VPP 45) Introduction to animal physiology, emphasizing the function of the organ systems. (6 cr; prereq Biol 2, BioC 1 or equiv)
- 49 (1-305). **Reproductive Physiology and Artificial Insemination.** Physiology of reproduction of mammalian and avian species, emphasizing the application of physiological principles to artificial insemination. (3 cr; prereq Biol 1 and 2)
- 50 (3-140). **Livestock Evaluation.** Evaluation of beef cattle, horses, sheep, and swine on the basis of economic traits related to productivity and market value. (2 cr; prereq 33 recommended, jr or #)
- 51 (3-140). **Advanced Judging.** Practice in judging and selection of livestock. Visits to local herds and flocks. Judging of beef cattle, horses, sheep, and swine in fall quarter; judging of dairy cattle in spring quarter. (1 cr max; prereq #)
- 52 (3-401). **Principles of Animal Nutrition.** Classification and functions of nutrients; nature of nutrient requirements and their expression; gross differences in anatomy and physiology of digestion of ruminants and nonruminants; digestion and utilization of feedstuffs; and sources of nutrients for livestock and poultry.

- Feeding standards and their uses. (3 cr; prereq 1, BioC 1...AnSc 45 recommended)
- 53 (3-402). **Nonruminant Nutrition.** Nutrient requirements of nonruminants (poultry and swine); nutrient content of feedstuffs, primarily cereals, their by-products and other concentrates; and utilization of feedstuffs to formulate adequate diets. (3 cr; prereq 44 or 52)
- 54 (3-403). **Ruminant Nutrition.** Nutrient requirements of ruminants (beef and dairy cattle, sheep); nutrient content of feedstuffs, primarily forages; protein and nonprotein nitrogen utilization; and utilization of feedstuffs to formulate adequate rations. Nutrition of horses will be considered also. (3 cr; prereq 44 or 52)
- 56 (3-200). **Animal Breeding.** An introduction to quantitative genetic principles. Concepts of livestock improvement through breeding and selection systems. (3 cr; prereq GCB 66)
- 109 (5-310). **General Endocrinology.** (Same as VPP 109, Zool 109) The physiological effects of the endocrine organs and hormones. (3 cr; prereq 45 or 6 cr systemic physiology or #)
- 110 (5-312). **Physiology of Lactation.** (Same as VPP 110) Anatomy, physiology, and biochemistry of the mammary gland; hormonal and nervous factors responsible for mammary growth, initiation and maintenance of lactation; physiology of suckling and milking; milk synthesis and factors influencing the lactation curve. (3 cr; prereq 45 or #)
- 111 (5-311). **Physiology of Reproduction.** (Same as VPP 111, Zool 111) Fundamentals of reproductive physiology including functions of the reproductive organs, fertilization, estrous cycle and its endocrine control, reproductive efficiency and problems, and principles of artificial insemination. (3 cr; prereq 45 or 6 cr systemic physiology or #)
- 120 (5-701). **Introduction to Literature in Animal Science.** Assignments and presentations relating to library study in disciplines within animal science. (1 cr)
- 130 (5-702). **Seminar.** Independent reading and/or research within the several disciplines in animal science, summarized and presented orally to students and staff. Open to juniors, seniors, and graduate students. (1 cr [max 2 cr])
- 133* (5-512). **Meat Chemistry and Processing.** (Same as FScI 133) The chemical and physical aspects of meat and meat products processing. (4 cr; prereq 32 and BioC 2)
- 134 (5-313). **Avian Physiology.** (Same as VPP 134, Zool 134) Physiology of various species of wild and domestic birds. (3 cr; prereq 45 or 6 cr of systemic physiology or equiv)
- 136* (5-510). **Muscle Chemistry and Physiology.** (Same as FScI 136) Muscle chemistry and function, including ultrastructure, theories of contraction, contractile and pigment proteins, and energy metabolism in living muscle. Post-mortem changes, development of rigor mortis, and conversion to meat. (3 cr; prereq 32 and 45, BioC 2 or equiv or #; offered 1970-71 and alt yrs)
- 150 (5-314). **Behavioral Physiology.** (Same as VPP 150, Zool 150) Current concepts of neurological and neurochemical bases of animal behavior, including reception, coding, transmission, and storage of information; levels of integration, central control of input and output; spontaneity, development, and learning. (3 cr; prereq 45 or 6 cr systemic physiology, Biol 110 or #)

Course Offerings

- 153 (5-402). **Nonruminant Nutrition.** See AnSc 53. (3 cr; prereq 44 or 52)
- 154 (5-403). **Ruminant Nutrition.** See AnSc 54. (3 cr; prereq 44 or 52)
- 160 (5-210). **Systems of Animal Breeding.** Application of quantitative genetic principles to large animal breeding; systems of breeding as related to beef cattle, poultry, sheep, and swine; and industry-related problems and research in large animal breeding. (3 cr; prereq 56...Biom 40 recommended)
- 161 (5-211). **Dairy Cattle Breeding.** Concepts and applications of quantitative genetics to dairy cattle improvement. Cow and sire evaluation methods. (3 cr; prereq 56)
- 162 (5-212). **Animal Cytogenetics.** Chromosome structure, function, and behavior; chromosome methodology, including material preparation, photomicroscopy, and other cytotechniques; diagnostic procedures for the study of aberrations; and uses of chromosome karyotype in studies of classification, phylogeny, and evolution. (3 cr; prereq GCB 66 or #)
- 163 (5-601). **Swine Production.** Status and characteristics of the swine industry; application of the principles of animal breeding, nutrition, physiology, and economics to swine production; considerations in the development of a successful swine enterprise. (3 cr; prereq 44 or 53 or #...56 recommended)
- 164 (5-602). **Sheep Production.** Status and characteristics of the sheep industry; application of the principles of animal breeding, nutrition, physiology, and economics to management of sheep breeding flocks. Ration formulation, management, and marketing of feedlot lambs. (3 cr; prereq 44 or 54 or #...56 recommended)
- 165 (5-603). **Beef Cattle Production.** Status and characteristics of the beef cattle industry; application of the principles of animal breeding, nutrition, physiology, and economics to management of beef cattle breeding herds. Ration formulation, management and marketing of feedlot cattle. (3 cr; prereq 44 or 54 or #...56 recommended)
- 166 (5-604). **Dairy Farm Management.** Status and characteristics of the dairy industry; application of the principles of animal breeding, nutrition, physiology, and economics to management of dairy cattle and to planning and operating a dairy farm. (3 cr; prereq 44 or 54 or #...56 recommended)
- 167 (5-605). **Commercial Poultry Production.** Current practices and production systems with emphasis on managerial aspects of egg, broiler, and turkey production. Technical and practical phases of production and marketing considered in relation to their underlying principles. Visits to appropriate commercial production units. (3 cr; prereq 44 or 53 or #)
- 180 (5-710). **Special Problems.** Research in an area of animal science under the supervision of a staff member. A written report of the research is required. Open to students who have completed pertinent prerequisites. (Cr ar; prereq #)
- 185 (5-715). **Tutorial.** Informally structured course to encourage study in depth of a specific discipline in animal science. Pertinent readings, centered around fundamental propositions, will be suggested and the preparation of written essays of high quality will be required. Tutorials are available in cryobiology, cytogenetics, genetics, nutrition, and physiology. (2 cr per qtr; prereq #)
- 190 (5-780). **Seminar: The Animal Sciences and World Food Supply Problems.** A synthesis of knowledge acquired in animal science in terms of and focused on international aspects of animal production and world food needs. For seniors with animal science interests. (2 cr; prereq #)

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- 201° (8-220). Advanced Animal Breeding
- 205° (8-221). Quantitative Inheritance
- 209x° (8-850). Research in Muscle Chemistry and Physiology
- 210x° (8-810). Research in Animal Science
- 211x° (8-820). Research in Animal Genetics
- 212x° (8-840). Research in Animal Nutrition
- 214x (8-760). Graduate Seminar: Animal Science
- 222° (8-420). Energy in Animal Nutrition
- 223° (8-421). Protein and Amino Acid Nutrition
- 224° (8-422). Vitamin Nutrition
- 225° (8-423). Mineral Nutrition
- 226° (8-440). Ruminant Nutrition
- 227 (8-741). Concepts and Developments in Avian Nutrition
- 228 (8-740). Concepts and Developments in Ruminant Nutrition
- 229 (8-742). Concepts and Developments in Swine Nutrition
- 230x (8-750). Concepts and Developments in Meat Science and Technology
- 231x (8-830). Research in Animal Physiology

Entomology, Fisheries, and Wildlife

Two fields of specialization are available in this department: (a) entomology, and (b) fisheries and wildlife. Students interested in the fisheries or wildlife fields should consult the fisheries and wildlife curriculum (see Index). The sequence of required and elective courses recommended for a 4-year program leading to a terminal B.S. degree in entomology or leading to a graduate degree in entomology is available in the department office. Students wishing to major in entomology at the undergraduate level will follow the curriculum in Biological and Physical Sciences in Agriculture.

Qualified students are advised to continue their training in the Graduate School where a wide variety of specializations, all dependent upon basic technical knowledge, is possible. A graduate study preparation option in fisheries and wildlife is available for qualified students who propose to continue beyond the B.S. degree and work toward the M.S. or Ph.D. degree.

Entomology (Ent)

- 5 (1-005). **Economic Entomology.** Brief introduction to the structure and classification of insects; management of insect populations; life histories, habits, and recognition of insect pests of livestock, orchards, field crops, vegetables, and ornamentals. (4 cr; prereq Biol 2 or #)
- 21 (1-020). **Principles of Beekeeping.** Lectures and laboratory demonstrations. History of beekeeping; life history and behavior of honey bees; colony and apiary

Course Offerings

- management; pollination and hive products; honey bee diseases and their control. (3 cr; prereq Biol 2 or equiv)
- 55 (3-100). **Entomological Techniques.** Practical laboratory instruction in mounting, preservation of insect larvae; preparation of microscopic mounts of minute insects; labeling, classifying, and cataloging specimens of insects for scientific study. (1-3 cr; prereq 74 or equiv)
- 56 (3-050). **Forest Entomology.** Lectures and laboratory dealing with the principles of controlling insects that attack trees and forest products; life history and habits of important representative species. (4 cr; prereq Biol 2 or equiv)
- 59 (3-150). **Field Entomology.** The insect fauna in various natural habitats of the park and surrounding areas. Includes field trips, collection and classification of insects, as well as studies of general morphology, life histories, and habits of local species under ecological conditions governing the distribution of insect fauna of the region. (5 cr; prereq Biol 2 or equiv; offered at Itasca)
- 74 (3-175). **Introductory Entomology.** General morphology, life histories, habits, and classification of insects. (5 cr; prereq Biol 2 or equiv)
- 103, 104, 105 (5-001, 5-002, 5-003). **Basic Entomology.** These courses provide a special arrangement for the making up of certain deficiencies in biological background. (Cr ar; prereq Δ)
- 114 ((5-200). **Apiculture.** Characteristics and social behavior of honey bees; colony development and management; diseases and their control; hive products, pollination. Lectures and laboratory demonstrations. (3 cr; prereq 9 cr entomology or biology)
- 118 (5-400). **Experimental Ecology.** Experimental approach to study of environmental factors affecting animal populations. (3 cr; prereq 9 cr biology or equiv and 3 cr animal or plant ecology, §, §201)
- 124 (5-132). **The Biology of Immature Insects.** A field and laboratory course treating of habits, habitats, life history, and identification of immature insects with particular emphasis on aquatic forms. (5 cr; prereq 59 or equiv or §; offered at Itasca)
- 125 (5-025). **Insect Morphology.** Comparative studies of external and internal anatomy and histology of insects; phylogeny and function. (5 cr, §Zool 125; prereq 74 or §)
- 126 (5-026). **Embryology and Development of Insects.** Reproductive behavior, embryology, and postembryonic development of insects. (5 cr, §Zool 126; prereq 125, OrCh 62, §)
- 127 (5-027). **Insect Metabolism and Coordination.** Homeostasis, permeability, circulation, metabolic systems and products, properties of muscles and nerves, sensation, behavior. (5 cr, §Zool 127; prereq 126, §...BioC 52 or MdBc 101 recommended)
- 129 (5-130). **Aquatic Entomology.** Identification and biology of aquatic and littoral insects in all stages. (5 cr; prereq 59, 74 or equiv or §; offered at Itasca)
- 130 (5-150). **Principles of Systematic Entomology.** Lectures on history of systematic entomology, the species concept and higher categories, systematic procedures and zoological nomenclature. (2 cr; prereq 15 cr entomology or zoology, §; offered 1970-71 and alt yrs)
- 131 (5-133). **Advanced Insect Taxonomy I.** Identification of taxa within the major insect orders; use of taxonomic literature and catalogs; with field trips and formation of an insect collection. (3 cr; prereq 74 or equiv)

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- 132 (5-134). **Advanced Insect Taxonomy II.** Identification of specimens collected by the student during the summer; classification within minor insect orders. (2 cr; prereq 131)
- 133 (5-131). **Aquatic Entomology.** Identification and biology of aquatic and littoral insects in all stages. (2 cr; prereq 74 or equiv; offered 1969-70 and alt yrs)
- 134 (5-210). **Integrated Control.** Suppression of insect, mite, and weed populations by integration of biotic agents; host plant resistance, artificial pest control measures and cultural practices. Principles of ecological approach to pest control. (3 cr; prereq 74 or equiv, #)
- 139 (5-500). **Problems in Microtechnique.** Guidance for independent study of material of student's choice, with particular reference to insects. (2 cr; prereq #)
- 140 (5-510). **Biological Microscopy.** Necessary elements of optics, use and limitations of various types of microscopes, interpretation of microscopical data. Laboratory; demonstration plus project in the field of student's interest. (4 cr; prereq 15 cr zoology, entomology, or botany, #; offered when demand warrants)
- 141 (5-215). **Insects in Relation to Plant Diseases.** (Same as PIPa 141) Insect transmission and dissemination of plant pathogens; development of plant-insect relationships; habits of principal insect vectors with emphasis on practical methods of control. (3 cr; prereq 5 cr entomology and 5 cr plant pathology or equiv, or #)
- 144 (5-275). **Medical Entomology.** Principal arthropods noxious to man and animals. Emphasis on those that serve as vectors of pathogenic organisms of man and animals. (3 cr; prereq 15 cr incl 74 or equiv, #)
- 175 (5-250). **Principles of Economic Entomology.** Methods and principles of insect control. Lectures and laboratory demonstration. (4 cr; prereq 15 cr entomology incl 5 or equiv or #; offered 1970-71 and alt yrs)
- 178 (5-425). **Special Lectures in Entomology.** Lectures in special fields of entomological research given by a visiting professor. (Cr ar; offered when feasible)
- 193, 194, 195 (5-901, 5-902, 5-903). **Advanced Work in Entomology.** Library and laboratory research in various lines of entomology. (1 or more cr per qtr; prereq #)
- 196 (5-904). **Special Problems in Entomology.** Advanced work and ample opportunity for individual research, especially in various faunistic studies. (Cr ar; prereq #; offered at Itasca)

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- 200x (8-200). Seminar
- 201° (8-300). Experimental Ecology Laboratory
- 202° (8-305). Insect Ecology
- 203° (8-323). Insect Physiology
- 204° (8-350). Insect Microbiology
- 205° (8-400). Insecticides and Their Action
- 206° (8-405). Insecticides Laboratory

Course Offerings

209° (8-210). **Current Topics in Forest Entomology**

240, 241, 242, 243° (8-500, 8-501, 8-502, 8-503). **Research in Entomology**

Fisheries and Wildlife (FW)

- 1 (0-001). **Orientation in Fisheries and Wildlife.** A survey of technical requirements and training of fishery and wildlife technicians and scientists; introduction to fields of work, problems, and career outlets. (No cr)
- 50 (3-050). **Principles of Fisheries and Wildlife Management.** Introduction to fishery and wildlife population ecology; relations between fish and wildlife and their environments; management of fish and game populations and habitats; management and research methods; administration of fish and wildlife agencies. (3 cr, §151, 161; for non-FW majors; prereq Biol 2 or equiv; Biol 80 or For 54, or Ecol 50)
- 67 (3-167). **Techniques of Forest Wildlife Management.** Biology and management of important forest wildlife species; methods of evaluating forest wildlife populations and habitats. (2 cr; prereq 50; given at Cloquet)
- 77 (3-277). **Mammalogy.** Distinguishing characteristics and life histories of the various mammal groups, particularly those represented in the state. (5 cr; prereq Zool 53)
- 103, 104, 105 (5-103, 5-104, 5-105). **Basic Fishery Biology, or Basic Wildlife Biology.** These courses provide a special arrangement for the making up of certain deficiencies in biological background. (Cr ar; prereq Δ)
- 151 (5-451). **Ecology of Fishery Populations.** Relationship of fishery populations to limnological conditions; factors influencing strength of year classes; influence of climatological factors on fish growth; species interactions as related to population structure; influence of natural and fishing mortality rates on structure and yield of exploited populations; fishery yield models. (3 cr, §50; prereq Ecol 50 or equiv...Zool 121, Ecol 119 or 128, Math 40A or equiv...or §)
- 152 (5-452). **Fishery Management.** Fundamentals of population control; use of fishing regulations; habitat development; water quality control; use of artificial stocks for population maintenance; relationship between sport and commercial fisheries, including economic aspects; fundamentals of hatchery practice; pond management. (3 cr; prereq 151 or §)
- 153 (5-453). **Techniques of Fishery Biology.** Basic methods used in fishery research and management; lake and stream survey methods, mapping, chemical and biological sampling; methods of fish collection, use of nets and traps, fish toxicants, electro-fishing; tagging and marking; methods of creel census. (3 cr; prereq 152, or §)
- 161 (5-551). **Wildlife Ecology and Management I.** Principles and concepts pertaining to relationships between wildlife populations and their habitats; habitat requirements and relationships of important game species; relationships to land use and land management practices; habitat evaluation and management. (4 cr, §50; prereq 77, Biol 80 or Ecol 50, Zool 75-76 or 135, Ecol 130 or 135, Ent 118 or Ecol 162...courses in soils, plant and animal physiology recommended)
- 162 (5-552). **Wildlife Ecology and Management II.** A discussion of population characteristics and the factors affecting them. Will include natality, recruitment, and mortality rates, density and behavior. The role of these factors in

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- relation to proper management of populations will be stressed. (4 cr; prereq 161, AnSc 45 or Zool 105, or #)
- 169 (5-553). **Wildlife Statistics.** Emphasizes statistical procedures commonly used in wildlife ecology, including sampling techniques, chi-square analyses, and certain probability distributions as applied to population estimation and computer modeling. (2 cr; prereq Biom 100 or equiv, or #)
- 178 (5-678). **Fisheries and Wildlife Administration.** Organization and function of federal and state agencies; laws and regulations; and internal policies concerning personnel, budgets and financing, research management, law enforcement, and public education. (4 cr; prereq 50, 152, 162, or #)
- 179 (5-279). **Special Lectures in Fisheries and Wildlife.** Lectures in special fields of fishery and wildlife research given by a visiting professor. (Cr ar; offered when feasible)
- 180 (5-280). **Senior Seminar: Fisheries and Wildlife.** Discussion and presentation of papers in fisheries and wildlife and related subjects. (1 cr; prereq sr)
- 193, 194, 195 (5-393, 5-394, 5-395). **Advanced Work in Fishery Biology — Advanced Work in Wildlife Biology.** Library and laboratory research in various lines of fishery biology or wildlife biology. (1 or more cr per qtr; prereq #)
- 196 (5-396). **Special Problems in Vertebrate Ecology.** Advanced work and ample opportunity for individual research, especially in various faunistic studies. (Cr ar; prereq #; offered at Itasca)

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- 200x (8-200). **Seminar**
- 248-249° † (8-448/8-449). **Fishery Biology**
- 250° (8-450). **Fisheries Resources of the United States**
- 251° (8-451). **Production Biology of Fishery Environments**
- 264, 265, 266, 267° (8-364, 8-365, 8-366, 8-367). **Research in Fishery Biology**
- 274° (8-574). **Wildlife Management: Upland Game**
- 275° (8-575). **Wildlife Management: Waterfowl**
- 276° (8-576). **Wildlife Management: Big Game**
- 277, 278, 279, 280° (8-377, 8-378, 8-379, 8-380). **Research in Wildlife Biology**

Courses Offered by Other Departments

ZOOLOGY

- 93 (5-093). **Introduction to Animal Parasitology.** Elementary course dealing with parasitic protozoa, worms, and arthropods, and their relation to diseases of man and animals. (5 cr; prereq Biol 2 or 50)
- 116 (5-116). **Population Dynamics.** Seminars and lectures on verbal mathematical population theories; emphasis on relationship to laboratory and field data. (2 cr; prereq Biol 80 or #...Math 44 recommended; offered 1969-70 and alt yrs)
- 121 (5-121). **Ichthyology.** Taxonomy and habits of North American fishes, especially those of upper Mississippi drainage. (3 cr; prereq 15 cr incl Biol 2 or 50)

Course Offerings

- 145 (5-145). **Parasitic Protozoa.** Structure, life histories, and economic relations of protozoal parasites of man and animals; laboratory diagnosis. (3 cr; prereq 15 cr incl Biol 2 or 50 and #)
- 146 (5-146). **Experimental Parasitology.** Discussion sections and laboratory investigations designed to illustrate relationships between metazoan parasites and their hosts. (3 cr; prereq 93, or #)

ECOLOGY AND BEHAVIORAL BIOLOGY

- 119 (5-812). **Aquatic Ecology.** Conditions for life in the water and distribution of aquatic animals. (5 cr; prereq 15 cr incl Biol 2 or 50; offered at Itasca)
- 162 (5-817). **Vertebrate Ecology.** Field work on populations and their relationships to local environments; habitat analysis and ecological research methods. Individual and team research projects, field trips and lectures. (5 cr; prereq Biol 80 or equiv; offered at Itasca)

GEOLOGY

- 128 (5-601). **Limnology.** Description and analysis of the events occurring in lakes, reservoirs, and ponds, beginning with their origins and progressing through study of their physics, chemistry, and biology. Interrelationships of these parameters, and effects of civilization on lakes. Laboratory, field trips. (4 cr, §Bot 138; prereq GeCh 26 or equiv and #)

Food Science and Industries (FSci)

- 10 (1-010). **Man's Food.** Man's nutritional needs; food composition, world food supply, consumption patterns, acceptance, quality programs and regulations, food preservation, commercial processes, packaging, marketing, national and international food programs. (3 cr)
- 20 (1-020). **Introductory Microbiology.** Especially for students in home economics. Fundamental principles of microbiology, characteristics of bacteria, yeasts, molds, and other microorganisms, their importance in the preparation and preservation of foods, relation to health and well-being of the individual and the family. (4 cr; prereq 3rd qtr fr, #)
- 22 (0-001). **Freshman-Sophomore Seminar.** Presentation by invited faculty and industry representatives on areas of current interest in chemistry, microbiology, management, marketing, and other food industry-related topics. Open to all interested students. (No cr)
- 30 (1-520). **Milk Production.** (Same as AnSc 30) Production and management concepts and their application to dairy farm planning and the production and marketing of high quality milk. (3 cr; prereq Biol 1 or #)
- 32 (1-500). **Meat Science.** (Same as AnSc 32) Fundamental properties and composition of animal tissues and their conversion to meat. Influence of age, sex, heredity, and environment on muscle meat properties. The anatomy and function of muscle in the animal in relation to the cutting and merchandising of meat. Principles of inspection, quality evaluation and grading. Field trips to meat and poultry packing and processing plants. (4 cr; prereq soph)
- 50° (3-120). **Food Microbiology.** Relationship of environment to occurrence, growth, and survival of microorganisms in foods; evaluation of microbiological

Food Science and Industries

- quality of dairy and food products; characteristics and activities of bacteria, yeasts, and molds related to food spoilage; utilization of microorganisms in manufacture of dairy and food products; recognition and control of food-borne pathogens and food poisoning. (3 or 5 cr [3 cr for lect, 2 cr for lab...lect taken separately with #]; prereq MicB 53)
- 51 (3-110). **Food Process Chemistry.** The chemical properties of foods and food constituents as influenced by processing and storage. (3 or 5 cr [3 cr for lect, 2 cr for lab...lect taken separately by #]; prereq BioC 2 or #)
- 52 (3-130). **Food Physics.** Discussion and demonstration of the physical properties and behavior of foods. Fluid flow and heat transfer applied to food processing. (3 cr; prereq Phys 2 or 5; 2 lect and 3 lab hrs per wk)
- 53 (3-132). **Food Process Engineering.** Discussion and demonstration of mass transfer operations (crystallization, filtration, extraction, evaporation, distillation, separation, etc.) and particle size reduction applied to food processing. (3 cr; prereq 52; 2 lect and 3 lab hrs per wk)
- 100 (5-100). **Seminar: Food Industries Literature.** Selected topics. Food literature. Preparation of bibliographies. Each student presents papers and reports on assigned subjects and reviews scientific investigations in food industries. (2 cr; prereq Rhet 22, 51, three courses in food science and industries)
- 101* (1-010). **Principles of Dairy Processing I.** Application of scientific principles to problems involved in the processing of fluid and concentrated milk products. Physical and chemical properties of fluid milk systems and their control. Demonstrations of basic processing operations including heating, cooling, homogenization, evaporation, crystallization, and freezing. (4 cr; prereq 50, 51, 53 or #)
- 102* (5-523). **Principles of Dairy Processing II.** Manufacture of cheese and fractionated milk proteins with emphasis on the application of chemical, microbiological, and physical principles. (3 cr; prereq 50, 51, 52; 2 lect and 3 lab hrs per wk)
- 103* (5-550). **Principles of Food Dehydration.** Lectures and laboratory. Manufacture of dry food products, with special reference to the physical and chemical processes and engineering problems involved. (3 cr; prereq 101)
- 104 (5-380). **Food Packaging.** Lecture and demonstration of the properties of various packaging materials and their uses in the food industry. (3 cr; prereq Phys 2 or 5)
- 105* (5-360). **Sensory Testing of Foods: Theory and Methodology.** Fundamentals of flavor perception; sensory evaluation of the properties of food products with emphasis on methodology and interpretation of test results. (2 cr; 1 lect and 3 lab hrs per wk)
- 106 (5-561). **Supervised Industry Practice.** Practical training and experience in some operational phase of the dairy and food industries. Includes a minimum of 2 months' employment in an approved position and written reports. (3 cr; prereq 15 cr in food science and industry courses)
- 108 (5-524). **Judging Dairy Products.** Laboratory and commercial procedures for evaluating the sensory properties and market quality of dairy products. Identification of common defects in flavor, physical properties, and appearance. (1 cr; prereq 105 or #)
- 110* (3-122). **Sanitation and Process Microbiology.** Factors that influence the control and destruction of microorganisms, chemical, physical, and microbiological

Course Offerings

- principles in cleaning and sanitizing dairy and food processing equipment; in-activation of microorganisms and thermal process evaluation; microbiological fermentations and preservation methods; development of sanitation programs; microbiological standards for dairy and food products. (3 or 4 cr [3 cr for lect, 1 cr for lab...lect taken separately with #]; prereq 50 or 150 or #)
- 121° (5-530). **Industrial Processing of Fruits and Vegetables.** Relationship of chemical, physical, and microbiological principles to commercial processing of fruits and vegetables from procurement of raw products through preparation, preservation, packaging, storage, transportation, and merchandising. Emphasis is on preservative methods involving heat sterilization and freezing. (3 cr; prereq 50, 51, and 53 or #; 2 lect and 3 lab hrs per wk)
- 133° (5-512). **Meat Chemistry and Processing.** (Same as AnSc 133) The chemical and physical aspects of meat and meat products processing. (4 cr; prereq 32 and BioC 2)
- 136° (5-510). **Muscle Chemistry and Physiology.** (Same as AnSc 136) Muscle chemistry and function, including ultrastructure, theories of contraction, contractile and pigment proteins, and energy metabolism in living muscle. Post-mortem changes, development of rigor mortis, and conversion to meat. (3 cr; prereq 32 and 45, BioC 2 or equiv or #; offered 1969-70 and alt yrs)
- 150° (5-120). **Food Microbiology.** See FSci 50. (3 or 5 cr [3 cr for lect, 2 cr for lab...lect taken separately by #]; prereq MicB 53)
- 151° (5-110). **Food Process Chemistry.** See FSci 51. (3 or 5 cr; prereq grad with #)
- 160° (5-552). **Food Lipids.** Application of the principles of physics and chemistry, with strong emphasis on physical chemistry, to the manufacture of lipid systems for human consumption. (3 cr; prereq 51, 52, and 53)
- 170° (5-571). **Special Problems in Food Manufacturing.** Individual laboratory or library research on chemical, physical, and engineering problems involved in processing and utilization of food products. (1-3 cr; prereq sr or #; hrs ar)
- 180° (5-321). **Special Problems in Dairy and Food Microbiology.** Laboratory or library research on problems related to the microbiology of dairy and food products. (1-3 cr; prereq sr or #; hrs ar)
- 181° (5-320). **Advanced Dairy and Food Microbiology.** Investigations of specific problems on the bacteriology and mycology of dairy and other food products. (3 cr; prereq sr, 50 or equiv, 101 or 102, or #)
- 182° (5-310). **Advanced Food Chemistry Topics.** An in-depth study of food chemistry and current food chemistry research topics. (3 cr; prereq sr or #)
- 190° (5-581). **International Food Technology.** Independent study of food processing problems and developments throughout the world. The relation of food technology to adequate feeding of peoples of the world will be emphasized. (3 cr; prereq sr; hrs ar)
- 5-122.° **Sanitation and Process Microbiology.** See FSci 110. (3 or 4 cr [3 cr for lect, 1 cr for lab...lect taken separately with #]; prereq 50 or 150 or #)

For Graduate Students Only

- 205x° (8-205). **General Seminar**

Horticultural Science (Hort)

There are seven distinct fields in horticulture: vegetable science, fruit science, landscape design, urban park and landscape management, nursery management, floriculture, and turf management. In some cases students may find it advisable to include more than one field in their area of emphasis. Those who plan to enter some horticultural industry such as fruit growing, market gardening, truck farming, the nursery or floriculture industry, or turf, park, or landscape management should follow the curriculum in Agricultural Science and Industries. Students interested in landscape design should elect the landscape design and environmental planning major of the Resources and Community Development curriculum.

Students planning on graduate work should follow the curriculum in Biological and Physical Sciences in Agriculture.

1. *Agricultural Science and Industries* — The courses listed below are recommended for each of the indicated fields.

a. Vegetable Science

Hort 1, 32, 41, 99, 104, 135, 136, 138, 139, 140; Agro 132; Biom 40; Bot 91, 91A; Ent 50; GCB 66; PIPa 1, 119; Soil 19

b. Fruit Science

Hort 1, 6, 36, 41, 74, 99, 111, 121, 138, 139, 140; Agro 132; Biom 40; Bot 91, 91A; Ent 50; GCB 66; PIPa 1; Soil 19

c. Nursery Management

Hort 1, 16, 21, 22, 24, 74, 75, 91, 92, 99, 140, 142, 143; Biom 40; Bot 91, 91A; Ent 50; PIPa 51; Soil 19; GCB 66

d. Urban Park and Landscape Management

Hort 1, 21, 22, 23, 24, 74, 75, 91, 92, 99, 116, 142; Bot 91, 91A; Ent 50; For 11, 143; MeAg 45; PIPa 51; Soil 19; GCB 66

e. Floriculture

Hort 1, 16, 23, 36, 41, 53, 77, 78, 99, 140, 152, 154; Biom 40; Bot 91, 91A; Ent 50; GCB 66; PIPa 1 or 51; Soil 19

f. Turf Management

Hort 1, 21, 22, 23, 99, 142; Biom 40; Bot 91, 91A; Ent 50; GCB 66; MeAg 45; PIPa 1 or 51; Soil 19, 126, 132

Additional courses in such supporting fields as botany, plant pathology, entomology, soils, business administration, etc., may be added to fit the needs of individual students.

2. *Landscape Design and Environmental Planning* — See landscape design curriculum, pages 35-37.

3. *Biological and Physical Sciences in Agriculture* — For subjects recommended for an area of emphasis in horticulture, consult adviser.

1 (1-001). **Fundamentals of Horticulture.** Fruit, vegetable, and ornamental plants, including factors which influence their culture, value, and importance. Lectures, laboratory and field trips. (4 cr; prereq Biol 2 or equiv)

Course Offerings

2. **Landscape Practices I.** Principles and cultural practices involved in establishment and maintenance of landscape plantings including pruning, fertilization, digging, handling, and transplanting of ornamental plants and use of equipments and chemicals for weed control will be covered. (3 cr; prereq GC students or #)
3. **Landscape Practices II.** Principles and practices in landscape maintenance including insect and disease control, edging, watering, mulching, and winter protection. Availability and usage of equipment will be stressed. (3 cr; prereq GC students or #)
4. **Landscape Practices III.** Landscape construction includes building landscape features such as fences, patios, walks, drives, and retaining walls. Establishment of grades and use of simple surveying devices will be included. (3 cr; prereq GC students or #)
5. **Landscape Practices IV.** Turf maintenance includes principles and practices involved in culture of turf. Fertilization, aeration, mowing, watering, and establishment of turf areas. Maintenance of landscape equipment will be included. (5 cr; prereq GC students or #)
- 10 (1-010). **Ornamental Horticulture.** Designed for the student who does not plan to major in ornamental horticulture. Gives working knowledge of the propagation, culture, and uses of the common garden flowers and house plants. Lectures, laboratory, and reference reading. (3 cr)
- 16 (1-016). **Greenhouse Management.** Fundamentals of greenhouse construction and management; thorough discussion of cultural and physiological principles involved. (3 cr; prereq Biol 2; offered 1970-71 and alt yrs)
- 21 (1-021). **Woody Plant Materials I.** Trees, vines, and evergreens used in landscape planting, their identification, ecology, and landscape use. Lectures, laboratories, and field trips. (3 cr)
- 22 (1-022). **Woody Plant Materials II.** Deciduous shrubs used in landscape planting, their identification, ecology, and landscape use. Lectures, laboratories, and field trips. (3 cr)
- 23 (1-023). **Herbaceous Plant Materials.** Taxonomy, ecology, and landscape uses of perennial and annual flowers, tender and hardy bulbs, and herbaceous vines and ground covers. Lectures, laboratory, and field trips. (3 cr, §51; prereq Biol 2 or 6 cr in botany)
- 24 (1-024). **Theory of Landscape Design.** Analysis of design elements and forms involving line, direction, shape, proportion, and color, with emphasis on their function in design; a study of perception and man's relationship to his environment, and the social effects and psychological basis for design. Lectures and laboratory. (3 cr)
- 25 (3-025). **History of Landscape Design.** Study of landscape design and gardening from the Egyptian period to the present. Emphasis will be given to the significant designers, social forces, and human needs as related to the periods studied and the influence of history on contemporary design. (3 cr)
- 31 (3-031). **Fruit Science.** Principles of fruit production. Fruits of the world with emphasis on temperate climate crops. Topics include site selection, cultural and management practices, physiological and environmental control of plant development, dwarfing, growth regulating compounds, insecticides and herbicides. Lectures and laboratory. (4 cr; prereq 1, PIPa 1, Soil 19, or #)

Horticultural Science

- 32 (3-032). **Vegetable Science.** Principles of vegetable agriculture, including reference to world food problems; geography of production; scope of the industry; physiological adaptation of species as food for man, and such principles of production practice as propagation, irrigation, nutrition, seed production, and post-harvest handling. Lectures and laboratory. (4 cr; prereq 1, PIPa 1, Soil 19, or #)
35. **Arboriculture.** Principles and practices involved in the maintenance of ornamental and shade trees including pruning, fertilization, bracing and cabling, and cavity work. Use of ropes, slings, saddles and other safety features will be stressed. Use of equipment will be covered. (3 cr; prereq GC students or #)
- 36 (1-036). **Plant Propagation.** Principles and techniques of propagating plants by seeds, cuttings, grafts, buds, layers, and division. Lectures deal with principles while the laboratories give student the opportunity to practice various propagating techniques. Field trips. (3 cr; prereq Biol 2 or 6 cr in botany)
- 41 (3-041). **Horticultural Crop Judging.** Principles and practices of judging and exhibiting fruits, vegetables, and flowers. (3 cr; prereq 1)
- 53 (3-053). **Ornamentals for Interior Decoration.** Identification, utilization, and culture primarily of foliage plants used in interior decoration. Lectures, reference reading, and field trips. (3 cr; prereq 16; offered 1970-71 and alt yrs)
- 62 (3-094). **Special Problems in Landscape Design and Composition.** Problems based upon the work given in the preceding landscape design courses. (2-4 cr per qtr; prereq sr, 91 or 93 or #)
- 74 (3-074). **Landscape Management and Horticultural Practices.** The application of basic biological principles to successful establishment and maintenance of horticultural plantings on commercial, private, utility, recreational, highway, and park lands. Techniques and equipment used in culture and transplanting, pruning, tree maintenance and repair, and weed control in landscape plantings. (4 cr; prereq 6 cr in biology, Soil 19)
- 75 (3-075). **Landscape Construction.** Survey of garden and landscape construction, grading, materials, planting, and maintenance, including plans, specification, and computation of costs. Materials and construction of walks, walls, fences, landscape structures, steps, pools, terraces, turf and planting areas, flower beds, etc. Lectures, field trips, reports, and construction problems. (4 cr; offered 1970-71 [s] and alt yrs)
- 77 (3-077). **Floral Design.** Fundamental principles in floral arrangement. Analysis of basic design principles used in floral design. The decorative use of flowers, foliage, and accessories. (3 cr)
- 78 (3-078). **Retail Flower Shop Management.** Commercial approach to floral design. Business management principles and practices in a retail florist shop. Scope of the industry and its place in horticulture. (3 cr; prereq 77, #)
- 91 (3-091). **Principles of Landscape Design I.** Principles of landscape design with special reference to their practical application in planning of residential landscapes. Relationships of landscape design, architectural design, and interior decoration. Landscape plans, landscape drafting techniques, and methods of presentation. Lectures, drawings, and practical problems. (3 cr; prereq 21, 22, 24, or #)
- 92 (3-092). **Principles of Landscape Design II.** Landscape design principles related to commercial and public buildings and sites. Emphasis will be placed on utilization and organization of space, circulation, and integration into the community environment. (5 cr; prereq 24, 91)

Course Offerings

- 93 (3-093). **Principles of Planting Composition.** Principles of planting arrangement, the aesthetic qualities of plants, their value and uses in all kinds of landscapes and gardens; special reference to home landscapes and gardens. Lectures and problems. (5 cr; prereq 21, 22, 24, 91)
- 99 (3-099). **Seminar.** Student seminars on horticultural problems, research projects, work experience, and employment opportunities. (1 cr per qtr [max 2 cr]; prereq jr)
- 104 (5-004). **Frozen Food Processing and Storage.** Technology of food preservation by freezing. Study of changes occurring during handling, freezing, and storage. Application to processing, packaging, distribution, and storage. (3 cr; prereq BioC 1, 2, MicB 53 or #)
- 105 (5-005). **Frozen Food Problems.** Special problems based upon work given in Hort 104. (2-4 cr per qtr [9 cr total]; prereq 104 or #)
- 111 (5-009). **Systematic Pomology.** Fruit varieties. Classification, description, identification, and elements of judging. Lectures, laboratory, and a survey of the literature. (3 cr; prereq 6, hort majors or minors or #; offered 1969-70 and alt yrs)
- 112 (5-012). **Principles of Recreational Design Laboratory.** Analysis, development, and presentation of landscape design solutions for diverse recreational land use. (5 cr; prereq 92, 116)
- 113 (5-013). **Advanced Landscape Design.** Advanced landscape design and site planning related to complex problems. Emphasis will be placed on analytic methods and procedures as well as detailed design and presentation of solutions. (5 cr; prereq 92)
- 114 (5-014). **Senior Design Thesis.** Development and presentation of an original large-scale landscape design. A written analysis, developmental study, and specifications are required. (5 cr; prereq 113)
- 116 (5-010). **Principles of Outdoor Recreation Design and Planning.** For advanced students associated with design, management, and planning of recreation facilities. Planning and design principles related to recreational land use and development: parks, campsites, water areas, highways, summer and winter recreational facilities. (4 cr)
- 121 (5-008). **Small Fruit Culture.** Botanical relationships, history of commercial development, and factors of environment and culture as related to small fruits. (3 cr; prereq horticulture majors or minors or #, 6 or 32, 9 cr botany or equiv; offered 1969-70 and alt yrs)
- 135 (5-035). **Potatoes.** Culture, handling, storage, seed maintenance, varieties, improvement, and physiology of the potato plant. (2 cr; prereq 32)
- 136 (5-036). **Adaptation and Maintenance of Vegetable Varieties.** Origin and development of leading varieties and their adaptation to different vegetable-producing areas. Methods of seed production and maintaining of varieties. Activities of plant breeding organizations. (3 cr; prereq 32; offered 1970-71 and alt yrs)
- 137 (5-037). **Advanced Plant Propagation.** Lecture and laboratory dealing with the basic concepts, theory, and techniques involved in propagating plants from seeds, cuttings, grafts, buds, layers, and division. In the laboratory, students will design and conduct propagation experiments on plants or techniques of special interest. (3 cr, §36; prereq Bot 51 or equiv)

- 140 (5-040). **Plant Growth Regulators.** The physiology and agricultural technology of phytohormones and synthetic growth regulators in horticulture. Emphasis on the practical uses of such substances in the control of fruit and leaf abscission, parthenocarpy, growth rate, plant size, apical dominance, organ initiation, dormancy, germination, flowering, callusing, and others. (3 cr; prereq 15 cr in plant sciences incl 3 cr in plant physiology; offered 1969-70 and alt yrs)
- 141 (5-041). **Environmental Requirements of Horticultural Plants.** Lectures and assigned reading on the relation of light, temperature, and water to the growth and culture of horticultural plants. (3 cr; prereq 15 cr in plant sciences incl 3 cr in plant physiology)
- 142 (5-042). **Turf Management.** Taxonomy, ecology, and culture of grasses for landscape purposes. Included are basic principles, terminology, construction, maintenance, and soil-plant relationships in turf management for lawns, golf courses, athletic fields, and production operations. Lecture and laboratory. (4 cr; prereq 1, PIPa 1, Soil 19; offered 1969-70 and alt yrs)
- 143 (5-043). **Nursery Management.** Application of basic biological principles in the development of modern management procedures for the production, storage, and distribution of plant materials. Seedbed and field practices, digging, grading, storage, and handling operations. Shipping, merchandising, and business practices for nursery production and sales organizations. Lecture, laboratory, and field trips. (4 cr; prereq 1, 36, PIPa 1, Soil 19)
- 152 (5-052). **Commercial Floriculture, Fall Crops.** Physiological and cultural aspects of the production of the principal florist crops of economic importance. Major emphasis on chrysanthemums, carnations, cut flowers, and potted plants especially adapted to Christmas sales. Lectures, reference reading, and field trips to greenhouses, wholesaler, and retail flower stores. (3 cr; prereq 16; offered 1969-70 and alt yrs)
- 154 (5-054). **Commercial Floriculture, Spring Crops.** Physiological and cultural aspects of the production of the principal florist crops of economic importance. Major emphasis on roses, bulbous plants, and materials adapted to spring sales. Lectures, reference reading, and field trips to greenhouses, wholesalers, and retail flower stores. (3 cr; prereq 16; offered 1969-70 and alt yrs)
- 160 (5-060). **Plant Breeding Techniques.** Lectures and laboratory covering physical aspects of plant breeding problems, e.g., pollination control and floral morphology, sex modification, embryo culture, mutation induction, manipulation of ploidy levels, and automated data processing. (3 cr; prereq GCB 66)
- PIPh 167. **Physiology of the Plant Cell.** Characteristics of the living state, elements of the cell, general aspects of cell metabolism, development of the cell, polarity, differentiation, and irritability of the cell and cellular movements. (3 cr; prereq 103 or equiv, plant anatomy, inorganic and organic chemistry or biochemistry; offered 1970-71 and alt yrs)
- PIPh 168. **Experimental Protoplasmatology.** Physical and physiochemical properties of living protoplasm in plant cells, including viscosity, wall attachment, permeability, primary and secondary fluorescence, vital staining and changes in these qualities in harmful and harmless environments. (3 cr; prereq 103 or equiv, cytology, organic chemistry or biochemistry and experience in light microscopy; offered 1969-70 and alt yrs)
- PIPh 183. **Plant Physiology.** A discussion of membrane phenomena, water relations, mineral metabolism, and translocation in plants. (3 cr; prereq Biol 2 or 51, OrCh 42 or 62, physics)

Course Offerings

- PIPh 187A, B, C, D, E, F. Methods of Plant Analysis.** (Same as Bot 187) Six discrete and independent laboratory units in plant physiology. In-depth experimental laboratory approach to microscopic analysis, sample preparation, fractionation, isolation, and measurement of plant compound employing modern methods of plant physiology. Enrollment limited. (1-6 cr; prereq AnCh 57, 8 cr biochemistry, and §) C J Weiser and staff as indicated below
- 187A. The Primary Plant Metabolites.** (1 cr; offered 1970-71 and alt yrs)
P H Li
- 187B. Plant Proteins and Amino Acids.** (1 cr; offered 1969-70 and alt yrs)
T Soulen, L Olson
- 187C. Plant Hormones and Tissue Culture.** (1 cr; offered every yr)
- 187D. Chloroplast Metabolism and Plant Pigments.** (1 cr; offered 1970-71 and alt yrs) A Frenkel
- 187E. Plant Nucleic Acids.** (1 cr; offered 1969-70 and alt yrs) P H Li
- 187F. Analysis of Cell Structure.** (1 cr; offered 1970-71 and alt yrs)
E Stadelmann
- 190, 191, 192 (5-090, 5-091, 5-092) Special Problems.** Written report based on library, laboratory, or field research. (1-4 cr per qtr; prereq §) Staff

For Graduate Students Only

- 221 (8-021). Breeding of Sexually Propagated Horticultural Crops**
- 222 (8-022). Breeding Asexually Propagated Crops**
- 223 (8-023). Evolution of Crop Plants**
- 241 (8-041). Organization of Horticultural Research**
- 242x° (8-042). Horticultural Seminar**
- Agro 242x° (Agro 242). Seminar: Plant Breeding**
- 245 (8-045). Plant Hardiness**
- Agro 246° (Agro 8-246). Seminar: Genetics**
- 251x° (8-051). Advanced Problems in Horticultural Crop Breeding**
- PIPh 251x. Seminar: Plant Physiology**
- 252x° (8-052). Advanced Problems in Physiology of Horticultural Crops**
- GCB 298. Seminar: Genetics**

Plant Pathology (PIPa)

- 1 (1-001). Introductory Plant Pathology.** Introductory course in plant diseases. Lectures, laboratory, and special problems. (5 cr, §51; prereq soph, 9 cr in plant science with at least 6 cr in botany or Biol 2)
- 51 (3-050). Forest Pathology.** Diseases of forest and shade trees, and wood decay. Symptoms, etiology, and control. Lectures, laboratory, and field work. (4 cr, §1; prereq 6 cr in botany or Biol 2)

Plant Pathology

- 56 (3-101). Introduction to the Study of Fungi.** The structure, development, and identification of fungi, especially those of economic importance. (6 cr; prereq 9 cr in botany, or #; offered at Itasca)
- 90 (3-090). Research in Plant Pathology.** Assignment of special problems to undergraduate students who desire opportunity for independent research in plant pathology and related fields. (Cr and hrs ar; prereq 1, 51, 56, or #)
- 101* (5-500). Plant Nematology.** Nematode taxonomy, morphology, life cycles, biology, and control; nematodes as plant pathogens and their effects on plants. (5 cr; prereq 1, 51, or 121 and Biol 2, or #)
- 105* (5-105). Introduction to the Study of Fungi.** The structure, habits, classification, and identification of fungi. (3 cr, §106, §107; prereq 9 cr in botany or Biol 2 or #)
- 102 (5-051). Advanced Forest Pathology.** Student discussion of important concepts in forest pathology. (2 cr; prereq 51 or equiv)
- 106-107* (5-106/5-107). Mycology.** Lectures and laboratory exercises on the taxonomy, identification, life histories, genetics, and ecology of the fungi. (3 cr per qtr; prereq 1, 51 or 105 or 112 or MicB 53)
- 109* (5-109). Physiology and Biochemistry of Fungi.** Physiological and biochemical processes in fungi with major emphasis on elucidation of metabolic pathways. (3 cr; prereq BioC 51 or #; offered 1970-71 and alt yrs)
- 112-113 (5-012/5-013). Plant Pathology.** Diseases of ornamental plants, vegetable crops, fruit crops, field crops, and trees. Lectures, conferences, laboratory, and field work. Laboratory and field work continues throughout the summer. (2 cr per qtr; prereq 120 and 105 or equiv)
- 117* (5-300). Virus Diseases of Plants.** Nature of plant viruses and types of diseases they cause; emphasis on methods for studying virus diseases. (3 cr; prereq 1, 51, or 120; offered 1969-70 and alt yrs)
- 118* (5-400). Bacterial Diseases of Plants.** Bacteria as plant pathogens; representative types with particular reference to techniques used in studying bacterial diseases of plants. (3 cr; prereq 1, 51, or 120 and 3 cr in bacteriology; offered 1970-71 and alt yrs)
- 120* (5-002). Introductory Plant Pathology for Advanced Students.** See PIPa 1 or 51. (3 cr, §1 or §51; prereq 14 cr in plant science or #)
- 121* (5-700). Principles of Plant Disease Control.** General consideration of principles and practices in controlling plant diseases. (3 cr; prereq 1, 51, 120 or #; offered 1970-71 [s] and alt yrs)
- 122* (5-701). Chemical Control of Plant Diseases.** Concepts and practices concerning the types of chemicals, their modes of action and methods of application in controlling plant diseases. (3 cr; prereq 1, 51, 120 or #; offered 1969-70 [s] and alt yrs)
- 132 (5-104). Biology of the Fungi.** Survey of the fungi; their morphology, taxonomy, genetics, physiology, biochemistry, and ecology, and their impact in medicine, industry, and agriculture. (3 cr, §105; prereq Biol 2, and OrCh 62 or BioC 1A, or #)
- 137 (5-200). Poisonous Plants.** (Same as VMC 137) Systematic study of important plants poisonous to animals. Special emphasis is placed on identification, toxicology, diagnosis, and treatment. (2 cr; prereq #)

Course Offerings

- 141 (5-215). **Insects in Relation to Plant Diseases.** (Same as Ent 141) Insect transmission and dissemination of plant pathogens; development of plant-insect relationships; habits of principal insect vectors with emphasis on practical methods of control. (3 cr; prereq 5 cr in entomology and 5 cr in plant pathology or equiv, or #)
- 156 (5-102). **Introductory Mycology.** General characters of fungi; especially those used in identification; cultural and taxonomic procedures and practices. (6 cr; prereq 9 cr in botany, or #; offered at Itasca)
- 160 (5-103). **Aquatic Fungi.** Collection, culture, taxonomy, and morphology of freshwater fungi. (5 cr; limited to 12 students; prereq 3 cr mycology or #; offered at Itasca)
- 170 (5-220). **World Food Supply Problems.** A multidisciplinary approach will examine the problems of feeding the world's growing population. Principles from the socioeconomic sciences, plant sciences, animal sciences, public health, and animal sciences will be applied in lectures and informal discussions. (3 cr; limited enrollment; prereq srs and grad students with Δ or #)

For Graduate Students Only

- 201x^o (8-501). **Research in Nematology**
- 203x^o (8-090). **Research in Plant Pathology**
- 207x^o (8-110). **Problems in Mycology**
- 213x^o (8-600). **Seminar: Plant Pathology**
- 215 (8-111). **Genetics of Plant Pathogens**
- 216 (8-610). **Physiology of Host-Parasite Relationships**
- 217 (8-112). **Ecology of Plant Pathogens**
- 218 (8-620). **Principles of Plant Pathology**

Rhetoric (Rhet)

All students in the College of AFHE are required to take the following courses in rhetoric: Freshman Communication (9 cr); Public Speaking (Rhet 22); and Exposition (Rhet 51). Additional requirements as to number of credits and specific courses depend upon the particular curriculum for which the student is registered.

The Rhetoric Department also offers courses in humanities, literature, original and technical writing, speech, and dramatics. A number of these courses may be used to fulfill the distribution requirements in Categories I, III, and IV.

- 1 (1-101). **Communication I.** Writing from observation and experience. Attention to grammar, sentence and paragraph construction, punctuation, spelling. Integrated assignments in reading, listening, and speaking. Progress tests. (3 cr)
- 1H (1-101). **Honors Course: Freshman Communication I.** Writing from observation and experience. Integrated projects in reading, listening, speaking. (3 cr; prereq upper 10% on ACT [English] or by invitation)

- 2 (1-102). **Communication II.** The expository paper. Note-taking, outlining. Short themes, library research, term paper, documentation. Integrated assignments in reading, listening, and speaking. (3 cr; prereq 1)
- 2H (1-102). **Honors Course: Freshman Communication II.** Writing from library research. Integrated projects in reading, listening, speaking. (3 cr; prereq upper 10% on ACT [English] or grade of A in Communication I or by invitation)
- 3 (1-103). **Communication III.** Persuasion. Preparation and analysis of written and oral materials. The character, sources, and proper use of evidence. Integrated assignments in reading, listening, and speaking. (3 cr; prereq 2)
- 3H (1-103). **Honors Course: Freshman Communication III.** Persuasive communication. Integrated projects in writing, reading, listening, and speaking. (3 cr; prereq upper 10% on ACT [English] or grade of A in Communication II or by invitation)
- 22 (1-222). **Public Speaking.** Practical course in fundamentals of speechmaking. Emphasis upon organizing the speech and projecting it to the audience. (3 cr; prereq rhet comm req or equiv)
- 25 (1-225). **Parliamentary Procedure.** Parliamentary procedure applied to group organization and management. Duties of officers and disposition of motions emphasized. Individual participation stressed through role playing and other workshop procedures. (1 cr)
- 26 (1-506). **Original Writing.** For students interested in creative writing: description, narration, feature articles, short stories. (3 cr; prereq rhet comm req)
- 31 (1-401). **Introduction to Literature.** Analysis of literary structural forms and stylistic devices: poetry, drama, and prose fiction. (3 cr; prereq rhet comm req)
- 32 (1-442). **Novel and Short Story.** Analysis of selected European and American fiction. Emphasis on literary style in relation to themes of prose fiction. (3 cr; prereq rhet comm req)
- 34 (1-451). **Introduction to Dramatic Literature.** Selected readings from Greek literature to the present. Emphasis upon the development of dramatic art form. (3 cr; prereq rhet comm req)
- 35 (1-421). **English Literature I.** Historical and stylistic development from the Anglo-Saxon period through the Renaissance. (3 cr; prereq rhet comm req)
- 36 (1-422). **English Literature II.** Historical and stylistic development from the Puritans through the neoclassical period. (3 cr; prereq rhet comm req)
- 37 (1-423). **English Literature III.** Historical and stylistic development from the Romantics to the present. (3 cr; prereq rhet comm req)
- 41 (1-301). **Humanities: The Enlightenment.** An introduction to the humanities. The development of rationalism and humanism. Readings in Pope, Voltaire, Locke, Rousseau, Tolstoy. (3 cr)
- 41A (1-311). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 41. (1 cr; prereq 41 or ¶41)
- 42 (1-302). **Humanities: The Industrial Revolution.** The classical economists and the romantic response. Readings in the classical, utopian, and Marxian economists, the romantic poets, Zola, Dostoyevsky, and Mill. (3 cr; prereq 41)
- 42A (1-312). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 42. (1 cr; prereq 42 or ¶42)

Course Offerings

- 43 (1-303). **Humanities: Age of Darwin.** The effect of evolution upon religion and morality of a changing society. Creativity in science and art. Readings in the evolutionists, Nietzsche, Shaw, and Thomas Mann. (3 cr; prereq 41)
- 43A (1-313). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 43. May be taken in conjunction with or immediately subsequent to Rhet 43. (1 cr; prereq 43 or f43)
- 47 (1-147). **Efficient Reading.** Designed to increase reading rate, comprehension, and vocabulary. For persons of average or above-average reading ability who wish to achieve or maintain superior scholastic status. Not a remedial course. (3 cr; Arts College students see *College of Liberal Arts Bulletin*)
- 48 (1-251). **Effective Listening.** Designed to increase listening comprehension by developing three central abilities. Readings, research, theory, and practice. (3 cr)
- 51 (3-551). **Exposition.** Informative writing, semitechnical and technical; letter of application; feature article; preparation for professional writing; review of usage and style. (3 cr; required of all students unless exempted through dept exam; prereq jr)
- 52 (3-562). **Technical Writing.** Methods of exposition in technical writing; types of reports; continuous practice in report writing. Designed to enable students to meet later professional responsibilities. (3 cr; prereq 51)
- 54 (3-254). **Advanced Public Speaking.** Training for specific speech situations most likely to be encountered professionally soon after graduation. Psychology of communication especially as related to use of visual aids, demonstration, performance methods, and radio. (3 cr; prereq 22)
- 56 (3-266). **Discussion Methods.** Study of and practice in structured and unstructured discussion. Emphasis on group dynamics and the psychology of leadership. Practice in leading meetings, debating, planning radio programs, organizing in-service training programs, evaluating group progress. (3 cr; prereq rhet comm req)
- 61** (3-371). **Humanities: Individualism — An American Problem.** Examination and evaluation of conflicts arising from varied interpretations of individualistic traditions in America. Readings in Emerson, Thoreau, Mark Twain, Frank Lloyd Wright, Herbert Hoover. (3 cr)
- 62** (3-372). **Humanities: Religion in American Thought and Experience.** Examination of the diverse values centered in American religious and philosophical thinking from the 17th century to the present. Readings in Jonathan Edwards, Emerson, William James, John Dewey, and others. (3 cr)
- 63** (3-373). **Humanities: Nationalism in American Thought and Experience.** Examination of the growth of political and cultural nationalism in America. Readings in Jefferson, Webster, Calhoun, Turner, Henry James, and John Dos Passos. (3 cr)
- 64 (3-374). **Special Problems in Humanities.** Primarily for supervised reading and research on problems not covered in regularly offered courses. (1-3 cr; prereq #)
- 71 (3-455). **Shakespeare.** Reading of selected plays from the early, middle, and late periods. Emphasis upon the understanding of Elizabethan dramatic art. (3 cr; prereq rhet comm req)

** Students may take any combination of Rhet 61, 62, 63.

- 73 (3-471). **American Literature I.** Historical and stylistic development from early account of the new continent to the end of the 19th century. (3 cr; prereq rhet comm req)
- 74 (3-472). **American Literature II.** Historical and stylistic development since 1900. (3 cr; prereq rhet comm req)
- 91 (0-291). **American Speech for Foreign Students.** Primarily for graduate students who wish to improve their command of oral English. Individual attention; laboratory procedure. Audio-visual equipment used to expedite work in vocabulary, enunciation, and pronunciation. (No cr; 3 hrs per wk)
- 92 (3-192). **Communication Problems for Foreign Exchange Groups.** For any exchange group composed of members of similar national origins. English studied as a second language. (3 cr; prereq elementary knowledge of oral and written English)
- 141 (5-301). **Humanities Seminar: The Individual and Society.** Examination of contemporary ethical and cultural values as manifested in such conflicts as: liberty and authority, freedom and organization, art and technology, science and religion. (3 cr; prereq 41, 42, 43 or #)
- 147 (5-147). **Adult Reading Programs.** Problems, methods, and research in this field. Survey and evaluation of program designs, including those suitable for TV. (2 cr)
- 151 (5-551). **Report and Thesis Writing.** For graduate students and for seniors anticipating graduate work. Organization of reports and theses; library investigation; presentation of data; methods of documentation. Emphasis upon revision of manuscripts and improvement in style of writing. (3 cr; prereq 51 or #)
- 169 (5-169). **Communication Problems and Processes.** An analysis of contemporary communication theories and research. Problems of language, perception, and status in the application of communication theory to professional activity and growth. (3 cr; grad level)

For Graduate Students Only

- 251 (8-251). **Seminar: Listening Comprehension**

Soil Science (Soil)

Students selecting soil science as an area of emphasis in the Agricultural Science and Industries, Biological and Physical Sciences in Agriculture, or in the Resource and Community Development curricula are expected to take a minimum of 18 credits in soil science. These should include Soil 52 taken in the junior or senior year and at least one 3-credit special problem in Soil 130. Students should select with the help of the adviser a sufficient number of applicable courses to complete the major sequence. The courses taken will be dependent upon the objective of the area of emphasis and the interest of the student.

- 18 (1-110). **Forest Soils.** Origin and classification of forest soils; factors of soil organisms; forest floor; physical and chemical properties; soil water and erosion control; management of forest nursery soils. (3 cr, \$19; prereq soph, [GeCh 5])

Course Offerings

- 18B (1-113). Forest Soils Laboratory.** Laboratory study of selected physical, chemical, and microbiological properties of soil. (1 cr; prereq 18 or ¶18)
- 19 (1-122). Introductory Soil Science.** Basic physical, chemical, and microbiological properties of soil. Soil genesis, classification, and principles of soil fertility. Lectures, laboratory. (4 cr, §18; prereq ¶GeCh 5)
- 51 (3-210). Soil Management and Land Use.** Land use intensity; capability of production; management of lime and organic matter; fertilizer ratios, placement, time and rate of application, and equipment. (3 cr; prereq 18 or 19 or #)
- 52 (3-128). Current Topics in Soils.** Assigned reading, reports, and discussions on soil topics. (1 cr; prereq 18 or 19)
- 53 (3-220). Soil and Water Management and Conservation.** Principles of soil water, temperature, and aeration; their effect on plant growth, and interaction with other soil properties. Effect of soil tillage methods and cropping systems on structure erosion control, water storage, and water infiltration. Techniques and organizations involved in soil and water conservation. Field trips, consultation, and reference work. (3 cr; prereq 18 or 19)
- 54 (3-412). Soil Fertility Evaluation.** Methods of soil fertility evaluation; soil tests and tissue tests and their use in fertilizer and lime recommendations; fertility demonstration techniques. Lectures, laboratory. (3 cr; prereq 18 or 19)
- 55 (3-512). Soil Geography.** Introduction to soil morphology and classification as essential to understanding distribution patterns of soils. Primary emphasis on soil geography of the state, region, United States, and the world. Interpretation of this geography with the use of soil maps and aerial photographs in various types of resource development. Lecture, laboratory, field trips. (4 cr; prereq 18 or 19)
- 101 (5-210). Soil Management and Land Use.** See Soil 51. (2 cr; prereq 18 or 19 or 119)
- 103 (5-220). Soil and Water Management and Conservation.** See Soil 53. (2 cr; prereq 18 or 19 or 119)
- 105 (5-512). Soil Geography.** See Soil 55. (3 cr; prereq 18 or 19 or 119)
- 119° (5-122). Intermediate Soil Science.** See Soil 19. (3 cr; prereq GeCh 5)
- 123° (5-420). Fertilizers.** History of the fertilizer industry; manufacture, characteristics, and use of important fertilizer nutrients. (3 cr; prereq 18 or 19 or 119 or #)
- 125° (5-520). Soil Development and Classification.** Soil profile characteristics; influence of parent material, climate, topography, vegetation, and time on soil development; system of soil classification; and world distribution of major soil groups. (3 cr; prereq 55 or 105 or #)
- 126° (5-232). Soil Physics.** Soil structure, compaction, tith, tillage; water infiltration, retention, availability, movement, and evaporation; heat capacity, flow, air porosity, diffusion, deficiency effects on plants, drainage requirement. Lectures and laboratory. (4 cr; prereq 18 or 19, Math 10 and 1 yr physics)
- 127° (5-612). Ecology of Soil Microorganisms.** (Same as MicB 103) Soil as a microhabitant; the nature of the microbial population of soil; interactions among microorganisms in the soil ecosystem; and significant activities of soil microorganisms. Lectures and laboratory. (4 cr; prereq MicB 53 or 153, or Biol 52, and #)

- 128° (5-310). **Soil Chemistry.** Chemical composition of soils; organic matter; mineral matter; ionic exchange; plant nutrients and factors affecting their availability. (3 cr; prereq 18 or 119; offered 1969-70 and alt yrs)
- 130° (5-114). **Special Problems in Soils.** Research, readings, instruction. (1-5 cr per qtr [10 cr max]; prereq 18 or 19 or 119)
- 131° (5-322). **Physical Chemistry of Soils.** Selected topics in physical chemistry as related to soils. Electrokinetic phenomena, colloidal behavior, interactions of organic and inorganic soil materials. (3 cr; prereq physical chemistry or #; offered 1969-70 and alt yrs)
- 132° (5-430). **Soil Fertility.** Plant root-soil relationships, chemistry of essential elements in the soil and plant; diagnosing soil deficiencies. (3 cr; prereq 18 or 19 or 119)
- 133° (5-240). **Microclimatology (Soils).** The study of meteorology and climatology in relation to the soil-atmosphere interface with particular emphasis on the microclimate; physical processes taking place within the microclimate; modification of the microclimate by agricultural practices; weather instruments and use of climatic data. (3 cr; prereq Math 10, 1 yr physics)
- 134° (5-550). **Organic Soils.** Formation, classification, and properties of organic soils; their use and management. Lectures and laboratory. (3 cr; prereq 18 or 19 or 119)
- 135° (5-333). **Soil Analytical Chemistry Techniques.** Instrumental methods of inorganic and organic chemical analyses in soils. Lectures and laboratory. (3 cr; limited to 10 students; prereq 18 or 19, 6 cr physics, one course in analytical chemistry)
- 136° (5-340). **Organic and Pesticidal Residues.** Examination of the fate of natural and synthetic organic materials in soil, with emphasis upon the chemical, physical, and biological factors of the soil which influence composition or persistence. (3 cr; prereq 19 and 9 cr in biochemistry and/or organic chemistry)
- 137° (5-532). **Soils and the Ecosystem.** The formation and distribution of soils in relationship to vegetation, climate, and other soil-forming factors. The interrelationships of soils in the ecosystem. (5 cr; limited to 20 students; prereq course in ecology; offered at Itasca)
- 138 (5-540). **Soil Resources and Land Use.** Examines current kinds of soil resource evaluations and contrasts these evaluations with those of the past. Presents land use patterns in terms of discussion of the interaction of technology and soil resources. Lecture and case study projects on land use of specific soil resource areas. (2 cr; prereq 18 or 19 or #)

***Courses in Programs Serving All Departments
in the College of AFHE***

Biometrics (Biom)

- 40 (1-010). **Introductory Statistics.** Statistical concepts, use, presentation and interpretation of data, elementary probability, and introduction to testing procedures. (3 cr; prereq college algebra or #)

Course Offerings

- 100 (5-010). Statistical Analysis I.** Statistical procedures in agricultural research; tests of significance, simple regression and correlation analyses, analysis of variance. (5 cr; prereq college algebra)
- 101 (5-011). Introduction to Statistical Analysis II.** (Continuation of Biom 100) Application of statistical methods to experimental research; multiple regression and correlation, covariance and extension of analysis of variance techniques. (5 cr; prereq 100 or equiv)
- 110 (5-020). Computers in Agricultural and Biological Research.** Impact of computers on research, FORTRAN programming, use of current libraries in processing statistical data, simulation techniques. (3 cr; prereq 101 or equiv)
- 171 (5-030). Sampling Techniques in Agriculture.** Simple random sampling, stratified random sampling, systematic sampling; cluster sampling; applications in agriculture and biology. (3 cr; prereq 101 or equiv)
- 181 (5-040). Experimental Design.** Principles of design in agricultural experimentation. Application, analysis, and interpretation of basic designs including factorials, incomplete blocks, change-over, and long-time experiments. (3 cr; prereq 101)

For Graduate Students Only

- 202 (8-050). Advanced Experimental Methods**
- 220 (8-060). Special Problems in Biometrics**

Plant Physiology (PIPh)

Students majoring in the Biological and Physical Sciences in Agriculture curriculum in the College of Agriculture, Forestry, and Home Economics will be interested in the following listing of courses in plant physiology. With the approval of the student's adviser the introductory courses in plant physiology may be used in partial fulfillment of the science requirement. Upper Division courses in plant physiology may also be taken when the student has the necessary prerequisites. These courses will serve to introduce the undergraduate to the field of plant physiology and will illustrate how knowledge in this special area of plant science may be utilized in private or government research and in college and university teaching and research. Undergraduates who wish further advice and information on plant physiology as a professional career should contact any of the faculty members listed in this area in the *Graduate School Bulletin*.

- 91 (3-091). Survey of Plant Physiology.** Physiological principles underlying processes that occur in living plants; emphasis on higher plants. Growth and development, mineral nutrition, water relations and solute metabolism, respiration, and photosynthesis. (3 cr; prereq Biol 2 or 51, GeCh 5 or 25)
- 91A (3-092). Plant Physiology Laboratory.** To accompany Bot 91. (2 cr; prereq 91 or 91)
- 167 (5-167). Physiology of the Plant Cell.** Characteristics of the living state, elements of the cell, general aspects of cell metabolism, carbon assimilation, development of the cell, polarity, differentiation, and irritability of the cell and

Plant Physiology

- cellular movements. (3 cr; prereq plant physiology, plant anatomy, inorganic and organic chemistry or biochemistry; offered 1970-71 and alt yrs)
- 168 (5-168). Experimental Protoplasmatology.** Physical and physiochemical properties of living protoplasm in plant cells, including viscosity, wall attachment, permeability, primary and secondary fluorescence, vital staining, and changes in these qualities in harmful and harmless environment. (3 cr; prereq plant physiology, cytology, organic chemistry or biochemistry and experience in light microscopy; offered 1969-70 [f] and alt yrs)
- 182 (5-182). Plant Physiology.** The plant cell and its organelles, metabolism including photosynthesis, and genetic control of physiological processes; dynamic aspects of these processes. (3 cr; prereq a course in biochemistry)
- 183 (5-183). Plant Physiology.** Membrane phenomena, water relations, mineral metabolism, and translocation in plants. (3 cr; prereq Biol 2 or 51, OrCh 42 or 62, physics)
- 184 (5-184). Plant Physiology.** Growth of higher plants, including regulation by hormones, light, and temperature. (3 cr; prereq Biol 2 or 51, OrCh 42 or 62, physics)
- 185. Physiology of Photosynthetic Microorganisms.** Primarily a lecture course. Application of spectrophotometry, manometry, and other techniques toward elucidation of physiological behavior, chemical makeup, and intermediary metabolism of algae and photosynthetic bacteria. (3-5 cr; prereq #; offered 1970-71 and alt yrs)
- 186A,B,C (5-701, 5-702, 5-703). Measurement of Plant-Environment Interactions.** A laboratory course dealing with measurements using intact plants, including water balance, plant-radiation interactions, and gas exchange between plants and the environment. (1-4 cr; prereq PCh 90 and #)
- 186A. Energy Transfer and Plant Temperature.** (2 cr)
- 186B. Gas Exchange.** (1 cr)
- 186C. Internal Water Stress.** (2 cr)
- 187A,B,C,D,E,F (5-721, 5-722, 5-723, 5-724, 5-725, 5-726). Methods of Plant Analysis.** (Same as Bot 187) Six discrete and independent laboratory units in plant physiology. In-depth experimental laboratory approach to microscopic analysis, sample preparation, fractionation, isolation, and measurement of plant compound employing modern methods of plant physiology. (1-6 cr; enrollment limited; prereq AnCh 57, 8 cr biochemistry, and #)
- 187A. The Primary Plant Metabolites.** (1 cr; offered 1970-71 and alt yrs)
- 187B. Plant Proteins and Amino Acids.** (1 cr; offered 1969-70 and alt yrs)
- 187C. Plant Hormones and Tissue Culture.** (1 cr; offered every yr)
- 187D. Chloroplast Metabolism and Plant Pigments.** (1 cr; offered 1970-71 and alt yrs)
- 187E. Plant Nucleic Acids.** (1 cr; offered 1969-70 and alt yrs)
- 187F. Analysis of Cell Structure.** (1 cr; offered 1970-71 and alt yrs)
- 188 (5-188). Research Perspectives in Plant Physiology.** A laboratory course in which the student undertakes a well-defined research problem of limited scope. (1-4 cr; prereq AnCh 57, 8 cr in biochemistry and #)

Course Offerings

For Graduate Students Only

- 251. Seminar: Plant Physiology
- 280. Radioisotope Techniques Applied to Biology
- 281. Growth and Differentiation of Plants
- 282. Advanced Topics in Plant Metabolism
- 283. Structural Physiology
- 284. Ecological Physiology
- 285. Photosynthesis
- 297. Special Topics

Additional courses treating the area of plant physiology are offered by several departments within the University. Your attention is directed to such courses as Soil 133, Soil 136, Agro 135 and 136, PIPa 109, Hort 245 as examples of such courses offered by departments in the College of AFHE.

Resource and Community Development (RCD)

(See pages 35-36)

- 100. **Interdisciplinary Seminar I.** Interdisciplinary seminar designed to help students develop the competence necessary for identifying and analyzing resource development problems. Subject matter discussions to reflect diverse disciplinary contributions. Students to contribute as members of a team combining disciplinary skills. Invited speakers. Student assignments. (3 cr; prereq Resource and Community Development)
- 101. **Interdisciplinary Seminar II.** (Continuation of RCD 100) Papers, presentations, critiques on selected complex resource development problems related to discussion programs in Seminars I and II. (4 cr; prereq 100)

Courses in the College of Veterinary Medicine Offered Cooperatively with Other Colleges for All University Students

- VAna 20. Essentials of Vertebrate Development and Structure.** Same as VAna 120 but designed for Lower Division undergraduate students. Laboratory assignments are less detailed than in VAna 120. (5 cr; prereq Biol 2 or 50 or #)
- VAna 120. Essentials of Vertebrate Development and Structure.** (Same as Zool 120) Principles and patterns of vertebrate anatomy, based on the developmental approach. (5 cr; prereq Biol 2 or Biol 50 or #)
- VM 52. Animal Hygiene.** Principles of animal health and disease with emphasis on prevention, control, and eradication. (5 cr)
- VM 150. Seminar: World Food Supply Problems.** (Same as AnSc 189, HE 172, PIPa 170, Soc 264, and VM 150) A multidisciplinary approach will examine

the social, economic, and technical problems of feeding the world's growing population. Principles will be sought from the social and economic sciences, the plant sciences, the animal sciences, and the nutritional sciences for their application to food problems. Limited enrollment. (3 cr; prereq major in agriculture, veterinary medicine, nutritional sciences, social science field or #...grad students by Δ only)

- VMic 53. General Microbiology.** (Same as MicB 53) Lectures and laboratory exercises concerning the morphology, taxonomy, genetics, physiology, and ecology of microorganisms. Practical application of the fundamental principles of microbiology to other phases of science and industry. (5 cr; prereq 10 cr chemistry, 4 cr biologic sciences)
- VMic 130. Poultry Disease Control.** General anatomy; physiology of digestion and reproduction; prevention and control of the more important diseases affecting poultry. (3 cr; prereq Biol 2, and AnSc 1, MicB 53 or equiv)
- VPaP 103. Diseases and Parasites of Wildlife.** Economic and biologic relationships of animal parasites and disease to regional wildlife. (3 cr; prereq #; offered 1969-70 and alt yrs)
- VPP 45. Systemic Physiology.** (Same as AnSc 45) Introduction to animal physiology, emphasizing the function of organs. (6 cr, §41, §42, §Poul 105, 106; prereq Biol 2, BioC 1 or equiv)
- VPP 109. General Endocrinology.** (Same as AnSc 109, Zool 109) The physiological effects of the endocrine organs and hormones. (3 cr; prereq 45 or 6 cr systemic physiology, or #)
- VPP 110. Physiology of Lactation.** (Same as AnSc 110) Anatomy, physiology, and biochemistry of the mammary gland; hormonal and neural factors responsible for mammary growth; initiation and maintenance of lactation; physiology of suckling and milking; milk synthesis and factors influencing the lactation curve. (3 cr, §DyHu 121; prereq 45, or #)
- VPP 111. Physiology of Reproduction.** (Same as AnSc 111, Zool 111) Fundamentals of reproductive physiology including functions of the reproductive organs, fertilization, estrous cycle and its endocrine control, reproductive efficiency and problems, and principles of artificial insemination. (3 cr, §AnSc 49, DyHu 149; prereq 45 or 6 cr systemic physiology, or #)
- VPP 134. Avian Physiology.** (Same as AnSc 134, Zool 134) Physiology of various species of wild and domestic birds. (3 cr; prereq 45 or 6 cr systemic physiology or equiv, #)
- VPP 150. Behavioral Physiology.** (Same as AnSc 150, Zool 150) Current concepts of neurological and neurochemical bases of animal behavior, including reception, coding, transmission, and storage of information; levels of integration, central control of input and output; spontaneity, development, and learning. (3 cr; prereq 45 or 6 cr systemic physiology, Biol 110, or #)

SECTION IV

SPECIAL INFORMATION

Grading System

Academic progress in the College of AFHE may be evaluated by one of two grading systems, the traditional letter grade system (A-F) or the P-N system now in use on a trial basis.

A-F System

Under the A-F system (A-B-C-D-F) each letter grade carries the following meaning and number of grade points per credit:

<i>Grade</i>	<i>Grade Points Per Credit</i>
A (Excellent)	4
B (Good)	3
C (Satisfactory)	2
D (Passing)	1
F (Failure)	0

The grade point average is determined by dividing the sum of the grade points by the sum of the credits passed and failed. A cumulative average of 2.00 (C) is required for graduation. Additional requirements related to the grade point average may be found in materials descriptive of specific curricula (see Agricultural Education and Horticultural Education).

P-N System

An experimental grading system directed toward encouraging students to explore academic areas other than those closely related to the major is now available. The P-N system hopefully reduces to some extent the pressures associated with the traditional grading system and encourages students to seek greater breadth in the educational experience.

Under the P-N system the symbol P stands for "pass" and N for "no credit." The dividing line between P and N is approximately the same as that between D and F. P and N grades are not included in the computation of the grade point average, but credits of P count toward graduation.

The following principles have been adopted as a guide for use of the P-N grading system by AFHE students:

1. All courses available to undergraduate students (those numbered under 200) are available on the P-N and the A-F basis except where specifically restricted by the department offering the course. (Consult course listings in this bulletin.)
2. A candidate for the baccalaureate degree from the college may present a maximum of 25 percent of the residence course credits offered for graduation in courses in which the student received a grade of "P."

Grading System

3. The P-N system shall be available to a student of the college irrespective of his academic standing.
4. A student will be limited to one course per quarter on the P-N grading system until such time as he has completed 36 credits. This option shall be in excess of any courses offered on the P-N basis only.
5. P-N registration must be declared at time of registration and may not be changed on or after the opening day of the quarter. A course for which a student has on some previous occasion registered on the A-F system shall not be taken at a later date on the P-N basis.
6. Where a course is identified by title and number in bulletin copy as being required, or as being *the* course recommended to fulfill a curriculum requirement, it will be taken under the A-F grading system. Prerequisites for required courses, and courses in the major, will be taken under the A-F system, unless exceptions are established.

Your adviser or the College Office will help you if you should have questions about use of the P-N system.

Other Symbols That May Be Used on the Transcript

The temporary grade of I (incomplete) may be assigned by the instructor when there is not sufficient information immediately available to permit assignment of a permanent grade.

• An I which has not turned into permanent grade by the end of the sixth week of the next regular quarter of attendance shall become an F or N depending upon the grading system of registration. An extension of time may be permitted for removal of I grades upon recommendation of the instructor concerned and with approval of the adviser and the AFHE Student Scholastic Standing Committee.

The registration symbol W indicates official cancellation from a class without grade. This symbol is assigned in all cases of official cancellations during the first 6 weeks of classes irrespective of the student's standing. After 6 weeks, W shall be posted only if the student is not failing at the time of official cancellation. Whether or not cancellation is permitted is within the authority of the student's adviser and the Student Scholastic Standing Committee to determine. A student who cancels officially or otherwise discontinues attendance of a class after the sixth week and is failing at the time shall receive an F or N.

The symbol X may be reported in continuation courses in which a student is permitted to continue but in which a grade cannot be determined until the sequence is completed. A grade will be submitted by the instructor for each X when the student has completed the entire sequence.

Registration as an auditor or visitor is indicated by the registration symbol V (visitor). Such registration requires the permission of the instructor and the adviser.

A symbol T (transferred) indicates credits transferred from another institution, or from one college to another within the University when reevaluation is required. It is posted as a preceding supplement to the original grade.

Special Information

If you should wish additional information about grading symbols you may contact the Office of Admissions and Records, 220 Coffey Hall, or the College Office, 215 Coffey Hall.

Scholarship Requirements

Satisfactory Progress — As a student in AFHE you are expected to make satisfactory progress in the curriculum you have selected. This is interpreted to mean a C average. The cases of students who are not reaching this standard are considered by the Committee on Student Scholastic Standing. It is always best for a student to see his class instructor or his faculty adviser as soon as he feels himself in difficulty rather than to wait until he has already received a poor grade.

In some curricula, as indicated in the curricular descriptions, a higher grade point average is required.

Scholastic Probation — If a student's scholastic work should be considerably below a satisfactory level of performance, he will be placed on probation and his program or work will be restricted as seems advisable to the Student Scholastic Standing Committee.

A student will be placed on probation if, at the end of 3 quarters of work or earlier, he has not attained a grade point average of 1.75. At the end of 6 quarters or earlier, he will be placed on probation if he has not attained a grade point average of 1.90.

Exclusion from College — Students may be excluded from the college under one of the following headings:

1. *Dropped for Low Scholarship* — When it becomes apparent that a student's work is of a quality that will not lead to graduation, he will be dropped and usually will not be permitted to apply for readmission until 9 months later.

A freshman may be asked to withdraw when his grade point average is less than 1.50 after 2 or 3 quarters of work in this college. A sophomore may be dropped if his average is less than 1.75 after 6 quarters (or 5 quarters if he began his freshman work in the winter or spring quarter). When the factors which contributed to the unsatisfactory work have been removed or satisfactorily corrected, a student may petition for permission to return. Otherwise, he is encouraged to make other plans.

2. *Hold for Committee Clearance* — Sometimes a student's scholastic difficulty indicates that he should not continue for the time being even though the record hardly requires official drop action. In such case his later return must be approved by the Student Scholastic Standing Committee.

3. *Discontinued* — If a student is pursuing an appropriate course but is handicapped by conditions he cannot control (ill health, necessary outside work, etc.) he may be required to discontinue his registration until these conditions have improved. When discontinuance takes place at any time other than the end of the quarter, the courses for which he is registered may be recorded as canceled without grade (W).

Readmission — If a student is dropped, he may not return without the permission of the Student Scholastic Standing Committee. Credits earned at other institutions during the period of suspension will not apply toward graduation from this college unless permission to earn such credits was given in advance by the Student Scholastic Standing Committee. If he is permitted to return,

he will be placed on probation and may be dropped again at any time when his work is unsatisfactory.

Classification of Students

Sophomore — If you are within 18 credits of the number usually earned in your curriculum for the first year and if you have completed 3 quarters of college work, you will be classified as a sophomore. The 3 quarters may include time spent at another institution of collegiate rank. A sophomore who lacks not more than 12 credits of being a junior and who has a B average may be permitted to register for courses in the 100 group. Students who have not attained junior classification and who are below a C average will not be permitted to register for courses numbered 100 or above for which graduate credit is given.

Junior — A total of 90 credits with a grade point average of at least 2.00 and completion of the rhetoric communication requirement is required for junior classification.

Senior — To be classified as a senior, you must not be more than 9 credits short of the number required for the first 3 years in your curriculum.

Transfer Students — If you transfer from a college outside the University and enter this college as a junior, you should have a grade point average of not less than 2.00 at the end of your first year. If you do not have this average, you will be classified as a sophomore.

Student Personnel Services

Faculty Advisers — In choosing your curriculum from the many different offerings in the College of AFHE, you will be assisted by a member of the faculty who will become your adviser. Your adviser will interpret the program to you, will guide you in program planning, and will be concerned with your general progress. When you have problems and need special attention, your adviser may refer you to other faculty members, to the College Office, or to one of the specialized personnel agencies.

Student Scholastic Standing Committee — Almost every student on occasion makes use of the Student Scholastic Standing Committee in the College of AFHE. This is a committee of the faculty which interprets and enforces faculty regulations. It also may make exceptions to regulations when they work to the educational disadvantage of a particular student, provided the basic spirit of the regulation is maintained. If you have any questions concerning the interpretation of faculty regulations, you should consult with your adviser or call at the College Office. By means of petition, the forms for which are procured in the Office of Admissions and Records, you may request adjustments of your program where departure from normal procedures appears to be justified. These requests, after they have been approved by your adviser, are turned in to the College Office, 215 Coffey Hall.

Special Information

If you transfer from another institution to the College of AFHE, your transfer credits are evaluated in the Office of Admissions and Records. You should see the admissions and records supervisor if you have any questions about the use of transfer credits. If necessary, you will be referred to the Student Scholastic Standing Committee which makes final decisions in evaluating transfer credits in terms of this college and the requirements of the various curricula.

College Placement Services— Assistance in securing employment after graduation is provided by the college. The College Office through its Placement Service (312 Coffey Hall) will bring job opportunities to your attention and will assist in arranging interviews with employer representatives. Representatives of over 100 firms and agencies annually visit the campus for purposes of interviewing degree candidates. While major attention is given to placement of graduates, arrangements frequently are made for placement of students in summer jobs with companies offering internships or other types of summer employment.

Student Government

Student Council— The Student Council directs and coordinates student activities and encourages student leadership throughout the St. Paul Campus. Its membership is drawn from all major areas of the College of AFHE, the College of Veterinary Medicine, and the College of Biological Sciences.

The council cooperates with the Minnesota Student Association (MSA) and the Senate Committee on Student Affairs. It brings questions from the student body to the administration of the colleges and discusses and reaches decisions on matters of general interest.

Honor System— Under the provisions of the Student Self-Government Honor System, the students in the College of AFHE, rather than the faculty, conduct examinations and quizzes. The honor system is operated on the assumption that honesty prevails among a large majority of students. Students place themselves on their honor not to give or receive aid during examinations. The responsibility of honesty is between student and student; the faculty does not place the student on his honor. Under the honor system the faculty permits students to conduct the examinations.

If you observe dishonesty during an examination period, you may take some appropriate step at the time to halt the dishonest act, or may report the incident later to the Honor Case Commission. The Honor Case Commission, comprised of students from the various areas, considers confidentially the various aspects of the situations reported. If it is clear that scholastic dishonesty has occurred, the commission recommends to the Student Scholastic Standing Committee of the faculty an appropriate action to be taken with respect to the offending student.

The honor system is essentially a preventive, rather than a punitive system and provides for greater freedom of action on the part of students on this campus. New students are urged to discuss the honor system with students previously registered in the college. The membership of the Honor Case Com-

Reserve Officers Training Corps

mission is posted in the post office (in Coffey Hall) together with a notice as to how members may be contacted for information or assistance.

Student-Faculty Intermediary Board — When you encounter situations with respect to your classwork which in your opinion need attention or clarification, you are urged to bring the matter to the attention of the Student-Faculty Intermediary Board. This is a joint committee of students and faculty who are interested in maintaining helpful relationships between members of the student body and the faculty. The membership of this board is also posted in the St. Paul Campus post office.

Student Center Board of Governors — The St. Paul Campus Student Center provides a rich program of social, cultural, and recreational activities and contributes in many ways to the educational objectives of the campus. Student participation in this varied program is encouraged. An elected board, the St. Paul Campus Student Center Board of Governors, made up of students representing the various academic units on the St. Paul Campus, formulates policy for operation of the Student Center and establishes its budget. Students wishing information about the Student Center, its operation, and opportunities to serve on the various planning and programming committees should inquire at the Information Desk, first floor of the Student Center.

Reserve Officers Training Corps

The ROTC, through its three services — Army, Navy, and Air Force — gives college men students an opportunity to combine military or naval training with their academic work. Students are eligible for ROTC enrollment if they are registered in academic courses leading toward degrees, if they are United States citizens, and if they meet physical and other qualifications. The general requirements of the three services and their special characteristics are described in the *Army-Navy-Air Force ROTC Bulletin*. Also you may make inquiries personally or by letter at the following offices in the University Armory: Military Science, room 108; Naval Science, room 203; Aerospace Studies, room 3.

SECTION V

FACULTY

Departments in Agriculture

Agricultural Economics

Professor

Vernon W. Ruttan, Ph.D., *head*
Sherwood O. Berg, Ph.D.
John Blackmore, Ph.D.
O. Uel Blank, Ph.D.
W. Keith Bryant, Ph.D.
Marguerite C. Burk, Ph.D.
Willard W. Cochrane, Ph.D.
Reynold P. Dahl, Ph.D.
Selmer A. Engene, Ph.D.
Darrell F. Fienup, Ph.D.
Paul R. Hasbargen, Ph.D.
John D. Helmberger, Ph.D.
Clifford G. Hildreth, Ph.D.
John S. Hoyt, Jr., Ph.D.
Harald R. Jensen, Ph.D.
E. Fred Koller, Ph.D.
Elmer W. Learn, Ph.D.
Wilbur R. Maki, Ph.D.
Lee R. Martin, Ph.D.
Truman R. Nodland, Ph.D.
Philip M. Raup, Ph.D.
Frank J. Smith, Ph.D.
Arley D. Waldo, Ph.D.

Associate Professor

James L. App, Ph.D.
Martin C. Christiansen, Ph.D.
Dale C. Dahl, Ph.D.
Jerome W. Hammond, Ph.D.
James P. Houck, Jr., Ph.D.
Willis L. Peterson, Ph.D.

Assistant Professor

Willis E. Anthony, Ph.D.
Boyd M. Buxton, Ph.D.
Charles H. Cuykendall, Ph.D.
Robert E. Evenson, Ph.D.
Mathew D. Shane, M.S.
Robert W. Snyder, Ph.D.
Jerome M. Stam, Ph.D.
John J. Waelti, Ph.D.

Agricultural Education

Professor

Milo J. Peterson, Ph.D., *chairman*
Harry W. Kitts, Ph.D.
R. Paul Marvin, Ph.D.
Keith N. McFarland, Ph.D.
Gordon I. Swanson, Ph.D.

Associate Professor

Edgar A. Persons, Ph.D.

Assistant Professor

Donald W. Priebe, Ph.D.

Agricultural Engineering

Professor

Landis L. Boyd, Ph.D., *head*
Evan R. Allred, Ph.D.
William F. Bear, Ph.D.
Arnold M. Flikke, M.S.
Andrew Hustrulid, Ph.D.
Kenneth A. Jordan, Ph.D.
Curtis L. Larson, Ph.D.
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John Strait, M.S.

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M. Ray Smith, Ph.D.

Instructor

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Richard O. Hegg, M.S.
James A. Moore, M.S.

Agricultural Journalism

Professor

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Gerald R. McKay, M.S.

Associate Professor

Milton M. Morris, Ph.D.
Josephine B. Nelson, M.A.
Raymond S. Wolf, B.S.

Assistant Professor

Eldon E. Fredericks, B.S.

Agronomy and Plant Genetics

Professor

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Charles R. Burnham, Ph.D.
Laddie J. Elling, Ph.D.
John A. Goodding, Ph.D.
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James C. Sentz, Ph.D.
Horace L. Thomas, Ph.D.

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Ronald L. Phillips, Ph.D.
David E. Polson, Ph.D.
Robert E. Stucker, Ph.D.
Deon D. Stuthman, Ph.D.

Animal Science

Professor

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John D. Donker, Ph.D.
Edmund F. Graham, Ph.D.
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Robert J. Meade, Ph.D.
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Hubert J. Sloan, Ph.D.
Paul E. Waibel, Ph.D.

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George M. Speers, Ph.D.
W. Ronald Osborne, Ph.D.

Biometrics

Professor

Hugo H. John, Ph.D.

Entomology, Fisheries, and Wildlife

Professor

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Laurence K. Cutkomp, Ph.D.
Allan G. Peterson, Ph.D.
A. Glenn Richards, Ph.D.
Lloyd L. Smith, Ph.D.
Thomas F. Waters, Ph.D.

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Marion A. Brooks, Ph.D.
L. Daniel Frenzel, Jr., Ph.D.
Basil Furgala, Ph.D.
Herbert M. Kulman, Ph.D.
Richard J. Mackie, Ph.D.
Roger D. Price, Ph.D.

Assistant Professor

Edward B. Radcliffe, Ph.D.

Food Science and Industries

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Charles V. Morr, Ph.D.

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Horticultural Science

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F. I. Lauer, Ph.D.
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O. C. Turnquist, Ph.D.
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R. A. Phillips, M.S.
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C. Stushnoff, Ph.D.

Plant Pathology

Professor

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Thor Kommedahl, Ph.D.
Roy D. Wilcoxson, Ph.D.

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Lucas Calpouzos, Ph.D.
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Matthew B. Moore, M.S.

Assistant Professor

David H. MacDonald, Ph.D.

Instructor

Frank H. Tainter, M.S.

Rhetoric

Professor

Ralph G. Nichols, Ph.D., *head*
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Ronald M. Brown, Ph.D.
Paul H. Cashman, Ph.D.
Francis E. Drake, Ph.D.
Thomas E. Pearsall, Ph.D.
William A. Rosendahl, Ph.D.
Edward B. Savage, Ph.D.
Eugene S. Wright, Ph.D.

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Starling W. Price, Ph.D.

Assistant Professor

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Sarah E. McBride, Ph.D.

Instructor

Loree A. Brock, M.A.
Warren Y. Gore, M.A.
Carolyn J. Sorensen, M.A.
John F. White, M.A.

Soil Science

Professor

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Harold F. Arneman, Ph.D.
Donald G. Baker, Ph.D.
George R. Blake, Ph.D.
Paul M. Burson, M.S.
Alfred C. Caldwell, Ph.D.
John M. MacGregor, Ph.D.
Richard H. Rust, Ph.D.
Edwin L. Schmidt, Ph.D.

Associate Professor

Russell S. Adams, Jr., Ph.D.
Rouse S. Farnham, Ph.D.
Janis Grava, Ph.D.
Lowell D. Hanson, Ph.D.
James B. Swan, Ph.D.

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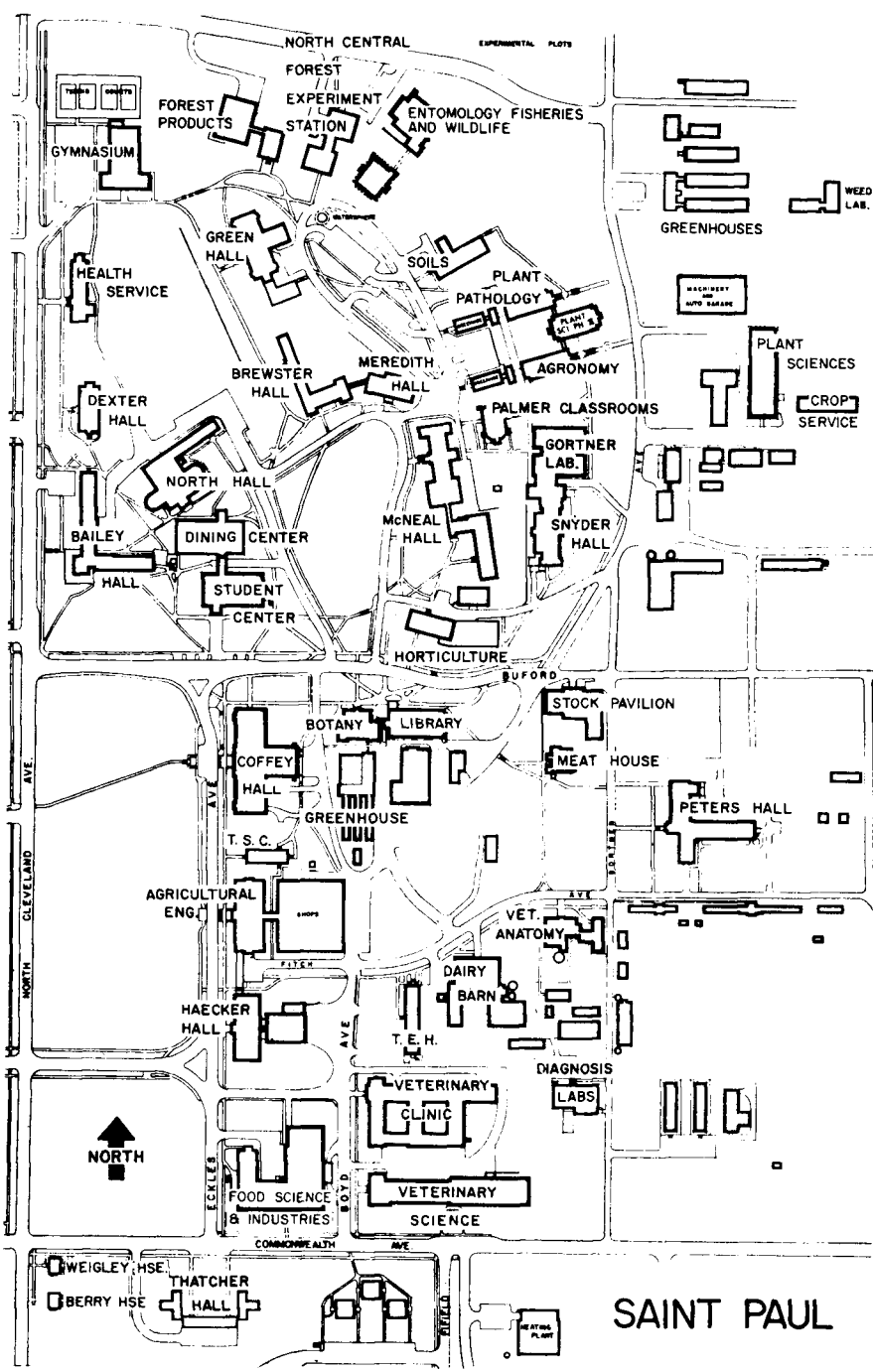
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HOW TO USE THIS BULLETIN

This bulletin is the basic source of information about the School of Home Economics. Keep it with you for repeated reference. You will use it in conjunction with the *General Information Bulletin* and the class schedules which are issued quarterly.

Section I gives information about admission, how you get a faculty adviser, and your program.

Section II lists the curricula and the courses you must take to complete each curriculum.

Section III describes courses open to undergraduates and to adult special students. Graduate students should refer to the *Graduate School Bulletin*.

Section IV gives information about general requirements and procedures and about student government in the College of Agriculture, Forestry, and Home Economics.

Section V lists faculty with whom you work.

Explanation of Symbols and Course Numbers

Courses primarily for freshmen and sophomores are numbered 1 through 49; for juniors and seniors, 50-99; for juniors, seniors, and graduate students, 100-199. Certain courses in the 100 range and all 200 numbered courses are limited to graduate students.

The following symbols are used throughout the bulletin and do not carry page footnotes:

- † To receive credit, all courses listed before the single dagger must be completed.
- ‡ Students may enter sequence course in any quarter which precedes the double dagger.
- § No credit is granted if credit was received for equivalent course listed after section mark.
- ¶ Concurrent registration is allowed with the course listed after paragraph symbol.
- ‡ Consent of instructor is required.
- △ Consent of department or school offering course is required.
- x after a course number indicates course is offered more than 1 quarter.

When no departmental abbreviated prefix precedes the course number listed as a prerequisite, that prerequisite is in the same department as the course being described. A prerequisite reading "6 cr" means 6 credits in courses offered by the "same" department.

UNIVERSITY OF MINNESOTA BULLETIN

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The contents of this bulletin and of other University bulletins, publications, or announcements are subject to change without notice.

MJ

University of Minnesota

College of Agriculture, Forestry, and Home Economics

*Announcement of
Undergraduate Programs
and Courses in*

HOME ECONOMICS

Separate bulletins contain the programs and courses in
Agriculture, Forestry, Liberal Arts, Education, and Graduate School

UNIVERSITY OF MINNESOTA

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School of Home Economics

Section I. GENERAL INFORMATION

Goals of the School of Home Economics

The School of Home Economics has two major goals. The first is to provide the opportunity for you to obtain a liberal education and to develop both the desire and ability to continue study throughout life. The second is to help you prepare for an entry level position in one of the home economics professions.

To achieve the liberal education goals, you will be expected to study in the areas of communication, language, and symbolic systems; physical and biological sciences; man and society; and artistic expression.

To achieve the professional goals, you will enroll in a series of three courses to develop understanding of the central purpose of home economics (the core courses) as it relates to all the professions for which it prepares. In addition, you will give intensive study to your particular interest field and to the disciplines with which it is closely allied.

Admission to the School of Home Economics

To be admitted to the School of Home Economics a student must make application to the Office of Admissions and Records, University of Minnesota, St. Paul, Minnesota 55101.

Listed below are requirements for admission to the programs in home economics.

High School Graduates — High school graduates in the upper 60 percent of their classes may enter if they have completed 12 units in grades 10-12. At least 9 of these should be in English, social studies and history, mathematics, natural science, and foreign languages. One unit in home economics may be included. Three units of English and 3 units in mathematics including 1 year of plane geometry and 2 years of algebra are required (elementary algebra if taken in grade 9 serves as 1 of these units). A student who expects to major in related art need present only 1 unit in mathematics (elementary algebra) for entrance. *However, if at a later date, this student changes to a different specialization, he will be expected to take additional mathematics on a noncredit, additional-fee basis to make up for the deficiency.*

Exceptions to the specific requirements listed above may be made by the College Office when additional information presented by the applicant indicates promise of academic success.

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Adult Special Students — A person may be admitted as a special student if he is a mature person (24 years of age or older) and wishes to register for particular courses to meet special needs. Normally, an adult special student will not be in residence for an extended period of time, but only for as long as he finds it necessary in order to secure the information that is specifically desired.

Students who enter the School of Home Economics of the College of Agriculture, Forestry, and Home Economics with the intention of transferring later to the Graduate School should confer with a graduate adviser in the chosen field and study the *Graduate School Bulletin*.

Admission with Advanced Standing — Credits from other accredited colleges and universities and from other colleges of the University of Minnesota which are appropriate for a student's course of study can be transferred to the College of AFHE. These will be evaluated by the Office of Admissions and Records. A course that is applied toward required credit is considered the equivalent of a specific course required in a curriculum here. Experience has shown that transfer credits for courses taken in home economics are frequently not applicable to courses offered in the junior and senior years, i.e., to courses numbered 50 or over, in the School of Home Economics. You will be expected to complete all required courses here and all area requirements regardless of the number of excess elective credits you may have.

Therefore it is important, in transferring to the School of Home Economics, to have planned your earlier programs carefully in order that your credits may apply with the greatest efficiency to the particular curriculum you desire to enter. If you are beginning your work in an institution other than the College of AFHE and plan to transfer at a later date, refer to the appropriate curriculum. You should note especially the requirements for the freshman and sophomore years. If you need further help you may write directly to the Office of Admissions and Records, Coffey Hall, University of Minnesota, St. Paul, Minnesota 55101, or you may confer with an adviser in the School of Home Economics.

Examinations upon Entrance — If you are a new student you are expected to have completed the American College Testing program and the Minnesota High School Statewide Testing program. These may be taken at the time of registration if not completed previously. Other examinations given at entrance will test your aptitude and achievement in English. Your admission to the University will not depend upon the results of these examinations if you are otherwise qualified.

Proficiency Examinations in Introductory Courses — The College of AFHE desires to correlate the courses taught here, as far as possible, with the technical courses taught elsewhere. If you have previously taken considerable work in technical courses, it may be unnecessary for you to repeat all or even part of them. Satisfactory performance on examinations in selected courses will permit you to substitute other courses for these. Students wishing to take proficiency examinations or to secure more information concerning them should contact the College Office in 215 Coffey Hall.

Transfer and Freshman Scholarships**

Scholarships — Students entering the School of Home Economics as freshmen may apply for all-University freshman scholarships some of which are specific to home economics. All applications are to be submitted on the University of Minnesota Scholarship Application Form to the Office of Student Financial Aid, 107 Armory Building, University of Minnesota, Minneapolis, Minnesota 55455. Scholarship information is sent to all Minnesota high schools in November of each year, and prospective students should consult with their high school principals concerning them; or correspond directly with the Office of Student Financial Aid on the Minneapolis Campus or with the College Office, 215 Coffey Hall, University of Minnesota, St. Paul, Minnesota 55101. At present, limited scholarship support is available to transfer students. You should note the need for early submission of applications and conform to the established deadline date.

Other scholarships or awards are distributed periodically to students in residence on the basis of specified criteria.

Selection of recipients for most scholarships is based upon academic aptitude, vocational promise, personal attributes, leadership, and, in most but not all of the scholarships, upon financial need.

The Students' Program

Adviser — When you enter the School of Home Economics as a freshman you are assigned a faculty adviser by the chairman of the freshman advisers. If you are a transfer student, you will be assigned an adviser by the chairman of the division in which your major resides. The adviser explains the requirements of the curriculum in which you are interested and helps you in planning your program as well as with other questions which may arise.

At the time of specialization (see page 11), you are assigned to an adviser in your major field by the chairman of the division in which the major is located.

It is important for you to keep in close contact with your adviser who expects you to take the initiative in making appointments. You will usually find a schedule sheet near the door of the office of your adviser.

Requirements of All Students — In addition to the specific requirements of each curriculum, the University of Minnesota believes that all of its students, whatever their area of specialization or their vocational goals, should hold in common the search for a liberal education. In the broadest sense a liberal education is one which frees us from the limitations placed by ignorance on our powers of judgment and choice. More specifically, a liberal education asks of us that we seek control over the general intellectual instruments for acquiring and communicating knowledge, primarily the instruments of language and number; that we seek understanding of the ways in which scientists contribute

** Refer to the *General Information Bulletin* for further information.

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to man's knowledge of himself and his environment; that we seek historical and philosophic perspective on the nature of our own lives and the world in which we live; and that we seek appreciation of the creative insights into life and nature provided by literature and the arts.

Rapid and dynamic changes and innovations are constantly occurring in all professions. Only those persons with wide horizons, and with sensitivity and perspective, will be able to make the wise value judgments and adjustments required by these changes. By encouraging a liberal education the college hopes to prepare a student to be poised, articulate, and able to communicate his ideas, and to have an appreciation of the value of interpersonal relationships. The college believes that these goals can be encouraged and sought concurrently with the development of technical-professional competence in depth in the student's specialty.

The following outline is a summary of course requirements and suggested courses particularly suitable for fulfilling the purposes sought by the all-University Council on Liberal Education (C.L.E.) as part of a Bachelor's degree program in the School of Home Economics.

SUGGESTED COURSES TO MEET C.L.E. REQUIREMENTS

I. Communication, Language, Symbolic Systems (18 credits)

A. English and Foreign Language Communication Skills

Engl 1-2-3¹, A-B-C²
Comm 1-2-3³
Comp 27, 28, 58
Jour 106

Rhet 1-2-3, 22, 26, 47, 51
Spch 5, 50, 51, 81, 106 (see note 4)
All beginning foreign language courses

B. Linguistics, Rhetoric, Logic, Philosophic Studies

Anth 85, 180, 181
Clas 48, 56, 68
Comm 1-2-3³
Engl 165, 166
Ling 1-2-3

Mathematics — all courses through 44
Phil 1, 2, 70, 151, 154, 160, 162
Spch 2, 51, 67, 106, 169 (see note 4)
Econ 40
Stat 41

II. The Physical and Biological Sciences (15 credits)

A. The Physical Universe

Ast 11, 51, 52, 53
BioC 1
GeCh 4, 5
Geo 1, 2, 11, 122

NSci 1, 2, 4-5-6
Phys 1-2-3, 4-5-6, 7-8-9, 21, 22, 23
Soil 19

B. The Biological Universe

Anth 170, 173, 175
Biol 1, 2
Bot 10, 12
Ent 5
FSci 20

GCB 66, 67, 68
MicB 53
NSci 3
Phsl 2, 51

III. Man and Society (15 credits)

A. Analysis of Human Behavior and Institutions

AgEc 1-2-3
 Anth 1A, 2A, 80, 100, 150, 165
 CPsy 80, 81
 Econ B-C, 1-2, 20, 50
 Ed 101, 180
 FamS 1, 1A, 25

Geog 1, 4, 41, 67, 78, 100
 Spch 61
 Jour 3, 90, 109
 Pol 1, 2, A, B, 25, 26, 30, 80, 81
 Psy 1, 2, 4-5-8, 10, 55, 75
 SSci 51-52-53, 71-72-73
 Soc 1, 2, 3, 14, 53

B. The Development of Civilization: Historical and Philosophic Studies

Anth 90
 Clas 122, 123
 Econ 80
 History — all courses through 63
 (see note ⁵)

Languages — Fren 60-61-62, Ital
 60-61-62, and Span 60-61-62;
 Hebr 74, 75; Arab 161, 162;
 Russ 75-76-77; Ortl 75, 76, 77,
 78
 NSci 171-172-173
 Pol 40, 60, 61
 Phil 3, 50-51-52, 53, 103, 105,
 107, 108, 109, 110, 150, 171,
 182

IV. Artistic Expression (9 credits)

A. Literature

Clas 1, 2, 3, 4-5-6, 42, 46, 80,
 81, 82, 91, 92, 93
 Engl 1-2-3¹; A-B-C²; 21-22-23,
 37-38-39, 52, 53, 54, 55-56,
 66, 67, 72-73-74
 Foreign language literature courses
 Hist 14A, 15A, 16A

Hum 1-2-3, 4, 1A-2A-3A, 11, 12,
 13, 21-22-23, 51, 52, 53, 54,
 61, 62, 63, 71-72-73
 Jour 103
 Rhet 31, 32, 33, 34, 35, 36, 37,
 41, 42, 43, 61, 62, 63, 71, 72,
 73, 74
 Spch 81⁴

B. The Arts

Anth 166
 Arch 1, 51, 52, 53, 54, 55, 56
 ArtH 1, 2, 3, 4, 47, 50, 56, 57,
 58, 77, 78
 ArtS 10, 11, 20, 23, 24, 25, 32,
 33, 40, 41, 45
 HE 20, 21, 120

Mus 1, 4, 31, 32, 33, 34, 35, 36,
 39, 40, 41, 42, 43, 44, 45, 46,
 47, 48, 49 (see also 11 through
 30 for individual instruments)
 PEW 80, 87, 88, 89
 Spch 3
 Th 11, 12, 21, 22, 23

NOTE — Credit distributed among categories as follows:

¹ Engl 1-2-3 — 9 cr comp, 3 cr in IVA

² Engl A-B-C — 6 cr comp, 9 cr in IVA

³ Comm 1-2-3 — 9 cr comp, 3 cr in IB

⁴ Spch 51 — 2 cr in IA and 1 cr in IB; Spch 81 — 1 cr in IA and 2 cr in IVA; Spch 106 — 1 cr in IA and 2 cr in IB

Core in Home Economics — The School of Home Economics requires all students to complete the 9-credit core (HE 5, 15, 99). The function of the core is to develop in the majors an understanding of home economics as an applied and professional field with a focus on home and family; purposes of the home economics field, its methods of inquiry, the relation of the specialization in it to the total field of home economics; and the current problems and issues.

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As you examine the curriculum in which you are interested, you will see that all of these requirements are included along with other courses needed to prepare you for your chosen career. You should also be aware that the curricula include courses that important accrediting groups believe to be essential. For example, the preparation of graduates to work with interior design meets standards of the American Institute of Designers when the appropriate collateral field is selected; those who complete work in dietetics and food service administration meet standards of the American Dietetic Association for internships; and those in education are eligible for certification to teach in departments which receive federal and state money (vocational departments).

Registration and Class Attendance

Fees — For information about fees, see the *General Information Bulletin*.

Registration — The Office of Admissions and Records announces the registration dates for each quarter. If you are accepted for admission, the dates for registering and detailed instructions will be included in the information that is sent to you. Students in residence are informed through the *Official Daily Bulletin* of the registration dates for each quarter. Faculty advisers will assist you in developing your quarterly program.

Quantity of Work — The normal load of work for each quarter is 16 to 18 credit hours. Each credit hour requires, on the average, 3 hours of time involvement each week. These may be distributed as follows: 1 hour of lecture or recitation requiring 2 hours of preparation; 2 laboratory periods requiring 1 hour of preparation; or 3 laboratory periods requiring no outside preparation. If you are employed, a lighter load should be planned. To carry more than 18 hours of credit, you must have a C average (grade point of 2.00).

Usually work may be completed in 4 years. If you change specializations or carry a lighter-than-average load, summer terms or additional quarters may be necessary. By careful planning and use of summer terms, work in some majors may be completed in less than 4 years.

Auditors — The approval of the Student Scholastic Standing Committee, your adviser, and the instructor is necessary if you wish to register for a course as an auditor. An auditor must enroll officially for a course and must pay the same fee that is charged for regular membership in the class. He does not take the final examination and is not given a grade or credit for the course.

Changes in Registration — To change your registration you must obtain Change of Registration Forms from the Office of Admissions and Records. Changes should be made only when necessary or highly desirable and they should be made as early as possible in a quarter.

During the first 6 weeks you may cancel a course without grade and with only your adviser's approval. After the sixth calendar week you are required to have the approval of your adviser, the instructor, and the Student Scholastic Standing Committee. However, withdrawal from a course after the sixth calen-

dar week of the quarter is strongly discouraged unless extenuating circumstances exist. Cancellations within the last 2 weeks prior to the beginning of the quarterly final exam period will seldom be approved. The instructor must indicate your grade at the time of cancellation. If the grade is passing, you will be permitted to cancel with W on your report, or without grade. If it is failing, this is indicated by a grade of F. A student who is doing failing work and discontinues attending class after the sixth week but does not officially cancel will also receive a grade of F.

During the first week of the quarter you may add a course with the approval of your adviser only. After the first week you must have the approval of your adviser, instructor, and the Student Scholastic Standing Committee.

Certain courses may be taken on the P-N basis. The student must indicate at the time of registration whether he expects to take work on the A-F or P-N basis (see *General Information Bulletin* for greater detail).

Cancellation of Entire Registration — If you leave college before the end of the quarter, you should cancel your registration at the time you discontinue attending class. Cancellation within the first 6 weeks entitles you to a refund proportional to the amount of time you attended class. If you do not attend classes at all, you are entitled to a full refund. You should inform your adviser of cancellation.

Class Attendance — In the College of AFHE, attendance is compulsory for certain classes only, because of the nature of such classes. If you miss class for good reasons beyond your control, you have the privilege of requesting the instructor's assistance in making up the classwork you miss. The instructor is under no obligation, however, to give assistance if you willfully or deliberately absent yourself from class, although there are situations in which he may properly wish to do so.

The following situations will be accepted by instructors as reasons that would justify absence from class and a request for assistance in making up work: (a) illness certified by a physician; (b) emergencies caused by a death or serious illness in the immediate family; (c) absence approved by the Student Scholastic Standing Committee; and (d) participation in University-approved, cocurricular activities (certification that a student was absent from class because he was engaged in such activities will be made by the dean of students).

Credit Without Class Attendance — If you wish to secure full credit for a course for which you have adequate training and preparation, you may apply for permission to take a special examination. It may be taken during the first quarter in residence without fee; after that time a fee of \$5 is required. Special examinations in which a grade of C or better is earned are recorded with credit and grade as part of the student's college record.

You may register for a course as a reading course (individual work) during the quarter in which the course is regularly offered, with the approval of your adviser, the instructor in the course, and the Student Scholastic Standing Committee, under the following conditions:

1. When a course normally offered is canceled because of inadequate registration.

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2. When, because of conflicts, the student finds it impossible to schedule the course at the time it is offered.

It is assumed that you will complete the work of the course during the quarter in which you are registered for it and take the final examination at the regularly scheduled time.

Quality Credits — The number of free elective credits required for graduation may be decreased by 1 for each 5 grade points in excess of those required to reach an average of 2.70. Free electives are those you may choose without regard to curricular or all-College requirements. Not more than one-twelfth of the total number of credits required for graduation may be gained through excess grade points.

Section II. CURRICULA

Specializations Offered — Seven divisions within the School of Home Economics offer a variety of curricula which are presented in detail in this section. A brief summary of these specializations follows:

1. Family Social Science
 - Family Relationships
 - Family Economics
2. Foods
 - Foods in Business
 - Foods Major, Journalism Minor
 - Preparation for Research in Foods
3. Home Economics Education
 - Home Economics Teaching
 - Home Economics Extension
4. Household Equipment
 - Preparation for Research in Household Equipment
 - Household Equipment in Business
5. Nutrition and Food Service Administration
 - Dietetics
 - Food Service Administration
 - Nutrition Science
6. Related Art
 - Interior Design
 - Costume Design and Fashion
 - Decorative Arts: Art History
 - Decorative Arts: Studio
7. Textiles and Clothing
 - Textiles and Clothing in Business
 - Textiles and Clothing Major, Journalism Minor
 - Preparation for Research in Textiles and Clothing
8. General
 - General Home Economics
 - Home Economics and Nursery School Certification

Application for Specialization — At the time of entry, you may indicate your intent to specialize (major) in a certain field. However, formal application

Curricula

for a specialization is not made until the third quarter of the sophomore year. The procedure is as follows (except for home economics education**):

1. Obtain specialization form at the Office of Admissions and Records in Coffey Hall.
2. Schedule conference with adviser and take form to adviser at scheduled time for approval.
3. Schedule conference with chairman of the division in which your major falls for final action.
4. Return completed form to Office of Admissions and Records.

If this specialization form is not filed at the designated time, further registration may be withheld.

The curriculum as indicated on the specialization card becomes the curriculum required for graduation. Copies of the approved curriculum are sent to you, to your adviser, and to the Student Scholastic Standing Committee. In case the major is changed to a different area, a new adviser must be assigned and a new specialization form submitted.

Application for Home Management Laboratory — A student who wishes to take HE 86 or 86A needs to file an application no later than the third quarter of the junior year indicating three times when the course might be scheduled in his program. Application forms are available at 212 McNeal Hall. A \$10 deposit payable at the home economics office, 200 McNeal Hall, is required the quarter preceding registration in the course.

A Curriculum Enrichment Program in International Affairs — Interested students may use elective credit or take courses beyond the minimum required for graduation and earn a program certificate in international affairs. See your adviser for specific information.

1. FAMILY SOCIAL SCIENCE

Two undergraduate specializations are offered within this division: (a) family relationships emphasis, and (b) family economics emphasis. These curricula are designed to meet the needs of students interested in social science research positions and social welfare positions concerned with the family. Positions available include junior social science analyst and junior home economist with state and federal government agencies, family life extension specialist, social welfare worker, and researcher. Properly qualified students will be encouraged to participate in the research program of the division, including paid employment during the summer between junior and senior years, or the

** For procedure for home economics education major, see the home economics education section of this bulletin.

federal government's junior trainee program. Students may specialize in either the economic or the interpersonal relational aspects of the family.

All students must meet the requirements under groups I, II, III, and either IVA or IVB.

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
 Rhet 22 — Public Speaking (3)
 Soc 1 — Man in Modern Society (3)
 AgEc 1-2-3 — Economics (9)
 (or) Econ 1-2 — Principles of Economics (8)
 Psy 1-2 — General Psychology (6)
 Math 10 — College Algebra and Analytic Geometry (5)
 (or) Math 10A — Algebra, Analytic Geometry, Elementary Functions (5)
 (or) Math 15 — College Algebra (5)
 PubH 5 — Individual, Public Health (3)
 (or) PubH 50 (see jr-sr list)
 12 credits in humanities or 9 credits to be selected from literature, philosophy, non-studio courses in art, music, or theatre arts (C.L.E. list)
 HE 5 — Home Economics in Contemporary Society (3)
 HE 15 — Home and Family in Society (3)
 Natural science — Select option required for area of secondary emphasis, identified by matching letter (see III)

Option A

- NSci 1-2-3 — Orientation to Natural Sciences (15)

Option B

- GeCh 4-5 — General Principles of Chemistry (10)
 BioC 1 — Elementary Biochemistry I (5)

Option C

- GeCh 4-5 — General Principles of Chemistry (10)
 Phys 1-1A-2-2A-3-3A — Introductory Physics (12)

Option D

- GeCh 4-5 — General Principles of Chemistry (10)
 BioC 1 — Elementary Biochemistry I (5)
 GC 10A — Principles of Biology (5) (and)
 GC 10B — Human Body: Structure, Function, Health (5)
 (or) Biol 1-2 — General Biology (10) (and)
 Phsl 51 — Human Physiology (5)

II. JUNIOR-SENIOR YEARS

- HE 85 — Home Management Principles (3)
 HE 87 — Family Relationships (3)
 HE 99 — Senior Seminar (3)
 HE 183 — The Family in World Perspective (3)
 HE 186 — Family Economics (3)
 CPsy 80 — Child Psychology (3)

- Rhet 51 — Exposition (3)
 PubH 50 — Personal and Community Health (3)
 (or) PubH 5 (see fr-soph list)
 AgEc 56 — Micro-Economics of Consumption (3)

III. REQUIRED COLLATERAL FIELD OR AREA OF SECONDARY EMPHASIS

These courses may be taken at appropriate times in the college program. Fifteen (15) credits from one of the following alternative combinations of home economics areas or 20 credits from two areas. Refer to natural science requirements above for science prerequisites for the area with exception of a few introductory courses (see course prerequisites).

Alternative A — Related Art and/or Clothing

Alternative B — Textiles

Alternative C — Household Equipment

Alternative D — Foods and/or Nutrition

Curricula

IVA. REQUIRED FOR FAMILY RELATIONSHIPS OPTION

- Psy 4-5 — Introductory Laboratory Psychology (4)
Anth 2A — Cultural Anthropology (5)
Soc 80-81-82 — Sociological Methods (9)
9 credits in history or 3 credits in history and 6 in modern foreign language
HE 182 — Parent in American Society (3)
HE 185 — Theory and Research Methods in Family Relationships (3)
HE 190 — Colloquium in Family Relationships (2)
Soc 120 — Social Psychology (3)
Soc 126 — Family Development (4)
Minimum of 8 credits in one or more of the following fields: anthropology, child psychology, psychology, or pre-social work with these courses recommended:
Anth 150 — Cultural Change, Development (3)
Anth 164 — Social Anthropology (3)
Psy 120-121 — Personality (6)
CPsy 100 — Processes of Socialization of Children (3)
CPsy 140 — Behavior Problems (3)
CPsy 188 — Children in Society (3)
CPsy 189 — Parent-Child Relationships (3)
SW 90 — American Social Welfare (5)
SW 91 — Social Work Process (4)
SW 95, 96 — Field Experience (1-6 cr per qtr)
Soc 123 — Minority Group Relations (3)
Soc 144 — Social Stratification and Mobility (3)
Soc 145 — Urban Sociology (3)
Soc 160 — Rural Community Organization (3)
Soc 161 — Rural Community Analysis (3)
Soc 162 — Rural Social Institutions (3)
HE 187 — Readings in Family Relationships (1-3)

IVB. REQUIRED FOR FAMILY ECONOMICS OPTION

- AgEc 40 — Agricultural Marketing (3)
AgEc 157 — Macro-Economics of Consumption and Distribution (3)
Pol 1-2 — American Government and Politics (6)
Soc 80-81-82 — Sociological Methods (9)
Econ 65 — Intermediate Economic Analysis I (3)
Econ 66 — Intermediate Economic Analysis II (3)
Econ 75 — Intermediate Economic Analysis III (3)
Econ 120 — Economics of Consumption (3)
2 years of a foreign language or 2 years of mathematics are recommended, including Math 40A
9 credits from the following:
HE 182 — Parent in American Society (3)
HE 185 — Theory and Research Methods in Family Relationships (3)
HE 190 — Colloquium in Family Relationships (2)
Econ 160 — Comparative Economic Systems (3)
Econ 170 — Economics, Ethics, and Economic Philosophy (3)
Psy 4-5 — Introductory Laboratory Psychology (4)
Soc 120 — Social Psychology (3)
Soc 123 — Minority Group Relations (3)
Soc 126 — Family Development (4)
Soc 144 — Social Stratification and Mobility (3)
Soc 145 — Urban Sociology (3)
Soc 160 — Rural Community Organization (3)
(or) Soc 161 — Rural Community Analysis (3)
(or) Soc 162 — Rural Social Institutions (3)

2. FOODS

The objectives of the foods division are to help the student to achieve understanding of the concepts fundamental to the science of food and to the economic and social aspects of food; to apply these concepts to the selection, preparation, and utilization of food; to provide education in the area of foods which orients the student to his profession, provides him with the basic understandings necessary to his profession, and assists him in cultivating professional attitudes.

Undergraduate Curricula Offered by Foods Division — The foods division offers three undergraduate programs leading to the Bachelor's degree: (1) foods in business, (2) foods with journalism minor, and (3) preparation for research in foods. Persons having interests and abilities in the applications of physical and social sciences to use of food will find challenging and worthwhile opportunities awaiting them. Those having interest in the basic sciences as related to food may find the preparation for research curriculum more suitable for meeting their future professional needs.

Foods in Business

It is the purpose of this curriculum to prepare the student for professional work in areas relating to the promotion, product development, marketing, and consumption of food. A graduate may expect to be engaged in work of an educational, public relations, advertising, promotional, or developmental nature. His role in any of these positions may include several different aspects of foods, such as developing new products as well as improving existing products, testing and developing new processing and packaging techniques, writing food releases for various communication media, etc.

For this specialization, a grade of at least C is required for the following courses: HE 40, 41, 142, 170, and Rhet 22.

All students must meet the requirements under groups I, II, and III.

I. FRESHMAN-SOPHOMORE YEARS

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|---|--|
| Rhetoric — Freshman communication requirement (9) | GeCh 4-5 — General Principles of Chemistry (10) |
| Rhet 22 — Public Speaking (3) | OrCh 61-62 — Elementary Organic Chemistry (10) |
| HE 5 — Home Economics in Contemporary Society (3) | (or) BioC 1 — Elementary Biochemistry I (5) |
| HE 15 — Home and Family in Society (3) | Phys 1 and 2 or 3 — Introductory Physics (6) |
| 6 credits from HE 19, 21, 23, 24A | MicB 53 — General Microbiology (5) |
| HE 31 — Principles of Nutrition (3) | AgEc 1-2-3 — Economics (9) |
| HE 40 — Food Preparation (5) | Psy 1-2 — General Psychology (6) |
| HE 41 — Food Management and Marketing (5) | Jour 11 — Reporting for Nonmajors (3) |
| HE 49 — Household Equipment (3) | 6 credits in literature and the arts (3 credits if HE 21 is elected) |
| Math 10 — College Algebra and Analytic Geometry (5) | |
| (or) Math 15 — College Algebra (5) | |
| Biol 1-2 — General Biology (10) | |

II. JUNIOR-SENIOR YEARS

- | | |
|---|---|
| Phsl 51 — Human Physiology (5) | HE 140 — New Developments in Food Preparation (3) |
| HE 50 — Textiles (4) | HE 141 — Current Literature in Foods (3) |
| HE 71 — Demonstrations (1) | HE 142 — Experimental Cookery (3) |
| HE 73 — Experimental Foods (3) | HE 146 — Special Food Problems (3) |
| HE 85 — Home Management Principles (3) | HE 170-171 — Human Nutrition (6) |
| HE 86 — Home Management Laboratory (4) | HE 174 — Nutrition Topics (1) |
| HE 88 — Introduction to Food Quality Evaluation (3) | Psy 156 — Psychology of Advertising (3) |
| HE 99 — Senior Seminar (3) | Biom 40 — Elements of Statistics (3) |
| HE 120 — Art History (3) | (or) Soc 80-81 — Statistics (6) |
| | Rhet 51 — Exposition (3) |

Curricula

III. 15 CREDITS SELECTED FROM FOLLOWING

- Jour 6 — Beginning Photojournalism (3)
(or) GC 26 — Photography (3)
GC 22C — Creativity, Creative Personalities (3)
Jour 41 — Publications Editing (3)
Jour 55 — Newspaper Editing (2)
Jour 60 — Graphic Arts: Processes (3)
Jour 73 — Magazine Writing (3)
AnSc 32 — Meat Science (4)
Rhet 54 — Advanced Public Speaking (3)
HE 63 — Quantity Food Purchasing and Production (5)
Soc 1 — Man in Modern Society (3)
Math 40 — Introduction to Calculus (5)
- (or) Math 42-43-44 — Analytic Geometry and Calculus I-II-III (15)
AgEc 40 — Agricultural Marketing (3)
AgEc 56 — Micro-Economics of Consumption (3)
Econ 65 — Intermediate Economic Analysis I (3)
Econ 66 — Intermediate Economic Analysis II (3)
Mktg 57 — Principles of Marketing (3)
BioC 51-52 — Introduction to Biochemistry (8)
AnCh 57A-B — Quantitative Analysis (5)

Foods Major, Journalism Minor

It is the purpose of this curriculum to prepare the student for professional work in areas requiring an introductory knowledge of journalistic problems and practices in addition to a basic understanding of food sciences. A graduate may expect to find employment with industry-supported institutes, food processing companies, and equipment manufacturing firms in which home economists with some journalistic background are employed. A limited number of positions is also available on the staffs of magazines, newspapers, and trade journals.

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
Rhet 22 — Public Speaking (3)
HE 5 — Home Economics in Contemporary Society (3)
HE 15 — Home and Family in Society (3)
3 credits from HE 19, 21, 24A
HE 31 — Principles of Nutrition (3)
HE 40 — Food Preparation (5)
HE 41 — Food Management and Marketing (5)
HE 49 — Household Equipment (3)
Math 10 — College Algebra and Analytic Geometry (5)
(or) Math 15 — College Algebra (5)
Biol 1-2 — General Biology (10)
GeCh 4-5 — General Principles of Chemistry (10)
BioC 1 — Elementary Biochemistry I (5)
(or) OrCh 61-62 — Elementary Organic Chemistry (10)
- NSci 4 — Physical World (4)
(or) Phys 1 and 2 or 3 — Introductory Physics (6)
MicB 53 — General Microbiology (5)
Soc 1 — Man in Modern Society (3)
AgEc 1-2-3 — Economics (9)
Psy 1-2 — General Psychology (6)
6 credits in literature and the arts (3 credits if HE 21 is elected)
Comp 27 or 28 — Advanced Writing (3)
Jour 1 — Introduction to Mass Communication (3)
Jour 11 — Reporting for Nonmajors (3)
Jour 18 — Principles of Advertising (3)
Jour 41 — Publications Editing (3)
GC 26A — Photography (3)
(or) ArtS 10 — Photography (3)
(or) AnSc 32 — Meat Science (4)
(or) HE 131 (see jr-sr list)

II. JUNIOR-SENIOR YEARS

- Phsl 51 — Human Physiology (5)
HE 50 — Textiles (4)
HE 71 — Demonstrations (1)
HE 73 — Experimental Foods (3)
HE 85 — Home Management Principles (3)
HE 86 — Home Management Laboratory (4)
- HE 88 — Introduction to Food Quality Evaluation (3)
HE 99 — Senior Seminar (3)
HE 120 — Art History (3)
HE 131 — Laboratory Problems in Household Equipment (3)

- (or) GC 26A (see fr-soph list)
 (or) ArtS 10 (see fr-soph list)
 (or) AnSc 32 (see fr-soph list)
 HE 140 — New Developments in Food Preparation (3)
 HE 141 — Current Literature in Foods (3)
 HE 142 — Experimental Cookery (3)
 HE 146 — Special Food Problems (3)
 HE 170-171 — Human Nutrition (6)
 Biom 40 — Elements of Statistics (3)
 Rhet 51 — Exposition (3)
- Jour 55 — Newspaper Editing (2)
 (or) Jour 60 — Graphic Arts: Processes (3)
 Jour 73 — Magazine Writing (3)
 (or) Jour 71 — Business News and Feature Writing (3)
 Jour 53 — Picture Editing (3)
 (or) Jour 74 — Magazine Editing (3)
 (or) Jour 79 — Advertising Copy Writing (5)
 (or) Jour 90 — Mass Communications and the News (3)

Preparation for Research in Foods

It is the purpose of this curriculum to prepare the superior student for continuing study at the graduate level toward the Master's or Ph.D. degree. Persons completing the advanced degree may expect to enter research or college teaching positions; however, those completing only the B.S. degree can find employment in junior positions in product development and research laboratories. Two major emphases are offered in the curriculum — Option I with emphasis in the biological and physical sciences, and Option II with emphasis in economics and social science. Selection of the option should be done after consultation with a Graduate School faculty adviser in the foods division. A grade point average of 2.50 must be maintained to continue in this curriculum.

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
 Rhet 22 — Public Speaking (3)
 HE 5 — Home Economics in Contemporary Society (3)
 HE 15 — Home and Family in Society (3)
 3 credits from HE 19, 21, 24A
 HE 31 — Principles of Nutrition (3)
 HE 40 — Food Preparation (5)
 HE 41 — Food Management and Marketing (5)
 HE 49 — Household Equipment (3)
 Math 10 — College Algebra and Analytic Geometry (5)
 (or) Math 15 — College Algebra (5)
 Math 42-43-44 — Analytic Geometry and Calculus I-II-III (15)
 (or) Math 40A — Introduction to Calculus (5)
 Biol 1-2 — General Biology (10)
 GeCh 4-5 — General Principles of Chemistry (10)
 Soc 1 — Man in Modern Society (3)
- AgEc 1-2 — Economics (6)
 Psy 1-2 — General Psychology (6)
 9 credits in literature and the arts (6 credits if HE 21 is elected)
 Take Option I or II (see also jr-sr list):
- Option I*
- AgEc 3 — Principles of Micro-Economics (3)
 MicB 53 — General Microbiology (5)
 Phys 1-2-3 and 1A-2A-3A — Introductory Physics (12)
 (or) Phys 4-5-6 — General Physics (15)
- Option II*
- AgEc 3 — Principles of Micro-Economics (3)
 AgEc 40 — Agricultural Marketing (3)
 MicB 53 — General Microbiology (5)
 (or) FScI 20 — Introductory Microbiology (4)
 NSci 4 — Physical World (4)
 BioC 1 — Elementary Biochemistry I (5)
 (or) OrCh 61-62 — Elementary Organic Chemistry (10)

II. JUNIOR-SENIOR YEARS

- Phsl 51 — Human Physiology (5)
 Rhet 51 — Exposition (3)
 Biom 100 — Statistical Analysis I (5)
 HE 73 — Experimental Foods (3)
- HE 85 — Home Management Principles (3)
 HE 88 — Introduction to Food Quality Evaluation (3)
 HE 99 — Senior Seminar (3)

Curricula

HE 170 — Human Nutrition (3)

Take Option I or II (see also fr-soph list):

Option I

OrCh 61-62-63 — Elementary Organic Chemistry (13)

AnCh 57A-B — Quantitative Analysis (5)

HE 86 — Home Management Laboratory (4)

Option II

AgEc 56 — Micro-Economics of Consumption (3)

Econ 65 — Intermediate Economic Analysis I (3)

Econ 66 — Intermediate Economic Analysis II (3)

HE 186 — Family Economics (3)

HE 171 — Human Nutrition (3)

3. HOME ECONOMICS EDUCATION

The curricula in home economics education offered jointly by the College of Agriculture, Forestry, and Home Economics and the College of Education are designed for students who plan to become home economics teachers in secondary schools or adult programs or to assume home economics positions in the Agricultural Extension Service. Satisfactory completion of the teaching curriculum qualifies the student for teaching home economics in Minnesota including those departments which are federally aided.

During the first 2 years the student is registered in the College of AFHE and carries the required work of the home economics education curriculum. In the junior and senior years she completes the combined curriculum of the College of Education and the College of AFHE leading to the bachelor of science degree.

Application for admission to the joint curriculum should be made during the first 2 weeks of the third quarter of the sophomore year or of the first quarter in residence for those who transfer after 2 years of college work. The application form and information about procedure should be obtained at 109 McNeal Hall.

Applications for student teaching (HEEd 63) must be filed during the first week of the spring quarter prior to the academic year in which student teaching is to be done. Application for student teaching (HEEd 63) is made through the Department of Home Economics Education, 109 McNeal Hall.

Following approval of the application by the Department of Home Economics Education, forms will be forwarded by the chairman of the department to the Department of Clinical Experiences, Burton Hall.

Forms for application and information concerning admission policies and procedures may be obtained in 109 McNeal Hall.

In order to be recommended for graduation from the teaching specialization, the student must have a C+ (2.50) average in 40 credits of required home economics work in the curriculum for general home economics teaching and an average of C (2.00) in all other courses pursued during the junior and senior years.

Home Economics Teaching

The following courses are required for those preparing for teaching home economics. The list includes the liberal education (C.L.E.) requirements, as well as those in the major and professional areas.

Home Economics Education

I. FRESHMAN-SOPHOMORE YEARS

Rhetoric — Freshman communication requirement (9)
Rhet 22 — Public Speaking (3)
HE 1 — Clothing Selection (3)
HE 3 — Clothing Construction I (3)
(or) HE 4 — Clothing Construction II (3)
HE 5 — Home Economics in Contemporary Society (3)
HE 15 — Home and Family in Society (3)
HE 20 — Introduction to Related Art (3)
HE 21 — Color (3)
HE 24A — The Home: Selection and Furnishing I (3)
HE 24B — The Home: Selection and Furnishing Experience I (3)
HE 31 — Principles of Nutrition (3)
HE 40 — Food Preparation (5)
HE 41 — Food Management and Marketing (5)
HE 49 — Household Equipment (3)
PubH 5 — Individual and Public Health (3)
(or) PubH 50 (see jr-sr list)
Soc 1 — Man in Modern Society (3)
AgEc 1-2-3 — Economics (9)
(or) Econ 1-2 — Principles of Economics (8)
Psy 1-2 — General Psychology (6)
HEED 49 — Introduction to Home Economics Education (2)
GC 10B — Human Body: Structure, Function, Health (5)
FSci 20 — Introductory Microbiology (4)
3 credits elective in communication and symbolic systems (see C.L.E. course list)

3 credits to be selected from any combination of the following: literature, non-studio art, nonstudio music, or HE 120
Select one of the following options:

Option I

GeCh 4-5 — General Principles of Chemistry (10)
BioC 1 — Elementary Biochemistry I (5)
(or) OrCh 61-62 — Elementary Organic Chemistry (10)
Biol 1-2 — General Biology (10)
GC 7A — Physics (5)
(or) NSci 4 — Physical World (4)

Option II

Social science elective (3)
GeCh 4-5 — General Principles of Chemistry (10)
GC 7A — Physics (5)
(or) NSci 4 — Physical World (4)

Option III

12 credits social science (minimum) to include:
Soc 3 — Social Problems (3)
Anth 2A — Introduction to Cultural Anthropology (5)
(or) Anth 100 — Principles of Cultural Anthropology (3)
Anth 165 — Culture and Personality (3)
Electives (3)
NSci 4-5 — The Physical World (8)

II. JUNIOR-SENIOR YEARS

HE 50 — Textiles (4)
HE 76 — Current Problems in Nutrition (3)
HE 85 — Home Management Principles (3)
HE 86 or 86A — Home Management Laboratory (4)
HE 87 — Family Relationships (3)
HE 99 — Senior Seminar (3)
HE 115 — Sociological and Economic Aspects of Clothing (3)
(or) HE 116 — Family Clothing Problems (3)
PubH 50 — Personal and Community Health (3)
(or) PubH 5 (see fr-soph list)
Rhet 51 — Exposition (3)
Ed 55A-B — Introduction to Secondary School Teaching (10)
HEd 90 — School and Society (3)
HEED 60 — Curriculum in Home Economics Education (3)
HEED 61 — Methods of Teaching Home Economics (3)
HEED 62 — Evaluation of Home Economics (3)

HEED 63 — Supervised Teaching in Home Economics (9)
HEED 64 — Adult Education in Home Economics (3)
HEED 65 — Colloquium in Home Economics Education (2)
CPsy 80 — Child Psychology (3)
HEED 90A — Practicum in Child Development (1)
9 credits to be selected from advanced courses in at least two areas. The following are recommended:
Child Psychology: 81 or 132, 127, 180, 181
Family Social Science: 182, 183, 186, 187, 190
Foods: 70, 137, 138, 139
Household Equipment: 131, 133, 189A-B-C
Related Art: 120, 127, 180, 197
Textiles and Clothing: 53, 152, 153, 154

Home Economics Extension

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
- Rhet 22 — Public Speaking (3)
- HE 1 — Clothing Selection (3)
- HE 3 — Clothing Construction I (3)
(or) HE 4 — Clothing Construction II (3)
- HE 5 — Home Economics in Contemporary Society (3)
- HE 15 — Home and Family in Society (3)
- HE 20 — Introduction to Related Art (3)
- HE 21 — Color (3)
- HE 24A — The Home: Selection and Furnishing I (3)
- HE 24B — The Home: Selection and Furnishing Experience I (3)
- HE 31 — Principles of Nutrition (3)
- HE 40 — Food Preparation (5)
- HE 41 — Food Management and Marketing (5)
- HE 49 — Household Equipment (3)
- PubH 5 — Individual and Public Health (3)
(or) PubH 50 (see jr-sr list)
- 3 credits in historical and philosophical studies selected from the following:
Hist 1 through 6, 12 through 19, 23, 24;
Phil 3; Pol 40
- 3 credits elective in communication or symbolic systems (see C.L.E. course list)
- 9 credits to be selected from literature, non-studio art or music, or HE 120
(or) 12 credits in humanities
Psy 1-2 — General Psychology (6)
AgEc 1-2-3 — Economics (9)
(or) Econ 1-2 — Principles of Economics (8)
6 additional credits in social science to be selected from anthropology, geography, political science, sociology
GeCh 4-5 — General Principles of Chemistry (10)
GC 7A — Physics (5)
(or) NSci 4 — Physical World (4)
FScI 20 — Introductory Microbiology (4)
GC 10B — Human Body: Structure, Function, Health (5)
HEED 49 — Introduction to Home Economics Education (2)

II. JUNIOR-SENIOR YEARS

- HE 50 — Textiles (4)
- HE 76 — Current Problems in Nutrition (3)
- HE 85 — Home Management Principles (3)
- HE 86 or 86A — Home Management Laboratory (4)
- HE 87 — Family Relationships (3)
- HE 99 — Senior Seminar (3)
- HE 115 — Sociological and Economic Aspects of Clothing (3)
- (or) HE 116 — Family Clothing Problems (3)
- 9 credits in advanced home economics courses to be selected in consultation with adviser
- PubH 50 — Personal and Community Health (3)
(or) PubH 5 (see fr-soph list)
- Rhet 51 — Exposition (3)
- AgJo 53 — Publicity (3)
- Ed 55A-B — Introduction to Secondary School Teaching (10)
- AgEd 56 — Rural Education Through Extension Methods (3)
- HEED 60 — Curriculum in Home Economics (3)
- HEED 61 — Methods in Teaching Home Economics (3)
- HEED 64 — Adult Education in Home Economics (3)
- HEED 95 — Supervised Field Experience (6)
- HEED 190 — Readings (2)
- CPsy 80 — Child Psychology (3)
- HEED 90A — Practicum in Child Development (1)
- Electives to meet graduation requirement

Professional Five-Year Curriculum

This is a joint curriculum between the College of Education and the College of AFHE leading to the degree of master of education (M.Ed.). For information, consult the chairman of the department.

4. HOUSEHOLD EQUIPMENT

The household equipment curricula emphasize physical factors in home maintenance — appliances for kitchen and laundry areas, principles of and plans for functional and pleasing kitchen and laundry areas, principles of and equipment for effective home wiring, lighting, heating, and cooling.

The curricula prepare for consumer-oriented positions. These include public relations with companies that manufacture appliances and laundry supplies. Home economists in utility companies demonstrate appliances for homemakers, salesmen, distributors, and in schools; make calls to help homemakers use appliances effectively; help homemakers plan kitchen and laundry areas; advise homeowners on good quality lighting. Household equipment home economists work for magazines and newspapers reporting on new appliances, new uses of current appliances, new types of home lighting and wiring, and writing for the advertising sections. Household equipment people do free-lance preparation of consumer instruction materials for appliances.

The preparation for research in household equipment curriculum prepares students for graduate work, for research and development sections of companies that manufacture, develop, or test new appliances, laundry products, and kitchen cabinets.

Preparation for Research in Household Equipment

I. FRESHMAN-SOPHOMORE YEARS

- | | |
|---|--|
| Rhetoric — Freshman communication requirement (9) | (or) Math 15 — College Algebra (5) |
| Rhet 22 — Public Speaking (3) | Math 40A — Introduction to Calculus (5) |
| HE 1 — Clothing Selection (3) | (or) Math 42 — Analytic Geometry and Calculus I (5) |
| HE 5 — Home Economics in Contemporary Society (3) | Math 43 — Analytic Geometry and Calculus II (5) |
| HE 15 — Home and Family in Society (3) | Biol 1-2 — General Biology (10) |
| HE 24A — The Home: Selection and Furnishing I (3) | GeCh 4-5 — General Principles of Chemistry (10) |
| HE 31 — Principles of Nutrition (3) | MicB 53 — General Microbiology (5) |
| HE 40 — Food Preparation (5) | Phys 21, 21A, 22, 22A, 23, 23A — General Physics and Physics Laboratory (15) |
| HE 41 — Food Management and Marketing (5) | Psy 1-2 — General Psychology (6) |
| HE 49 — Household Equipment (3) | Soc 1 — Man in Modern Society (3) |
| Math 10 — College Algebra and Analytic Geometry (5) | (or) Anth 2A — Cultural Anthropology (5) |
| (or) Math 10A — Algebra, Analytic Geometry and Elementary Functions (5) | AgEc 1-2-3 — Economics (9) |
| | (or) Econ 1-2 — Principles of Economics (8) |
| | Art and literature requirement (12) |

II. JUNIOR-SENIOR YEARS

- | | |
|--|--|
| HE 50 — Textiles (4) | HE 189C — Problems in Household Equipment (3) |
| HE 76 — Current Problems in Nutrition (3) | Rhet 51 — Exposition (3) |
| HE 85 — Home Management Principles (3) | Rhet 52 — Technical Writing (3) |
| HE 99 — Senior Seminar (3) | OrCh 61-62 — Elementary Organic Chemistry (10) |
| HE 131 — Evaluation Procedures for Household Equipment (3) | Biom 40 — Elements of Statistics (3) |
| HE 189A — Construction and Use Characteristics of Appliances (3) | Electives to make a total of 185 credits |
| HE 189B — Equipment in the Home Laundry and Kitchen (3) | |

Household Equipment in Business

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
 Rhet 22 — Public Speaking (3)
 HE 1 — Clothing Selection (3)
 HE 5 — Home Economics in Contemporary Society (3)
 HE 15 — Home and Family in Society (3)
 HE 24A — The Home: Selection and Furnishing I (3)
 HE 31 — Principles of Nutrition (3)
 HE 40 — Food Preparation (5)
 HE 41 — Food Management and Marketing (5)
 HE 49 — Household Equipment (3)
 Math 10 — College Algebra and Analytic Geometry (5)
 (or) Math 10A — Algebra, Analytic Geometry, and Elementary Functions (5)
- Biol 1-2 — General Biology (10)
 GeCh 4-5 — General Principles of Chemistry (10)
 Soc 1 — Man in Modern Society (3)
 AgEc 1-2-3 — Economics (9)
 (or) Econ 1-2 — Principles of Economics (8)
 Psy 1-2 — General Psychology (6)
 6 credits in literature and the arts (3 credits if HE 21 is elected)
 Choose either Option I or II:
Option I
 Phys 1-1A-2-2A-3-3A — Introductory Physics and Physics Laboratory (12)
Option II
 Phys 1-2 — Introductory Physics (6)
 BioC 1 — Elementary Biochemistry I (5)
 (or) OrCh 61-62 — Elementary Organic Chemistry (10)

II. JUNIOR-SENIOR YEARS

- HE 50 — Textiles (4)
 HE 76 — Current Problems in Nutrition (3)
 HE 85 — Home Management Principles (3)
 HE 86 — Home Management Laboratory (4)
 HE 87 — Family Relationships (3)
 HE 99 — Senior Seminar (3)
 HE 120 — Art History (3)
 HE 127 — Purchasing Home Furnishings (3)
 HE 131 — Evaluation Procedures for Household Equipment (3)
 HE 189A — Construction and Use Characteristics of Appliances (3)
 HE 189B — Equipment in the Home Laundry and Kitchen (3)
 HE 189C — Problems in Household Equipment (3)
 Rhet 51 — Exposition (3)
 AgJo 53 — Publicity (3)
- (or) Jour 11 — Reporting for Nonmajors (3)
 (or) Rhet 54 — Advanced Public Speaking (3)
 CPsy 80 — Child Psychology (3)
 MicB 53 — General Microbiology (5)
 Soc 80-81 — Sociological Methods (6)
 (or) Biom 40 — Elements of Statistics (3)
 Suggested electives:
 HE 73 — Experimental Foods (3)
 HE 20 — Introduction to Related Art (3)
 HE 21 — Color (3)
 HE 115 — Sociological and Economic Aspects of Clothing (3)
 (or) HE 116 — Family Clothing Problems (3)
 Additional courses to make total of 185 credits

5. NUTRITION AND FOOD SERVICE ADMINISTRATION

Three specializations are designed for those men and women who are interested in the field of nutrition and its various applications in dietetics, food service administration, public health, and research. The curricula in dietetics and food service administration meet the requirements of the American Dietetic Association for hospital, administrative food service, and food clinic internships. Students who complete either of these two programs will find employment opportunities as administrative or therapeutic dietitians in hospitals or food clinics; as food service managers in college dormitories, hotels,

Nutrition and Food Service Administration

restaurants, industrial cafeterias, or schools; or as nutritionists in public health agencies. Students who elect the nutrition science curriculum will be prepared for first-level positions in research, for further graduate study, and ultimately for research and teaching at the college level.

A grade of at least C is required in all food and nutrition courses. Students who have not completed a high school trigonometry course with a satisfactory grade will need to take a course in trigonometry.

Dietetics

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
Rhet 22 — Public Speaking (3)
HE 5 — Home Economics in Contemporary Society (3)
HE 15 — Home and Family in Society (3)
HE 40 — Food Preparation (5)
Math 10 — College Algebra and Analytic Geometry (5) (or equiv)
Biol 1-2 — General Biology (10)
GeCh 4-5 — General Principles of Chemistry (10)
OrCh 61-62 — Elementary Organic Chemistry (10)
Select from: Phys 1, 2, 3, 1A, 2A, 3A (at least 8 cr)
- AgEc 1-2-3 — Economics (9)
(or) Econ 1-2 — Principles of Economics (8)
Soc 1 — Man in Modern Society (3)
(or) Soc 1D — Man in Modern Society (4)
Psy 1-2 — General Psychology (6)
PubH 5 — Individual and Public Health (3)
(or) PubH 50 (see jr-sr list)
AgEc 25 — Principles of Accounting (4)
(or) 6 credits from Acct 24-25-26 — Principles of Accounting
Phsl 51 — Human Physiology (5)
(or) Phsl 2 — Human Physiology (4)
MicB 53 — General Microbiology (5)
9 credits in literature or the arts (exclusive of studio courses)

II. JUNIOR-SENIOR YEARS

- HE 41 — Food Management and Marketing (5)
HE 63 — Quantity Food Purchasing and Production (5)
HE 67 — Food Service Organization and Management (3)
HE 99 — Senior Seminar (3)
HE 142 — Experimental Cookery (3)
HE 170-171 — Human Nutrition (6)
HE 173 — Clinical Nutrition (3)
HE 174 — Nutrition Topics (1)
HE 176 — Human Nutrition Research Methods (3)
HE 178 — Clinical Problems in Nutrition (2)
PubH 50 — Personal and Community Health (3)
- (or) PubH 5 (see fr-soph list)
BioC 51-52 — Introduction to Biochemistry (8)
Rhet 51 — Exposition (3)
IR 72 — Systems: Manpower Management (3)
Biom 40 — Elements of Statistics (3)
(or) Biom 100 — Statistical Analysis I (5)
CPsy 80 — Child Psychology (3)
(or) Anth 175 — Human Physical Growth and Development (3)
EPsy 193 — Psychological Analysis of Instruction (3)
(or) EPsy 159 — Personality Development and Mental Hygiene (3)
Electives to meet 185-credit graduation requirement

Food Service Administration

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
Rhet 22 — Public Speaking (3)
- HE 5 — Home Economics in Contemporary Society (3)
HE 15 — Home and Family in Society (3)

Curricula

- HE 40 — Food Preparation (5)
Math 10 — College Algebra and Analytic Geometry (5)
Biol 1-2 — General Biology (10)
GeCh 4-5 — General Principles of Chemistry (10)
BioC 1 — Elementary Biochemistry I (5)
(or) OrCh 61-62 — Elementary Organic Chemistry (10)
At least 8 credits from Phys 1, 2, 3, 1A, 2A, 3A
Soc 1 — Man in Modern Society (3)
(or) Soc 1D — Man in Modern Society (4)
AgEc 1-2-3 — Economics (9)
- (or) Econ 1-2 — Principles of Economics (8)
AgEc 40 — Principles of Marketing Organization (3)
Psy 1-2 — General Psychology (6)
AgEc 25 — Principles of Accounting (4)
(or) 6 credits from Acct 24-25-26 — Principles of Accounting
PubH 5 — Individual and Public Health (3)
(or) PubH 50 (see jr-sr list)
9 credits in literature and the arts (exclusive of studio courses)

II. JUNIOR-SENIOR YEARS

- HE 29 — Art and the Environment (3)
(or) HE 20 — Introduction to Related Art (3)
HE 41 — Food Management and Marketing (5)
HE 50 — Textiles (4)
HE 63 — Quantity Food Purchasing and Production (5)
HE 64 — Design and Layout of Food Services (4)
HE 67 — Food Service Organization and Management (3)
HE 69 — Administrative Food Service Experience (5)
HE 99 — Senior Seminar (3)
HE 170-171 — Human Nutrition (6)
PubH 50 — Personal and Community Health (3)
- (or) PubH 5 (see fr-soph list)
PubH 75 — Introduction to Environmental Sanitation (3)
Phsl 51 — Human Physiology (5)
(or) Phsl 2 — Human Physiology (4)
MicB 53 — General Microbiology (5)
IR 72 — Systems: Manpower Management (3)
BLaw 58 — Business Law: Contracts (3)
(or) BLaw 28 — Business Law (3)
Mgmt 70 — Fundamentals (3)
(or) Mgmt 80 — Administrative Practice (3)
EPsy 159 — Personality Development and Mental Hygiene (3)
Rhet 51 — Exposition (3)

Nutrition Science

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
Rhet 22 — Public Speaking (3)
HE 5 — Home Economics in Contemporary Society (3)
HE 15 — Home and Family in Society (3)
HE 40 — Food Preparation (5)
Math 10 — College Algebra and Analytic Geometry (5)
(or) Math 15 — College Algebra (5)
Math 40A — Introduction to Calculus (5) (or equiv)
Biol 1-2 — General Biology (10)
GeCh 4-5-6 — Chemistry (14)
AnCh 57 — Quantitative Analysis (5)
- OrCh 61-62 — Elementary Organic Chemistry (10)
Phys 4-5-6 — General Physics (15) (or equiv)
Phsl 51 — Human Physiology (5)
MicB 53 — General Microbiology (5)
Soc 1 — Man in Modern Society (3)
(or) Soc 1D — Man in Modern Society (4)
AgEc 1-2-3 — Economics (9)
(or) Econ 1-2 — Principles of Economics (8)
Psy 1-2 — General Psychology (6)
9 credits in literature or the arts (exclusive of studio courses)

II. JUNIOR-SENIOR YEARS

- Rhet 51 — Exposition (3)
HE 41 — Food Management and Marketing (5)
HE 99 — Senior Seminar (3)
HE 142 — Experimental Cookery (3)
HE 170-171 — Human Nutrition (6)

HE 176 — Human Nutrition Research Methods (3)
 CPsy 80 — Child Psychology (3)
 (or) Anth 175 — Human Physical Growth and Development (3)

Biom 100 — Statistical Analysis I (5)
 Minimum of 8 credits of biochemistry with laboratory, exclusive of BioC 1

6. RELATED ART

Related art courses are concerned with art that is part of personal, home, and family living. Their aim is twofold: to contribute to the general liberal education of the student and to prepare for professional employment.

There are three fields of specialization within the related art curriculum: (a) interior design leading primarily to positions in home or commercial interiors or with utility companies, (b) costume design and fashion leading primarily to merchandising positions, (c) decorative arts with either a history or a studio-crafts emphasis. A grade of at least C is required in all related art courses.

Students who expect to do graduate work should consult the chairman of the division for help in detailed planning of major and supporting areas of undergraduate study.

Collateral Sequence — A minimum of 18 credits is to be developed by each student with approval of major adviser and divisional committee. Forms and general information are available in the related art division office (351 McNeal Hall) and should be filed by the end of the sophomore year (same time as specialization form).

Minor in Journalism — The following 18 credits in journalism courses may be substituted for the collateral sequence: Jour 11, 41, 71, and 9 additional credits in Upper Division courses: 53, 57, 73, 78, 90 or 121, 109, 112, 124 recommended. This minor, together with one of the specializations in related art, is designed for students who wish to do writing in the areas of home furnishings, crafts, costume design, and general fashion. Positions are available with magazines and newspapers as well as with manufacturers and retailers who issue educational and promotional materials.

For those students interested in merchandising, it is highly desirable to have practical retailing experience before graduation.

Note — Students enrolled in studio courses will be assessed a materials fee. They may be required to leave superior class projects for exhibits during the academic year and/or summer months.

I. FRESHMAN-SOPHOMORE YEARS (Courses Required of All Majors)

Rhetoric — Freshman communication requirement (9)	minimum of 10 credits: humanities, Mus 1, Th 11
Rhet 22 — Public Speaking (3)	AgEc 1-2-3 — Economics (9)
Humanities — ArTH 1; additional courses from the following to complete a mini-	(or) Econ 1-2 — Principles of Economics (8)
	Psy 1-2 — General Psychology (6)

Curricula

History (3) to be selected
HE 5 — Home Economics in Contemporary Society (3)
HE 15 — Home and Family in Society (3)
HE 19 — Visual Presentation (3)
HE 20 — Introduction to Related Art (3)
HE 21 — Color (3)
HE 23 — Design I (3)
HE 29 — Art in the Environment (3)

Natural sciences — a minimum of 15 credits to include chemistry, physics, and biology; one of the following options is suggested:

Option I

NSci 4-5 — The Physical World (8)
Biol 1-2 — General Biology (10)

Option II

NSci 1-2-3 — Orientation in the Natural Sciences (15)

II. JUNIOR-SENIOR YEARS (Courses Required of All Majors)

Rhet 51 — Exposition (3)
Collateral — a group of courses chosen by student with approval of adviser and division committee (18)
HE 99 — Senior Seminar (3)

HE 100 — Homes of the World (3)
(or) HE 120 — Art History (3)
HE 120A — Senior Seminar: Related Art (1)

Interior Design

To the courses required of all related art majors add the following:

ArtH 126-127-128 — Eighteenth-Century Art (9)
(or) ArtH 136-137-138 — Art in the United States (9)
(or) Elective courses in studio art or art history (9)
Rhet 26 (3) (or) Rhet 47 (3) (or) Comp 27 (3) or a foreign language (5)
Psy 156 — Psychology of Advertising (3)
AgEc 56 — Micro-Economics of Consumption (3)
MeAg 3 — Technical Drawing (3)
HE 24A — The Home: Selection and Furnishing I (3)
HE 24B — The Home: Selection and Furnishing Experience I (3)
HE 40 — Food Preparation (5)
(or) Other food course (3-5)

HE 49 — Household Equipment (3)
HE 50 — Textiles (4)
HE 52 — Home Furnishing Textiles (3)
HE 58A — Field Experiences (3)
(or) HE 124 — The Home: Selection and Furnishing Experiences II (3)
HE 85 — Home Management Principles (3)
HE 122A — Interior Design Presentation (3)
HE 122B — Interior Design Problems (3)
HE 123A — History of Home Interiors I (3)
HE 123B — History of Home Interiors II (3)
HE 127 — Purchasing Home Furnishings (3)
HE 180 — The Home: Selection and Furnishing II (3)
HE 181 — Housing Problems of the Family (3)
Electives to meet graduation requirement

Costume Design and Fashion

To the courses required of all related art majors add the following:

ArtS 20 — Basic Drawing (3)
French (10)
AgEc 56 — Micro-Economics of Consumption (3)
Psy 156 — Psychology of Advertising (3)
HE 1 — Clothing Selection (3)
HE 3-4 — Clothing Construction I and II (6)
HE 22 — Costume Design I (3)
HE 50 — Textiles (4)

HE 57 — Design II (3)
HE 58A or 58B — Field Experiences (3)
(or) HE 59 — Supervised Retail Experience (5)
HE 115 — Sociological and Economic Aspects of Clothing (3)
(or) HE 116 — Family Clothing Problems (3)
HE 118A — History of Decorative Arts I (3)

HE 121 — Textile Design II (3)
HE 125 — Costume Design II (3)
HE 128 — History of Costume (3)

Electives to meet the graduation requirement

Decorative Arts: Art History Emphasis

To the courses required of all related art majors add the following:

Art history or architectural history (consecutive courses) (9)
French, German, or Spanish (10)
History of must be two sequence courses in one of four periods of history: ancient, medieval, renaissance, modern) (9)
Home economics courses other than related art (9-10)
HE 24A — The Home: Selection and Furnishing I (3)
HE 24B — The Home: Selection and Furnishing Experience I (3)
HE 58A or 58B — Field Experience (3)

12 credits chosen from:
HE 118A — History of Decorative Arts I (3)
HE 118B — History of Decorative Arts II (3)
HE 123A — History of Home Interiors I (3)
HE 123B — History of Home Interiors II (3)
HE 128 — History of Costume (3)
Electives to meet the graduation requirement

Decorative Arts: Studio Emphasis

To the courses required of all related art majors add the following:

Art studio courses (take 6 to 12 credits in two of these areas: ceramics, drawing and design, metalwork, painting, photography, printmaking, sculpture) (18)
Rhet 26 (3) (or) Rhet 47 (3) (or) Comp 27 (3) (or) foreign language (5)
Home economics courses other than related art (9-10)
HE 25 — Textile Design I (3)
HE 26 — Crafts Design I (3)
HE 58A or 58B — Field Experience (3)
HE 121 — Textile Design II (3)
HE 122A — Interior Design Presentation (3) (or) HE 22 — Costume Design I (3)

HE 126 — Crafts Design II (3)
Select one of the following:
HE 57 — Design II (3)
HE 118A — History of Decorative Arts I (3)
HE 118B — History of Decorative Arts II (3)
HE 123A — History of Home Interiors I (3)
HE 123B — History of Home Interiors II (3)
HE 128 — History of Costume (3)
Electives to meet the graduation requirement

7. TEXTILES AND CLOTHING

The program of the textiles and clothing division is designed to prepare students for problems encountered in production, merchandising, and consumer utilization of textile articles and clothing apparel. Specialized curricula are offered leading to professional positions in business, journalism, and research.

The textiles and clothing in business curriculum is designed to provide students with fundamental knowledge concerning textiles, garment construction, and business procedures as background for positions in merchandising, in related fields of fashion, and as home economists for companies whose emphasis is in the clothing field. This curriculum may also be the basis for gradu-

ate study preparatory to teaching textiles and clothing at the college level.

Textiles and clothing in journalism is offered jointly with the School of Journalism and Mass Communication and is planned for students who wish to write professionally concerning textiles and clothing in the areas of fashion and consumer education. This program is intended to prepare for positions with newspapers, magazines, and educational divisions of business firms associated with the textile and clothing industries.

The preparation for research in textiles and clothing curriculum is planned for superior students who wish to pursue graduate study with the expectation of filling a teaching or research position after receiving an advanced degree. The electives offered should be selected in consultation with a major adviser of the Graduate School faculty. With the Bachelor's degree one is prepared for a position in laboratories whose emphasis is in textile research.

Students with a specialization in textiles and clothing must complete courses required in one of the curricula listed. Study during freshman and sophomore years is primarily for meeting the general requirements, and beginning the specialization. Greater attention is given to the area of specialization during the junior-senior years. A grade of C is required for HE 3, 4, 50, 102, 115.

Textiles and Clothing in Business

I. FRESHMAN-SOPHOMORE YEARS

- | | |
|---|--|
| Rhetoric — Freshman communication requirement (9) | Math 10 — College Algebra and Analytic Geometry (5) |
| Rhet 22 — Public Speaking (3) | (or) Math 10A — Algebra, Analytic Geometry, and Elementary Functions (5) |
| HE 1 — Clothing Selection (3) | 3 credits in statistics recommended |
| HE 3-4 — Clothing Construction I and II (6) | 15 credits in language recommended |
| HE 5 — Home Economics in Contemporary Society (3) | Natural science — Choose one of the following options: |
| HE 15 — Home and Family in Society (3) | <i>Option I</i> |
| HE 20 — Introduction to Related Art (3) | NSci 4-5 — The Physical World (8) |
| HE 21 — Color (3) | Biol 1-2 — General Biology (10) |
| HE 49 — Household Equipment (3) (recommended) | <i>Option II</i> |
| Psy 1-2 — General Psychology (6) | GeCh 4-5 — General Principles of Chemistry (10) |
| Soc 1 — Man in Modern Society (3) | BioC 1 — Elementary Biochemistry I (5) |
| Soc 2 — The American Community (3) | <i>Option III</i> |
| AgEc 1-2-3 — Economics (9) | NSci 1-2-3 — Orientation in the Natural Sciences (15) |
| (or) Econ 1-2 — Principles of Economics (8) | |
| AgEc 25 — Principles of Accounting (4) | |
| (or) Acct 24-25 — Principles of Accounting (6) | |
| Humanities (9) | |

II. JUNIOR-SENIOR YEARS

- | | |
|--|---|
| HE 50 — Textiles (4) | 12 credits from the following: |
| HE 59 — Supervised Retail Experience (5) | HE 52 — Home Furnishings Textiles (3) |
| HE 99 — Senior Seminar (3) | HE 53 — Advanced Clothing (3) |
| HE 115 — Sociological and Economic Aspects of Clothing (3) | HE 54A-B — Fashion Merchandising I and II (6) |
| HE 116 — Family Clothing Problems (3) | HE 102 — Advanced Textiles (3) |
| HE 120 — Art History (3) | HE 152 — Consumer Problems in Textiles (3) |

- HE 153 — Recent Developments in Clothing Construction (3)
 HE 154 — Pattern Design and Alteration (3)
 HE 198 — Topics in Textiles and Clothing (3)
 Rhet 51 — Exposition (3)
 AgEc 56 — Micro-Economics of Consumption (3)
 Mktg 57 — Principles of Marketing (3)
 Mktg 65 — Retail Management I (3)
 Psy 156 — Psychology of Advertising (3)
 (or) Jour 156 — Psychology of Advertising (3)
 18 credits in one of the following areas:

Related Art

- HE 22 — Costume Design I (3)
 HE 23 — Design I (3)
 HE 121 — Textile Design II (3)
 HE 128 — History of Costume (3)
 HE 26 — Crafts Design I (3)
 HE 126 — Crafts Design II (3)

Social Sciences

- HE 87 or Soc 141 — Family Relationships (3)
 HE 183 or Soc 154 — The Family in World Perspective (3)
 HE 186 — Family Economics (3)
 Soc 111 — Population Theory (3)
 Soc 112 — World Population Problems (3)
 Soc 120 — Social Psychology (3)
 Soc 123 — Minority Group Relations (3)
 Soc 124 — Social Movement in a Changing Society (3)
 Soc 126 — Family Development (4)
 Soc 140 — Social Organization (3)
 Soc 144 — Social Stratification and Mobility (3)
 Soc 170 — Analytical Social Theory (3)

Marketing and Economics

- Mktg 60 — Marketing Systems (3)
 Mktg 75 — Sales Management (3)
 Mktg 77 — Advertising (3)
 Mktg 85 — Price Policy (3)
 Mktg 98 — Social Psychology of Behavior (3)

- Mktg 99 — Communication and Attitude Change (3)
 Mktg 177 — Foreign Trade (3)
 IR 52 — Systems of Industrial Relations: Labor Marketing (3)
 (or) IR 62 — Human Relations in Industry (3)
 IR 82 — Modern Labor Relations (3)
 Mgmt 70 — Fundamentals of Management (3)
 Econ 65-66 — Intermediate Economic Analysis I and II (6)
 Econ 120 — Economics of Consumption (3)
 Econ 104 — International Economics (3)
 Econ 134 — International Economics Problems (3)
 Econ 150A-B — Current Economic Issues (6)
 Econ 160 — Comparative Economic Systems (3)

Market Research — Option I

- Mktg 95 — Market Analysis and Research I (3)
 Mktg 96 — Marketing Research II (3)
 QA 52 — Quantitative Methods for Administration I (3)
 QA 53 — Quantitative Methods for Administration II (3)
 QA 54 — Quantitative Methods for Administration III (3)
 QA 62 — Basic Computer Systems (3)
 QA 171 — Statistical Methods for Sample Survey (3)

Market Research — Option II

- Soc 80 — Descriptive Statistics (3)
 Soc 81 — Statistical Inference (3)
 Soc 82 — Research Methods (3)
 (or) Soc 180H — Honors: Methods of Social Research (3)
 Soc 181 — Data Analysis (3)
 Soc 182 — Statistical Methods (3)
 Soc 184-185-186 — Field Work and Laboratory Training in Social Research (2-3 per qtr)
 Electives to total 185 credits

Textiles and Clothing Major, Journalism Minor

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
 Rhet 22 — Public Speaking (3)
 HE 1 — Clothing Selection (3)
 HE 3-4 — Clothing Construction I and II (6)
 HE 5 — Home Economics in Contemporary Society (3)
 HE 15 — Home and Family in Society (3)
 HE 20 — Introduction to Related Art (3)
 HE 21 — Color (3)
 HE 49 — Household Equipment (3) (recommended)
 Psy 1-2 — General Psychology (6)
 Soc 1 — Man in Modern Society (3)
 AgEc 1-2-3 — Economics (9)

Curricula

(or) Econ 1-2 — Principles of Economics (8)
15 credits in language recommended
9 credits in humanities
Comp 27 or 28 — Advanced Writing (3)
Jour 11 — Reporting for Nonmajors (3)
Jour 18 — Principles of Advertising (3)
(or) Psy 156 (see jr-sr list)
(or) Jour 156 (see jr-sr list)
Jour 41 — Publications Editing (3)
Natural science — choose one of the following options:

Option I

NSci 4-5 — The Physical World (8)
Biol 1-2 — General Biology (10)

Option II

GeCh 4-5 — General Principles of Chemistry (10)
BioC 1 — Elementary Biochemistry I (5)
(or) OrCh 61-62 (8)

Option III

NSci 1-2-3 — Orientation in the Natural Sciences (15)

II. JUNIOR-SENIOR YEARS

HE 50 — Textiles (4)
HE 53 — Advanced Clothing (3)
HE 99 — Senior Seminar (3)
HE 102 — Advanced Textiles (3)
(or) HE 52 — Home Furnishings Textiles (3)
HE 115 — Sociological and Economic Aspects of Clothing (3)
HE 116 — Family Clothing Problems (3)
HE 120 — Art History (3)
HE 128 — History of Costume (3)
HE 198 — Topics in Textiles and Clothing (3)
Rhet 51 — Exposition (3)
AgEc 56 — Micro-Economics of Consumption (3)
Psy 156 — Psychology of Advertising (3)
(or) Jour 156 — Psychology of Advertising (3)
(or) Jour 18 (see fr-soph list)
Mktg 57 — Principles of Marketing (3)
Jour 73 — Magazine Writing (3)
(or) Jour 71 — Business News or Feature Writing (3)

6 additional credits in Upper Division journalism courses to be chosen, in conference with the adviser, from the following recommended courses:

Jour 53 — Picture Editing (3)
Jour 55 — Newspaper Editing (3)
Jour 60 — Graphic Arts: Processes (3)
Jour 74 — Magazine Editing (3)
Jour 78 — Public Relations Methods (3)
Jour 79 — Advertising Copy Writing (3)
Jour 90 — Mass Communications and the News (3)
Jour 112 — Communications and Public Opinion (3)
Jour 121 — Mass Media in Dynamic Society (3)

18 additional credits in not more than two of the following areas:

Related Art
Family Social Science
Household Equipment
Foods and Nutrition
Electives to equal 185 credits

Preparation for Research in Textiles and Clothing

I. FRESHMAN-SOPHOMORE YEARS

Rhetoric — Freshman communication requirement (9)
Rhet 22 — Public Speaking (3)
HE 1 — Clothing Selection (3)
HE 3 — Clothing Construction I (3)
HE 5 — Home Economics in Contemporary Society (3)
HE 15 — Home and Family in Society (3)
HE 20 — Introduction to Related Art (3)
(or) HE 29 — Art and the Environment (3)
HE 49 — Household Equipment (3)
Math 10 — College Algebra and Analytic Geometry (5)

(or) Math 10A — Algebra, Analytic Geometry, and Elementary Functions (5)
(or) Math 15 — College Algebra (5)
GeCh 4-5 — General Principles of Chemistry (10)
GeCh 6 — Principles of Solution Chemistry (4)
(or) GeCh 26 — General Principles of Chemistry (5)
Phys 1, 3, 1A, 3A — Introduction to Physical Science (8)
(or) Phys 4-5-6 — General Physics (15)
Biol 1-2 — General Biology (10)

General Home Economics

- FScI 20 — Introduction to Microbiology (4)
(or) MicB 53 (see jr-sr list)
Soc 1 — Man in Modern Society (3)
AgEc 1-2-3 — Economics (9)
(or) Econ 1-2 — Principles of Economics (8)
Psy 1-2 — General Psychology (6)
- 9 credits from humanities, literature, music, art, theatre arts (no studio or technical courses) (Rhet 41, 42, 43 recommended)
3 credits in historical and philosophical studies selected from the following: Hist 1 through 6, 12 through 19, 23, 24; Phil 3; Pol 40

II. JUNIOR-SENIOR YEARS

- HE 50 — Textiles (4)
HE 85 — Home Management Principles (3)
HE 99 — Senior Seminar (3)
HE 102 — Advanced Textiles (3)
HE 107 — Textile Analysis (3)
HE 115 — Sociological and Economic Aspects of Clothing (3)
(or) HE 116 — Family Clothing Problems (3)
Rhet 51 — Exposition (3)
- Rhet 151 — Report and Thesis Writing (3)
OrCh 61-62 — Elementary Organic Chemistry (8)
Biom 100 — Statistical Analysis I (5)
MicB 53 — General Microbiology (5)
(or) FScI 20 (see fr-soph list)
Recommended electives — French or German (3-4 qtrs)
Electives to equal 185 credits

8. GENERAL

General Home Economics

This curriculum is designed primarily for those who expect to become full-time homemakers and wish a broad general education rather than professional specialization.

Students in this curriculum may concentrate their electives in a particular area and thus plan a specialized program for which there is no presently organized curriculum.

I. FRESHMAN-SOPHOMORE YEARS

- Rhetoric — Freshman communication requirement (9)
Rhet 22 — Public Speaking (3)
HE 1 — Clothing Selection (3)
HE 3-4 — Clothing Construction I and II (6)
HE 5 — Home Economics in Contemporary Society (3)
HE 15 — Home and Family in Society (3)
HE 20 — Introduction to Related Art (3)
HE 21 — Color (3)
HE 24A — The Home: Selection and Furnishing I (3)
HE 24B — The Home: Selection and Furnishing Experience I (3)
HE 31 — Principles of Nutrition (3)
HE 40 — Food Preparation (5)
HE 41 — Food Management and Marketing (5)
HE 49 — Household Equipment (3)
6 credits from humanities, literature, theatre or music (no studio or technical courses)
- 3-5 credits from communications, language, or symbolic systems (see C.L.E. list)
PubH 5 — Individual and Public Health (3)
(or) PubH 50 (see jr-sr list)
Soc 1 — Man in Modern Society (3)
AgEc 1-2-3 — Economics (9)
(or) Econ 1-2 — Principles of Economics (8)
Psy 1-2 — General Psychology (6)
6 credits in historical and philosophical studies selected from the following: Hist 1 through 6, 12 through 19, 23, 24; Phil 3; Pol 40
Select one of these options:
- Option I*
GeCh 4-5 — General Principles of Chemistry (10)
BioC 1 — Elementary Biochemistry I (5)
NSci 4 — Physical World (4)
(or) GC 7A — Physics (5)

Curricula

GC 10B — Human Body: Structure, Function, Health (5)
FSci 20 — Introductory Microbiology (4)
(or) MicB 53 — General Microbiology (5)

Option II

NSci 4-5 — Physical World (8)
Biol 1-2 — General Biology (10)

Phsl 2 — Human Physiology (4)
(or) Phsl 51 — Human Physiology (5)
(or) GC 10B — Human Body: Structure, Function, Health (5)
FSci 20 — Introductory Microbiology (4)
(or) MicB 53 — General Microbiology (5)

II. JUNIOR-SENIOR YEARS

HE 50 — Textiles (4)
HE 76 — Current Problems in Nutrition (3)
(or) HE 170-171 — Human Nutrition (6)
HE 85 — Home Management Principles (3)
HE 86 — Home Management Laboratory (4)
HE 87 — Family Relationships (3)
HE 99 — Senior Seminar (3)
HE 120 — Art History (3)
HE 127 — Purchasing Home Furnishings (3)
(or) HE 131 — Laboratory Problems in Household Equipment (3)
PubH 50 — Personal and Community Health (3)
(or) PubH 5 (sec fr-soph list)
Rhet 51 — Exposition (3)
Rhet 54 — Advanced Public Speaking (3)
(or) AgJo 53 — Publicity (3)
CPsy 80 — Child Psychology (3)

9 credits from the following:

HE 70 — Advanced Food Preparation (3)
HE 100 — Homes of the World (3)
HE 102 — Advanced Textiles (3)
HE 115 — Sociological and Economic Aspects of Clothing (3)
HE 116 — Family Clothing Problems (3)
HE 152 — Problems in Consumer Textiles (3)
HE 174 — Nutrition Topics (1)
HE 181 — Housing Problems of the Family (3)
HE 182 — Parent in American Society (3)
HE 183 — The Family in World Perspective (3)
HE — 186 — Family Economics (3)

Nursery School Certification

Home economics majors wishing to qualify for teacher certification at the nursery school level must complete the following courses, open to juniors and seniors, as a part of, or in addition to, their requirements for a general home economics degree:

Early Childhood Education — 15 credits

EdCI 56 — Nursery-Kindergarten Curriculum I (3)

EdCI 57 — Nursery-Kindergarten Curriculum II (3)

EdCI 59 — Methods and Observation in Nursery School (3)

EdCI 77 — Student Teaching in Nursery School (6)

Child Psychology — 9 credits

CPsy 127 — Social Behavior of Young Children (3)

Two additional courses in child psychology selected from the following list:

CPsy 100 — Processes of Socialization of Children (3)

CPsy 125 — Experimental Research with Children (3)

CPsy 126 — Case Study of Children (3)

CPsy 140 — Behavior Problems (3)

CPsy 142 — Psychology of Handicapped Children (3)

CPsy 143 — Problems of Mental Deficiency (3)

CPsy 144 — Psychology of the Gifted Child (3)

CPsy 180 — Personality Development (3)

CPsy 181 — Peer Relationships (3)

CPsy 183 — Language Development (3)

CPsy 184 — Sensory and Motor Development (3)

CPsy 186 — Cognitive Development (3)

CPsy 188 — Children in Society (3)

CPsy 189 — Parent-Child Relationships (3)

Students wishing to enter this program should contact the person in charge of Nursery School Certification, Institute of Child Development, as well as her adviser in general home economics.

Section III. COURSE OFFERINGS**

HOME ECONOMICS (HE)

Core and Trends in Home Economics

- 5 (1-101). **Home Economics in Contemporary Society.** Focus of the home economics professions and a historical review of their contributions; professional responsibility in meeting challenges and issues affecting home and families in society. (3 cr)
- 15 (1-102). **Home and Family in Society.** An interdisciplinary view of the contemporary home and family. Relationships between home, family, and human development. Implications for the home economics professions. (3 cr; prereq 5, soph)
- 99 (3-101). **Senior Seminar.** A cross-divisional integrative seminar dealing with professional values, trends, and issues in home economics. (3 cr; prereq sr, 15 or #)
- 195 (5-191). **Development of Home Economics.** Discussion of the development of home economics with emphasis upon current problems. (2 cr)

Family Social Science

- 85 (3-260). **Home Management Principles.** Managerial aspects of homemaking; work simplification of household activities; financial records and budget making for the individual and the family. (3 cr; prereq AgEc 3...HE 41 recommended)
- 86 (3-263). **Home Management Laboratory.** Residence for one-half quarter in one of the two home management houses, with direct experience in managing and sharing activities and responsibilities. (4 cr; prereq 85 or ¶85...41 recommended; \$10 deposit required)
- 86A (3-264). **Home Management Laboratory.** (4 cr; prereq #)
- 87 (5-200). **Family Relationships.** Analysis of the family as an institution and system of relationships. Survey of current developments in study of family. Analysis of changes in American society and their influence on family life. (3 cr; prereq Psy 2, Soc 1)
- 182 (5-201). **Parent in American Society.** Analysis of the relationships between changes in American social structure and parental behavior. Analysis of contribution by psychological and sociological behavior theories to research and knowledge in parenthood and parental behavior. (3 cr; prereq 87 or equiv)
- 183 (5-210). **The Family in World Perspective.** Comparison of family organization and modes of functioning in selected major world civilizations. Emphasis on adaptation of the family to urbanization and industrialization, and family influences on personality formation. (3 cr; prereq 87 or #)
- 184 (5-260). **Home Management Principles.** A study and discussion of managerial aspects of homemaking; work simplification of household activities; financial

** See *Graduate School Bulletin* for other listings.

Course Offerings

records and budget making for the individual and the family. (3 cr; prereq 40, 41 advised; offered Summer Sessions)

- 185 (5-205). **Theory and Research in Family Relationships.** Scientific method in study of family relationships. Current theoretical questions will be discussed and hypotheses derived, tested, and analyzed in laboratory sessions. (3 cr; prereq 87 or equiv, Soc 82 or Soc 180H or #)
- 186 (5-220). **Family Economics.** Variations in family income, saving, spending, and decision making related to socio-economic factors. Conceptual development and research on economic problems of families. (3 cr; prereq 85 or #)
- 187 (5-230). **Readings in Family Relationships.** Independent study in selected areas with faculty conferences. (1-3 cr per qtr [3 cr max]; prereq #)
- 190 (5-240). **Family Relationships Colloquium.** Review of research, discussions. (2 cr per qtr [4 cr max]; designed for grad students but available to high-scholarship srs with #; prereq 87 or 15 cr in child development, psychology and/or sociology)

Food

- 40 (1-301). **Food Preparation.** The development of technique and the application of fundamental science principles to cookery processes and preservation. Establishment of good standards for food products. (5 cr; prereq 2 qtrs chemistry)
- 41 (1-311). **Food Management and Marketing.** Determination and study of the management factors in the food problems of the homemaker and consumer. Quality, cost, and conservation of foods. Meal planning, preparation, and service. (5 cr; prereq soph, 31, 40)
- 70 (3-302). **Advanced Food Preparation.** (Continuation of HE 40) Emphasizes the scientific principles that underlie cookery processes and food preservation. (3 cr, §73; prereq 40, BioC 1)
- 71 (3-304). **Demonstrations.** Purposes and techniques of food demonstrations with special reference to their application in business. (1 cr; prereq 3rd qtr jr, 41)
- 73 (3-301). **Experimental Foods.** Principles and modern concepts of food preparation; laboratory projects to illustrate effects of different procedures and ingredients. (3 cr, §70; prereq 40, OrCh 62 or BioC 1)
- 88 (3-303). **Introduction to Food Quality Evaluation.** Survey of some of the current procedures in appraising quality of food products. (3 cr; prereq 40, OrCh 62 or BioC 1, Biom 40...HE 73 recommended)
- 137 (5-313). **Modern Food Preparation Principles and Practices.** Experimental bases of principles underlying present-day food preparation practices; development of experiences illustrative of such principles in high school teaching, dietetics, and foods in business. (3 cr; prereq 15 cr in food and nutrition, organic chemistry)
- 138 (5-312). **Food Purchasing.** Cost factors, quality standards, informative labels, food laws, economy of new trends in food processing. (3 cr; prereq 15 cr food and nutrition, principles of economics)
- 139 (5-311). **Advances in the Management and Preparation of Food.** Recent developments in food materials and methods of preparation; their implications in the management of time, money, and energy expenditures. (3 cr; prereq 40 or equiv)

- 140 (5-304). **New Developments in Food Preparation.** Survey of recent trends in food preparation. (3 cr; prereq sr, 40, OrCh 62 or BioC 1, MicB 53, Biom 40 or 100...HE 73 recommended)
- 141 (5-305). **Current Literature in Foods.** Lecture and discussion of recent literature dealing with food products and preparation. (3 cr; prereq sr, 40, OrCh 62 or BioC 1, MicB 53, Biom 40 or 100...HE 73 recommended)
- 142 (5-301). **Experimental Cookery.** Intensive study of problems in foods and food preparation by means of individual laboratory problems. (3 cr; prereq 40, OrCh 62 or BioC 1, Biom 40 or 100...HE 73 recommended)
- 144 (5-306). **Topics in Experimental Foods.** Assigned readings, reports, and discussions of topics in experimental foods. (2-3 cr per qtr [6 cr max]; prereq OrCh 62 or equiv, 15 cr in food and nutrition)
- 146 (5-302). **Special Food Problems.** Class problems in foods and food preparation. (3 cr; prereq sr, 142)
- 188 (5-303). **Evaluation of Food Quality.** Subjective and objective methods frequently used in measuring the quality of food products. (3 cr; prereq 142, OrCh 62, AnCh 57A-B, Biom 100)

Household Equipment

- 49 (1-401). **Household Equipment.** The principles that should guide in selection, operation, care, and convenient arrangement of equipment in the home. (3 cr; prereq soph, GC 7A or NSci 4 or Phys 1 or #)
- 131 (5-404). **Evaluation Procedures for Household Equipment.** Laboratory procedures and instruments used to determine operating characteristics of selected household appliances. Field trips to assess selected physical characteristics of houses. (3 cr; prereq 49 or equiv, 8 cr in foods, textiles and clothing, or #; A-F basis only)
- 133 (5-407). **Topics in Household Equipment.** Assigned readings, reports, and discussion of topics in household equipment. (1-3 cr; prereq 49, total of 15 cr in physics, foods, textiles and clothing)
- 134 (5-409). **Consumer Selection Guides for Household Equipment.** Important construction and operating components of current models of selected appliances. Suitability of the appliances for kitchen and laundry plans that are in accord with research-based recommendations on kitchen and laundry planning. (3 cr; prereq 49 or equiv, 86 or equiv, 3 cr in related art, and 1 yr experience in teaching, extension, or business, or #)
- 189A (5-414). **Construction and Use Characteristics of Household Appliances.** Thermal, mechanical, and electrical characteristics of ranges, refrigerators, and home freezers. Use aspects of the equipment. (3 cr; prereq 49)
- 189B (5-416). **Equipment in the Home Laundry and Kitchen.** Thermal, mechanical, and electrical characteristics of laundry equipment. Use aspects. Meal preparation in kitchens planned and set up by student groups in flexible research laboratory. (3 cr; prereq 40, 49)
- 189C (5-418). **Problems in Household Equipment.** Utility of selected electric and nonelectric appliances and housewares. (3 cr; prereq 131, 189A or B, and #)

Course Offerings

Nutrition and Food Service Administration

- 31 (1-381). **Principles of Nutrition.** Quantitative and qualitative aspects of nutritional requirements. Interrelationships between physiological processes and dietary requirements. Problems of food faddism. (3 cr, §GC 3B)
- 63 (3-351). **Quantity Food Purchasing and Production.** Selection, preparation, serving, and cost accounting of different types of foods and food products. Organization of special banquets. (5 cr; prereq 3rd qtr soph, 41)
- 64 (3-353). **Design and Layout of Food Services.** Purchasing and maintenance of equipment related to storage, preparation, and service of food in quantity. Arrangement and layout of food service area. (4 cr; prereq 63...49 recommended; 3 hrs lect, 3 hrs field trip)
- 67 (3-352). **Food Service Organization and Management.** Survey of general types of food services and related administrative problems including menu planning, business procedures, personnel management, food cost control, and food merchandising. (3 cr; prereq 63)
- 69 (3-394). **Administrative Food Service Experience.** Planned experience in selected type of food service including menu planning, purchasing and storage of food, supervision of preparation and serving and maintenance of high sanitary conditions, accounting and bookkeeping. (5 cr; prereq 67)
- 72 (3-383). **Nutrition.** Discussion of the application of the principles of nutrition to the selection of food. (2 cr, §GC 3B, or §HE 31; intended for students majoring in fields other than home economics [open to HE students only by #]; prereq jr; given on Mpls Campus)
- 74 (3-382). **Community Nutrition.** The study of nutrition and health practices of the family in the community; an exploration of concepts and methodologies for nutrition education. (3 cr; prereq jr; HE 31 or equiv, 6 cr in psychology, sociology, anthropology, or economics)
- 76 (3-381). **Current Problems in Nutrition.** Study of major nutritional problems facing the world today. Consideration of protein-calorie malnutrition, obesity, nutritional status of adolescents, and special nutritional problems of infants and the aged. (3 cr, §170, §171; prereq 31, physiology or human biology)
- 164 (5-353). **Design and Layout of Food Services.** Problems related to the design and layout of remodeled and new food services. (4 cr; prereq 49, 63 or equiv, general physics course, #)
166. **Development in Quantity Food Production.** Survey of recent trends in quantity food products and production from management viewpoint including study of quality, yield, and related costs. (3 cr; prereq sr, 63, 67, #)
- 167 (5-352). **Food Service Organization and Management.** Management techniques applied to food services. Methods of analysis and control. (3 cr; prereq sr, 63, 3 cr elementary statistics, 6 cr economics)
- 169 (5-394). **Special Problems in Food Service Administration.** Selected problems in food service administration. Readings, discussion, field work. (3 cr; prereq sr, 67, #)
- 170-171 (5-361/5-362). **Human Nutrition.** A 2-quarter sequence in which nutrition is discussed from the standpoint of cellular metabolism and human growth and development. First quarter includes the contributions of macronutrients to cellular processes and metabolism of the whole organism. Second quarter

- includes contributions of the micronutrients. Major conditions of malnutrition in man today are discussed. (3 cr each; prereq BioC 1, Phsl 51 or #)
- 172 (5-381). **Current Developments in Nutrition.** Fundamental facts and techniques for solving current nutrition problems. (3 cr; prereq sr, 31, 40, BioC 1, Phsl 51, or #)
- 173 (5-371). **Clinical Nutrition.** Application of principles of normal nutrition to clinical problems, with description of altered nutrient requirements in human disease. Diet therapy as an applied aspect of clinical nutrition is considered. (3 cr; prereq 171, BioC 52 or ¶BioC 52, or #)
- 174 (5-391). **Nutrition Topics.** Oral presentation by students of selected nutrition topics. (1 cr; prereq 170)
- 176 (5-363). **Human Nutrition Research Methods.** Theoretical consideration of techniques used in studying human metabolism and nutrient requirements. Discussion of metabolic and balance studies and surveys of nutritional status. (3 cr; prereq 171, BioC 52 or ¶BioC 52)
- 177 (5-373). **Metabolic Basis for Therapeutic Nutrition.** Study of the physiological and biochemical basis for dietary treatment, and exploration of dietary principles as related to adequate nutrition. Case study presentations and clinical experience are included. (4 cr; prereq 178 or #; given at Rochester)
- 178 (5-393). **Clinical Problems in Nutrition.** Application of nutrition information to problems in health and disease involving assigned readings, discussions, and experience in a diabetic clinic. (2-4 cr [2 cr at StP and/or 2 cr at Rochester]; prereq 170, BioC 52 or ¶BioC 52)
- 179 (3-392). **Readings in Nutrition.** Survey of literature in the field. Oral and written reports. (2 cr; prereq 170)

Related Art

- 19 (1-523). **Visual Presentation.** Laboratory experiences designed to develop observation, perception, and communication through studies in basic art tools and media, visual elements, spatial representations, and lettering. Free and disciplined graphic expression including the development of a portfolio and sketchbook. (3 cr)
- 20 (1-501). **Introduction to Related Art.** Development of an appreciation of art involved in everyday life of students. (3 cr; not open to srs)
- 21 (1-521). **Color.** Study of color theory and its application to environment. Experiences with pigments and color in light and color illusion. (3 cr)
- 22 (1-541). **Costume Design I.** Problems in color, texture, design for individual. Introduction to fashion illustration. Study of folk and regional costume. (3 cr; prereq 1, 21, 19 or 23 or #)
- 23 (1-525). **Design I.** Problems in composition and arrangement, mainly two-dimensional, applied to everyday demand of home and environment. Emphasis on the sources of design and the role of and demands on the imaginative, practical designer. (3 cr; prereq 19, 21)
- 24A (1-552). **The Home: Selection and Furnishing I.** Problems involved in choosing location and in planning or selecting a dwelling unit and its furnishings. Emphasis on design and appraisal of individual and family needs. (3 cr, §FamS 15 or §GC 3D; prereq soph)

Course Offerings

- 24B (1-553). The Home: Selection and Furnishing Experience I.** Problems in designing for living space needs. Experiences in evaluation of design quality of furnishing elements. Selection and coordination of fabrics, furniture, accessories in an interior space laboratory. (3 cr; prereq 20, 21, 24A)
- 25 (1-531). Textile Design I.** Orientation to sources and resources of textile media. Individual designing in textile construction techniques and/or applied media. Studio problems. (3 cr)
- 26 (1-533). Crafts Design I.** Orientation to craft materials and techniques in non-textile crafts. Metals, wood, plastic, others. Studio problems. (3 cr)
- 28 (1-538). Construction and Refinishing of Home Furnishings.** Laboratory problems in refinishing and reupholstering furniture and making of slip covers and draperies. Emphasis on design. Techniques suitable for homemakers, extension workers, and homemaking teachers. Students need to furnish own materials. (3 cr; prereq #)
- 29 (3-563). Art and the Environment.** Art and design in housing; an individual's role and responsibility; contemporary and historic examples of alternative approaches to design of the physical home environment. (3 cr; prereq soph)
- 57 (3-525). Design II.** Study of three-dimensional spatial concepts. Relationship of materials to structures, display and decorative presentations. (3 cr; prereq 21, 23, or #)
- 58A (3-581). Field Experiences.** Supervised work-study program with professional firm, agency, or institution such as interior design studio, art museum, or housing authority. (3 cr; prereq Psy 2, completion of at least one-half of professional sequence and #)
- 58B (3-582). Field Experiences.** Supervised work-study program in display design and/or crafts. (3 cr; prereq completion of at least one-half of professional sequence and #)
- 100 (5-565). Homes of the World.** Study of home design in selected regions of the world. (3 cr; prereq 24A or 29 or equiv)
- 118A (5-507). History of Decorative Arts I.** Textiles of the world from early civilizations to the 20th century. Study of the characteristics of design, material, and technique. (3 cr; prereq 120 or equiv)
- 118B (5-509). History of Decorative Arts II.** Study of glass, ceramics, metalwork, wood, and other materials from selected historical periods. Application to interior design. Lectures and field trips. (3 cr; prereq 120 or equiv)
- 119 (5-504). Cultural Resources of the Twin Cities.** Study of the broad range of arts represented in the Twin Cities area. Lectures by instructor and practicing professional artists. Field trips, selected readings. (2-3 cr)
- 120 (5-505). Art History.** Art from the Egyptian period to present. Painting, sculpture, and architecture of the past studied for influences on contemporary period. Field trips. (3 cr)
- 120A (3-571). Senior Seminar: Related Art.** Discussions of problems in the field, possible goals, and professionalism. Assigned readings and reports. (1 cr; prereq sr in related art)
- 121 (5-531). Textile Design II.** Designing in one selected textile technique. Studio problems. Readings. (3 cr; prereq 25 or equiv)

- 121C (5-521). Color II.** Intensive study of color; consideration of visual, emotional, and symbolic aspects; color theory. (3 cr; prereq 12 cr hrs or equiv in art)
- 122A (5-551). Interior Design Presentation.** Methods of rapid rendering for interiors in various media. Presentation techniques for traditional and modern interior details. (3 cr; prereq 19 or equiv, 24B)
- 122B (5-554). Interior Design Problems.** Interiors designed and rendered in various media; intensive study of color and fabrics. Emphasis on commercial interiors. Field trips to studios, business firms, and homes. (3 cr; prereq 122A)
- 123A (5-512). History of Home Interiors I.** Study of furnishings and interiors from ancient times through the 18th century, including Oriental influences. Major emphasis given to European-American furnishings of the 18th century. (3 cr; prereq 120 or equiv)
- 123B (5-514). History of Home Interiors II.** Historic styles of American homes and furnishings of the 17th through 20th centuries; European styles of 19th and 20th centuries. Role of reproductions and adaptations. (3 cr; prereq 120, 123A or equiv)
- 124 (5-553). The Home: Selection and Experiences II.** Studio experience in coordination of color, texture, scale, and pattern in designing home interiors and their furnishings. Field trips. (3 cr; prereq 24B)
- 125 (5-541). Costume Design II.** Problems in draping and sketching clothing designs. Pencil, crayon, and water color techniques; studies and reports on selected topics. (3 cr; prereq 3, 22, or #)
- 126 (5-533). Crafts Design II.** Studio problems in nontextile materials and techniques. Readings. (3 cr; prereq 26 or equiv)
- 126A (5-585/5-586/5-587). Problems in Related Art.** Independent study in related art under tutorial guidance. (3 cr each qtr, [9 cr max]; prereq permission of division chairman)
- 127 (3-558). Purchasing Home Furnishings.** Study of home furnishings in terms of use, cost, and appearance. Includes furniture, dinnerware, floor and wall coverings, fabrics, and accessories. Actual materials, slides, and references used. Field trips. (3 cr; prereq 24A or equiv, 50)
- 128 (5-517). History of Costume.** Primitive to contemporary styles. Reports. Study of costumes from historic collection. (3 cr; prereq 120 or equiv)
- 180 (5-552). The Home: Selection and Furnishing II.** Problems in planning and furnishing a home to meet family needs. Aesthetic, economic, social, and managerial aspects considered. (3 cr; prereq 24B, 49, 50, 9 cr in social sciences)
- 181 (5-568). Housing Problems of the Family.** Plans for both urban and rural homes with evaluation of the economic, art, and social aspects. Discussions, field trips, and classroom analyses of student problems. (3 cr; prereq 24A or 29 or equiv and 12 cr in social sciences)
- 197 (5-502). Applications of Art Theory in Home Economics.** Current literature of art with implications for home and family living. (3 cr; prereq 120 or equiv)
- 197A (5-556). Environmental Studies in Interior Design.** Exploration of space, color, light, and arrangement in interiors (in specially designed laboratories). (3 cr; for postbaccalaureate students; prereq 6 cr in housing, home furnishings and interior design or equiv)

Textiles and Clothing

- 1 (1-661). **Clothing Selection.** Overview of individual, familial, and societal factors affecting selection of clothing and related items. Principles of clothing selection originating from economic and design theory. (3 cr; not open to sr)
- 3 (1-601). **Clothing Construction I.** Principles of fit and pattern alterations. Study of various basic clothing construction methods. (3 cr; prereq 1)
- 4 (1-602). **Clothing Construction II.** Techniques of fitting, pattern design, and draping as a basis for creative designing in fabric. Planning, choosing, and evaluating fabrics, designs, and construction methods. (3 cr; prereq soph, 3)
- 50 (3-621). **Textiles.** Basic physical, chemical, and biological characteristics of fiber, yarn, and fabric structures; interrelationship with choice, maintenance, and performance of consumer textiles. (4 cr; prereq 3rd qtr soph, GeCh 5 or NSci 2 or NSci 5, or #)
- 52 (3-622). **Home Furnishing Textiles.** Developments and trends with reference to fiber, yarn, finish, and construction of textiles such as carpeting, draperies, curtains, and upholstery materials. (3 cr; prereq 50, #)
- 53 (3-601). **Advanced Clothing.** Problems in tailoring a lined wool garment; use of a plaid or striped fabric in construction of a garment. (3 cr; prereq jr, 4, 50 or ¶50)
- 54A (3-642). **Fashion Merchandising I.** Study of the organization and structure of the fashion industry in America and abroad; sources of current fashion formation; analysis of fashion trends. (3 cr; prereq Mktg 65, #)
- 54B (3-643). **Fashion Merchandising II.** Problems related to fashion acceptance and its effect on retailing. Analysis of consumer demands for fashion goods. Study of merchandise selection and buying practices. (3 cr; prereq 54A or ¶54A)
- 59 (3-641). **Supervised Retail Experience.** Combines minimum of 8-10 hours sales experience per week with discussion of retail problems by store management and lectures in classroom. (5 cr; prereq jr and #)
102. (5-621). **Advanced Textiles.** Structural and physical properties of fibers; measurement and significance of physical characteristics of yarns and fabrics; economic problems involved in manufacture and use. (3 cr; prereq 50, BioC 1 or OrCh 62, AgEc 3 or Econ 2, or #)
- 107 (5-622). **Textile Analysis.** Application of quantitative methods in analysis of textile materials, with special reference to fiber composition and finishes. (3 cr; prereq 50, BioC 1 or OrCh 62, InCh 11 and AnCh 57)
- 115 (5-661). **Sociological and Economic Aspects of Clothing.** Effects of clothing on the individual, society, and economy; psychological, sociological, and economic aspects of fashion. (3 cr; prereq 50, AgEc 3 or Econ 2, Soc 1, Psy 2 or #)
- 116 (5-662). **Family Clothing Problems.** Clothing problems and issues resulting from family characteristics, value orientations, and social mores. Interpersonal influences in clothing behavior. (3 cr; prereq 50, AgEc 3 or Econ 2, Soc 1, Psy 2, or #)
- 152 (5-623). **Problems in Consumer Textiles.** Contemporary textiles, their physical characteristics in relation to end use performance; agencies aiding consumer through development of standards; problems students have met in the textile field. (3 cr; prereq 50 or equiv; offered when demand warrants)

- 153 (5-601). **Recent Developments in Clothing Construction.** (Workshop) Discussion, demonstration, and laboratory work with emphasis on management of time and materials, including newer construction techniques. (3 cr; prereq 53 or #)
- 154 (5-602). **Pattern Design and Alteration.** Principles of flat pattern designing, pattern alteration, modification of commercial patterns, and principles of fitting. Course develops versatility in use of commercial patterns and gives experience in designing original garments. Development of individual master pattern. (3 cr; prereq 4 or equiv, 22 or equiv, or #)
- 155 (5-603). **Experimental Studies in Clothing Construction.** The comparative study of selected procedures in clothing construction, with evaluation of suitability for use in teaching secondary, college, and adult levels. Individual experimental problems and class reports. (3 cr; prereq 53, tchg exper, #)
- 198 (5-624). **Topics in Textiles and Clothing.** Assigned readings, reports, and discussion. Independent study available to high scholarship students. (3 cr; prereq 15 cr in textiles and clothing and sociology or economics, #)

SUPPORTING UNATTACHED COURSES

Agricultural Journalism (AgJo)

53. **Publicity.** For students planning careers in agriculture, forestry, and home economics, or veterinary medicine or some allied industry in which the co-operation of the press and radio will be needed. Covers mass media relationships, news and direct mail writing, radio and TV broadcasting, and preparation of visuals. (3 cr; prereq rhet comm req)
134. **Rural Communication Media and Media Behavior.** Mass media behavior in rural communities; theoretical approaches relevant to problems of rural mass media behavior; analysis of research aimed at adult education efforts through mass media. (3 cr; prereq 53, Psy 2, Soc 14, or #)
135. **Communications in International Agricultural Development.** (3 cr; prereq 53 or Jour 1, 14, or #)

Biometrics (Biom)

40. **Elements of Statistics.** Terminal introductory course. Organization, presentation, and interpretation of data; elementary probability; binomial and normal distributions; introduction to estimation and testing procedures. (3 cr, \$100; prereq Math 10)
100. **Statistical Analysis I.** Statistical procedures in agricultural and biological research. Frequency distributions, descriptive statistics; elementary probability; binomial, Poisson, and normal distributions; estimation and testing procedures; analysis of variance; simple linear regression. (5 cr; prereq Math 10)
101. **Statistical Analysis II.** (Continuation of Biom 100) Further consideration of analysis of variance; randomized block design, factorial experiments; multiple regression, correlation; analysis of covariance; nonparametric methods. (5 cr; prereq 100)

Rhetoric (Rhet)

All students in the College of AFHE are required to take the following courses in rhetoric: Freshman Communication (9 cr); Public Speaking (Rhet 22); and Exposition (Rhet 51). Additional requirements as to number of credits and specific courses depend upon the particular curriculum for which the student is registered.

The Rhetoric Department also offers courses in humanities, literature, original and technical writing, speech, and dramatics. A number of these courses may be used to fulfill the distribution requirements in Categories I, III, and IV.

- 1 (1-101). Communication I.** Writing from observation and experience. Attention to grammar, sentence and paragraph construction, punctuation, spelling. Integrated assignments in reading, listening, and speaking. Progress tests. (3 cr)
- 1H (1-111). Honors Course: Freshman Communication I.** Writing from observation and experience. Integrated projects in reading, listening, speaking. (3 cr; prereq upper 10% on ACT [English] or by invitation)
- 2 (1-102). Communication II.** The expository paper. Note-taking, outlining. Short themes, library research, term paper, documentation. Integrated assignments in reading, listening, and speaking. (3 cr; prereq 1)
- 2H (1-112). Honors Course: Freshman Communication II.** Writing from library research. Integrated projects in reading, listening, speaking. (3 cr; prereq upper 10% on ACT [English] or grade of A in Communication I or by invitation)
- 3 (1-103). Communication III.** Persuasion. Preparation and analysis of written and oral materials. The character, sources, and proper use of evidence. Integrated assignments in reading, listening, and speaking. (3 cr; prereq 2)
- 3H (1-113). Honors Course: Freshman Communication III.** Persuasive communication. Integrated projects in writing, reading, listening, and speaking. (3 cr; prereq upper 10% on ACT [English] or grade of A in Communication II or by invitation)
- 22 (1-222). Public Speaking.** Practical course in fundamentals of speechmaking. Emphasis upon organizing the speech and projecting it to the audience. (3 cr; prereq rhet comm req or equiv)
- 25 (1-225). Parliamentary Procedure.** Parliamentary procedure applied to group organization and management. Duties of officers and disposition of motions emphasized. Individual participation stressed through role playing and other workshop procedures. (1 cr)
- 26 (1-506). Original Writing.** For students interested in creative writing: description, narration, feature articles, short stories. (3 cr; prereq rhet comm req)
- 31 (1-401). Introduction to Literature.** Analysis of literary structural forms and stylistic devices: poetry, drama, and prose fiction. (3 cr; prereq rhet comm req)
- 32 (1-442). Novel and Short Story.** Analysis of selected European and American fiction. Emphasis on literary style in relation to themes of prose fiction. (3 cr; prereq rhet comm req)
- 34 (1-451). Introduction to Dramatic Literature.** Selected readings from Greek literature to the present. Emphasis upon the development of dramatic art form. (3 cr; prereq rhet comm req)
- 35 (1-421). English Literature I.** Historical and stylistic development from the Anglo-Saxon period through the Renaissance. (3 cr; prereq rhet comm req)

Supporting Unattached Courses

- 36 (1-422). **English Literature II.** Historical and stylistic development from the Puritans through the neoclassical period. (3 cr; prereq rhet comm req)
- 37 (1-423). **English Literature III.** Historical and stylistic development from the Romantics to the present. (3 cr; prereq rhet comm req)
- 41 (1-301). **Humanities: The Enlightenment.** An introduction to the humanities. The development of rationalism and humanism. Readings in Pope, Voltaire, Locke, Rousseau, Tolstoy. (3 cr)
- 41A (1-311). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 41. (1 cr; prereq 41 or ¶41)
- 42 (1-302). **Humanities: The Industrial Revolution.** The classical economists and the romantic response. Readings in the classical, utopian, and Marxian economists, the romantic poets, Zola, Dostoyevsky, and Mill. (3 cr; prereq 41)
- 42A (1-312). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 42. (1 cr; prereq 42 or ¶42)
- 43 (1-303). **Humanities: Age of Darwin.** The effect of evolution upon religion and morality of a changing society. Creativity in science and art. Readings in the evolutionists, Nietzsche, Shaw, and Thomas Mann. (3 cr; prereq 41)
- 43A (1-313). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 43. (1 cr; prereq 43 or ¶43)
- 47 (1-147). **Efficient Reading.** Designed to increase reading rate, comprehension, and vocabulary. For persons of average or above-average reading ability who wish to achieve or maintain superior scholastic status. Not a remedial course. (3 cr; Arts College students see *College of Liberal Arts Bulletin*)
- 48 (1-251). **Effective Listening.** Designed to increase listening comprehension by developing three central abilities. Readings, research, theory, and practice. (3 cr)
- 51 (3-551). **Exposition.** Informative writing, semitechnical and technical; letter of application; feature article; preparation for professional writing; review of usage and style. (3 cr; required of all students unless exempted through dept exam; prereq jr)
- 52 (3-562). **Technical Writing.** Methods of exposition in technical writing; types of reports; continuous practice in report writing. Designed to enable students to meet later professional responsibilities. (3 cr; prereq 51)
- 54 (3-254). **Advanced Public Speaking.** Training for specific speech situations most likely to be encountered professionally soon after graduation. Psychology of communication especially as related to use of visual aids, demonstration, performance methods, and radio. (3 cr; prereq 22)
- 56 (3-266). **Discussion Methods.** Study of and practice in structured and unstructured discussion. Practice in leading meetings, debating, planning radio programs, organizing in-service training programs, evaluating group progress. Emphasis on group dynamics and the psychology of leadership. (3 cr; prereq rhet comm req)
- 61** (3-371). **Humanities: Individualism — An American Problem.** Examination and evaluation of conflicts arising from varied interpretations of individualistic

** Students may take any combination of Rhet 61, 62, 63.

Course Offerings

- traditions in America. Readings in Emerson, Thoreau, Mark Twain, Frank Lloyd Wright, Herbert Hoover. (3 cr)
- 62^{oo} (3-372). **Humanities: Religion in American Thought and Experience.** Examination of the diverse values centered in American religious and philosophical thinking from the 17th century to the present. Readings in Jonathan Edwards, Emerson, William James, John Dewey, and others. (3 cr)
- 63^{oo} (3-373). **Humanities: Nationalism in American Thought and Experience.** Examination of the growth of political and cultural nationalism in America. Readings in Jefferson, Webster, Calhoun, Turner, Henry James, and John Dos Passos. (3 cr)
- 64 (3-374). **Special Problems in Humanities.** Primarily for supervised reading and research on problems not covered in regularly offered courses. (1-3 cr; prereq #)
- 71 (3-455). **Shakespeare.** Reading of selected plays from the early, middle, and late periods. Emphasis upon the understanding of Elizabethan dramatic art. (3 cr; prereq rhet comm req)
- 73 (3-471). **American Literature I.** Historical and stylistic development from early account of the new continent to the end of the 19th century. (3 cr; prereq rhet comm req)
- 74 (3-472). **American Literature II.** Historical and stylistic development since 1900. (3 cr; prereq rhet comm req)
- 91 (0-291). **American Speech for Foreign Students.** Primarily for graduate students who wish to improve their command of oral English. Individual attention; laboratory procedure. Audio-visual equipment used to expedite work in vocabulary, enunciation, and pronunciation. (No cr; 3 hrs per wk)
- 92 (3-192). **Communication Problems for Foreign Exchange Groups.** For any exchange group composed of members of similar national origins. English studied as a second language. (3 cr; prereq elementary knowledge of oral and written English)
- 141 (5-301). **Humanities Seminar: The Individual and Society.** Examination of contemporary ethical and cultural values as manifested in such conflicts as: liberty and authority, freedom and organization, art and technology, science and religion. (3 cr; prereq 41, 42, 43 or #)
- 147 (5-147). **Adult Reading Programs.** Problems, methods, and research in this field. Survey and evaluation of program designs, including those suitable for TV. (2 cr)
- 151 (5-551). **Report and Thesis Writing.** For graduate students and for seniors anticipating graduate work. Organization of reports and theses; library investigation; presentation of data; methods of documentation. Emphasis upon revision of manuscripts and improvement in style of writing. (3 cr; prereq 51 or #)
- 169 (5-169). **Communication Problems and Processes.** An analysis of contemporary communication theories and research. Problems of language, perception, and status in the application of communication theory to professional activity and growth. (3 cr; prereq grad)

^{oo} Students may take any combination of Rhet 61, 62, 63.

Section IV. ADDITIONAL INFORMATION

Administration

The University's work in the fields of home economics, forestry, and agriculture is centered in the Institute of Agriculture. Major units of the institute include Resident Instruction, the Agricultural Experiment Station, the Agricultural Extension Service, and International Programs in Agriculture. The dean of the Institute of Agriculture has administrative offices in Coffey Hall.

Resident Instruction is under a director who administers the programs of the College of Agriculture, Forestry, and Home Economics (often referred to as College of AFHE). This college includes the Schools of Forestry and Home Economics and the various departments in agriculture. The College Office is in Coffey Hall. The director of the School of Home Economics has her administrative office in 200 McNeal Hall.

Location

The School of Home Economics has extensive facilities for the education of home economists in a large number of professional fields. Students may have work in both the Minneapolis and St. Paul areas of the Twin Cities Campus. The metropolitan area provides rich resources to supplement those of the University.

Human Rights

The University of Minnesota is guided by the principle that there shall be no differences in the treatment of persons because of race, creed, color, or national origin and that equal opportunity and access to facilities shall be available to all. This principle is particularly applicable in the admission of students in all colleges, and in their academic pursuits. It is also applicable in University-owned or University-approved housing, in food services, student unions, extra-curricular activities, and all other student services. It is a guiding policy in the employment of students either by the University or by outsiders through the University and in the employment of faculty and civil service staff.

General Requirements and Procedures

Scholarship Requirement — Students in the School of Home Economics are expected to make satisfactory progress in the curricula they have selected. This is interpreted to mean a C average. The cases of students who are not reaching this standard are considered by the Student Scholastic Standing Committee. It is always best for a student to see his class instructor and his faculty adviser as soon as he feels himself in difficulty rather than to wait until he has

Additional Information

already received a poor grade. In some curricula, as indicated in the curricular descriptions, a higher grade point average is required.

Scholastic Probation — If a student's scholastic work should be considerably below a satisfactory level of performance, he will be placed on probation and his program of work will be restricted as seems advisable by the Student Scholastic Standing Committee.

A student will be placed on probation if, at the end of 3 quarters of work or earlier, he has not attained a grade point average of 1.75. At the end of 6 quarters or earlier, he will be placed on probation if he has not attained a grade point average of 1.90.

Exclusion from College — Students may be excluded from the college under one of the following headings:

1. *Dropped for Low Scholarship* — When it becomes apparent that a student's work is of a quality that will not lead to graduation, he will be dropped and usually will not be permitted to apply for readmission until 9 months later.

A freshman may be asked to withdraw when his grade point average is less than 1.50 after 2 or 3 quarters of work in this college. A sophomore may be dropped if his average is less than 1.75 after 6 quarters (or 5 quarters if he began his freshman work in the winter or spring quarter). When the factors which contributed to the unsatisfactory work have been removed or satisfactorily corrected, a student may petition for permission to return. Otherwise, he is encouraged to make other plans.

2. *Hold for Committee Clearance* — Sometimes a student's scholastic difficulty indicates that he should not continue for the time being even though the record hardly requires official drop action. In such a case his later return must be approved by the Student Scholastic Standing Committee.

3. *Discontinued* — If a student is pursuing an appropriate course but is handicapped by conditions he cannot control (ill health, necessary outside work, etc.) he may be required to discontinue his registration until these conditions have improved. When discontinuance takes place at any time other than the end of the quarter, the courses for which he is registered may be recorded as canceled without grade (W).

Readmission — If a student is dropped, he may not return without the permission of the Student Scholastic Standing Committee. Credits earned at other institutions during the period of suspension will not apply toward graduation from this college unless permission to earn such credits was given in advance by the Student Scholastic Standing Committee. If he is permitted to return, he will be placed on scholastic probation and may be dropped again at any time when his work is unsatisfactory.

Degrees Offered — The College of AFHE offers two groups of curricula with degrees granted as follows: (a) curricula leading to the degree of bachelor of science, (b) curriculum leading to the professional Master's degree in home economics education (confer with chairman of the Department of Home Economics Education for requirements).

General Requirements and Procedures

Requirements for Bachelor's Degree in Home Economics — Candidates will be recommended for graduation after completing the following requirements: (a) the prescribed curriculum, including required and elective credits to make the total number of credits required (185 is the minimum for any curriculum); (b) an average of 2 grade points per credit — i.e., the cumulative grade point average must be 2.00 (C) or more (for additional quality requirements, see statements of prescribed curricula); (c) requirements for all students as listed in this bulletin; and (d) the residence and other general University requirements for graduation (see *General Information Bulletin*).

Graduation with Honors — Undergraduate degrees may be awarded "with distinction" or "with high distinction." If you should fail to meet in full the requirements stated below, your case will be referred to the Student Scholastic Standing Committee for individual consideration.

The degree is granted "with distinction" if you attain a minimum grade point average of 3.00 for the entire curriculum. If you are a transfer student with less than 2 years of work in this college you will not be eligible for graduation with distinction. However, if you complete one-half the number of credits required for graduation in any curriculum, you will satisfy the 2-year residence requirement. Recommendations to the faculty for the degree "with distinction" are made through the Student Scholastic Standing Committee on the basis of scholarship and other evidence of satisfactory achievement and advancement in the course pursued.

Your degree will be granted "with high distinction" if you attain a minimum grade point average of 3.50 for the entire curriculum. The same conditions for residence and recommendation apply as for the degree "with distinction."

If you are completing the curriculum in home economics education, you will be checked for your standing in student teaching as well as for the requirements stated above.

Electives — You should consult with your adviser as to your choice of electives. Electives taken by students registered in the College of AFHE may, upon approval of adviser and the Student Scholastic Standing Committee, be omitted from the courses offered for graduation. These electives, in amounts not to exceed 10 credits, may be withheld from the list of courses counted toward a degree to raise the grade point average only in instances relating to the securing of junior classification or in meeting the graduation requirement of 2.00. After a course has been withheld from the undergraduate record as authorized above, it shall not be reinstated other than by special examination or through repeating the course.

A maximum of 9 credits in music may be used as elective credit toward graduation, with not more than 6 of these in Mus 43, 44, 45, or in concert band. A maximum of 6 credits may be offered in physical education.

Credit in Graduate School — Credits for advanced courses earned while you are an undergraduate, even though in excess of those required for the baccalaureate degree, can be transferred to the Graduate School only under the following conditions: (a) If you lack not more than 9 credits of undergraduate work, taking into account required and sequence courses, you may carry a limited amount of graduate work (approved courses numbered 100 or

Additional Information

above) for graduate credit, such courses not to be applied toward an undergraduate degree. The conditions as stated apply to the beginning of the quarter in which you are taking the courses for graduate credit. In order to hold these credits available for use at the graduate level, a petition must be submitted to the AFHE Student Scholastic Standing Committee at the time of registration for the last quarter, requesting that these specified credits be withheld from the undergraduate transcript. Transfer of credit must be arranged by petition to the Graduate School. (b) If you lack not more than 9 credits for graduation, taking into account required and sequence courses, you may register in the Graduate School.

Student Scholastic Standing Committee — Almost every student on occasion makes use of the Student Scholastic Standing Committee of the College of AFHE. This is a committee of the faculty which interprets and enforces faculty regulations. It also may make exceptions to regulations when they work to the educational disadvantage of a particular student, provided the basic spirit of the regulation is maintained. If you have any questions concerning the interpretation of faculty regulations, you should consult with your adviser or call at the College Office. By means of petition, the forms for which are procured in the Office of Admissions and Records, you may request adjustments of your program where departure from normal procedures appears to be justified. These requests, after they have been approved by your adviser, are turned in to the College Office in Coffey Hall.

If you transfer from another institution to the College of AFHE, your transfer credits will be evaluated in the Office of Admissions and Records. You should see the person designated by the director of the School of Home Economics if you have any question as to use of transfer credit in any of the home economics curricula.

Orientation Programs — The College of AFHE joins with other divisions of the University in helping new students, whether freshmen or those with advanced standing, to get acquainted with one another and with the college program. Usually this involves a period of time devoted to testing, counseling, program planning and registration, and group activities.

College Placement Services — The college will offer some assistance in helping obtain employment upon graduation. The College Office will bring to your attention such job opportunities as are known, and will assist in arranging interviews or contacts with representatives of employing agencies. Many departments are aware of opportunities and you should ask their help. Specialized placement services are available to students in home economics education through the Bureau of Recommendations, College of Education.

Student Government

Student Council — The Student Council directs and coordinates student activities and encourages student leadership throughout the St. Paul Campus. Its membership is drawn from all major areas of the College of AFHE and

also from the College of Veterinary Medicine and College of Biological Sciences.

The council cooperates with the Minnesota Student Association (MSA) and the Senate Committee on Student Affairs. It brings questions from the student body to the administration of the colleges and discusses and reaches decisions on matters of general interest.

Honor System—Under the provisions of the Student Self-Government Honor System, the students in AFHE classes, rather than the faculty, conduct examinations and quizzes. The honor system is operated on the assumption that honesty prevails among a large majority of students. Students place themselves on their honor not to give or receive aid during examinations. The responsibility of honesty is between student and student; the faculty does not place the student on his honor. Under the honor system the faculty permits students to conduct the examinations.

If you observe dishonesty during an examination period, you may take some appropriate step at the time to halt the dishonest act, or may report the incident later to the Honor Case Commission. The Honor Case Commission, comprised of students from the various areas, considers confidentially the various aspects of the situations reported. If it is clear that scholastic dishonesty has occurred, the commission concerned recommends to the Student Scholastic Standing Committee of the faculty an appropriate action to be taken with respect to the offending student.

The honor system is essentially a preventive, rather than a punitive, system and provides for greater freedom of action on the part of students on this campus. New students are urged to discuss the honor system with students previously registered in the college. The membership of the Honor Case Commission is posted in the post office (in Coffey Hall) together with a notice as to how members may be contacted for information or assistance.

Student-Faculty Intermediary Board—When you encounter situations with respect to your classwork which in your opinion need attention or clarification, you are urged to bring the matter to the attention of the Student-Faculty Intermediary Board. This is a joint committee of students and faculty who are interested in maintaining helpful relationships between members of the student body and the faculty. The membership of this board is also posted in the St. Paul Campus post office.

Home Economics Board—The major objectives of the Home Economics Board are to initiate, promote, and coordinate activities of home economics organizations and to serve as liaison between home economics students and faculty members. Specific duties consist of the following: (a) to discuss and attempt to solve with the faculty problems arising from course work and student-faculty relationships; (b) to participate in long-range planning with faculty and all-college committees; (c) to help coordinate public relations programs of the School of Home Economics in such areas as Home Economics Day, high school visitation, programs involving people from other countries; and (d) to attempt to unite and inform students of the areas of specialization through representatives of the areas.

Additional Information

Home Economics Board membership consists of the vice presidents of Omicron Nu, Phi Upsilon Omicron, and Home Economics Association as well as a representative from each area of specialization in home economics (foods, family social science, general home economics, home economics education, household equipment, nutrition and food service administration, related art, and textiles and clothing), a home economics representative from St. Paul Campus Student Council, Intermediary Board, the Committee on Relationships with Prospective Students, the undergraduate student members of the Home Economics Curriculum Committee, three members at large, one transfer student, two freshman representatives, and two carry-over members from the previous year's board complete the roster. The membership of the Home Economics Board is posted on the second floor of McNeal Hall. Students may be kept informed of Home Economics Board activities through the notices on the bulletin board on the main floor of McNeal Hall.

Special Information

GRADING SYSTEM

Academic progress in the College of AFHE may be evaluated by one of two grading systems, the traditional letter grade system (A-F) or the P-N system now in use on a trial basis.

A-F System — Under the A-F system (A-B-C-D-F) each letter grade carries the following meaning and number of grade points per credit:

<i>Grade</i>	<i>Grade Points Per Credit</i>
A (Excellent)	4
B (Good)	3
C (Satisfactory)	2
D (Passing)	1
F (Failure)	0

The grade point average is determined by dividing the sum of the grade points by the sum of the credits passed and failed. A cumulative average of 2.00 (C) is required for graduation. Additional requirements related to the grade point average may be found in materials descriptive of specific curricula (see specific home economics and home economics education curricula).

An experimental grading system directed toward encouraging students to explore academic areas other than those closely related to the major is now available. The P-N system hopefully reduces to some extent the pressures associated with the traditional grading system and encourages students to seek greater breadth in the educational experience.

P-N System — Under the P-N system the symbol P stands for "pass" and N for "no credit." The dividing line between P and N is approximately the same as that between D and F. P and N grades are not included in the computation of the grade point average, but credits of P count toward graduation.

The following principles have been adopted as a guide for use of the P-N grading system for AFHE students:

1. All courses available to undergraduate students (those numbered under 200) are available on the P-N and the A-F basis except where specifically restricted by the department offering the course. (Consult course listings provided by division chairman.)
2. A candidate for the baccalaureate degree from the college may present a maximum of 25 percent of the residence course credits offered for graduation in courses in which the student received a grade of P.
3. The P-N system shall be available to a student of the college irrespective of his academic standing.
4. A student will be limited to one course per quarter on the P-N grading system until such time as he has completed 36 credits. This option shall be in excess of any courses offered on the P-N basis only.
5. P-N registration must be declared at time of registration and may not be changed on or after the opening day of the quarter. A course for which a student has on some previous occasion registered on the A-F system shall not be taken at a later date on the P-N basis.
6. Where a course is identified by title and number in bulletin copy as being required, or as being *the* course recommended to fulfill a curriculum requirement, it will be taken under the A-F grading system. Prerequisites for required courses, and courses in the major, will be taken under the A-F system, unless exceptions are established.

Your adviser or the College Office will help you if you should have questions about use of the P-N system.

Other Symbols That May Be Used on the Transcript — The temporary grade of I (incomplete) may be assigned by the instructor when there is not sufficient information immediately available to permit assignment of a permanent grade.

An I which has not turned into permanent grade by the end of the sixth week of the next regular quarter of attendance shall become an F or N depending upon the grading system of registration. An extension of time may be permitted for removal of I grades upon recommendation of the instructor concerned and with approval of the adviser and the AFHE Student Scholastic Standing Committee.

The registration symbol W indicates official cancellation from a class without grade. This symbol is assigned in all cases of official cancellations during the first 6 weeks of classes irrespective of the student's standing. After 6 weeks, W shall be posted only if the student is not failing at the time of official cancellation. Whether or not cancellation is permitted is within the authority of the student's adviser and the Student Scholastic Standing Committee to determine. A student who cancels officially or otherwise discontinues attendance of a class after the sixth week and is failing at the time shall receive an F or N.

Additional Information

The symbol X may be reported in continuation courses in which a student is permitted to continue but in which a grade cannot be determined until the sequence is completed. A grade will be submitted by the instructor for each X when the student has completed the entire sequence.

Registration as an auditor or visitor is indicated by the registration symbol V (visitor). Such registration requires the permission of the instructor and the adviser.

A symbol T (transferred) indicates credits transferred from another institution, or from one college to another within the University when reevaluation is required. It is posted as a preceding supplement to the original grade.

If you should wish additional information about grading symbols you may contact the Office of Admissions and Records, or the College Office, both in Coffey Hall.

ACTION LINE

The University is a complex institution offering many services to students. However, freshmen and transfer students may be unaware of efficient ways to get answers to questions or help with problems. Although the student's academic adviser in the School of Home Economics is the *first* resource, and the director and associate director are available, other specific resources are indicated:

For questions about

Courses which may be taken on P-N basis
Transfer credits granted in home economics

Testing out of courses

Curriculum requirements

Career information

Financial aid, scholarships
Campus organizations
Content or conduct of class

Contact

Head of division in which you major**
Mrs. Barbara Conklin, 223 McNeal Hall
Associate Director, School of Home Economics, 212A McNeal Hall
Mrs. Barbara Conklin, 223 McNeal Hall
Associate Director, School of Home Economics, 212A McNeal Hall
Head of division offering course**
Head of division in which you major**
Student members, Home Economics Curriculum Committee††
Associate Director, School of Home Economics, 212A McNeal Hall
Home Economics Board representative††
Adviser
Head of division**
Student Counseling
Office of Student Financial Aid**
Home Economics Board representative††
Instructor of class
Head of division offering course**
Home Economics Board representative††

** Inquire at main office, School of Home Economics, for name and office number.

†† See listing on bulletin board near Administrative Office, McNeal Hall, or inquire at office.

Section V. FACULTY

Administration

Louise A. Stedman, Ph.D., Professor and Director

Roxana R. Ford, Ph.D., Professor and Associate Director

Advisers (freshmen)

Marie H. Christenson, M.S., Assistant Professor

Barbara B. Conklin, M.A., Instructor

Marcia M. Zeimes, M.A., Instructor

Core

Natalie Gallagher, M.S., Assistant Professor

Family Social Science

Donald Bender, Ph.D., Assistant Professor and Extension Specialist

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Kathleen Jeary, M.A., Assistant Professor

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Margarita Billings, B.S., Lecturer

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Fudeko Maruyama, Ph.D., Assistant Professor

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Robert J. Sirny, Ph.D., Professor

Patricia Swan, Ph.D., Associate Professor

Esther Trammell, M.S., Assistant Professor

Dorothy G. Verstraete, M.S., Instructor

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Gwendolyn Newkirk, Ed.D., Associate Professor

Ardell H. Wantoch, M.A., Assistant Professor

Emma Whiteford, Ph.D., Professor

Household Equipment

Florence Ehrenkranz, Ph.D., Professor

Related Art

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Signe Betsinger, M.A., Instructor

Marion Bagley, M.A.T., Assistant Professor

Ann Erickson, M.A., Assistant Professor

Gertrude Esteros, Ed.D., Professor

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Juliette I. Myren, M.S., Assistant Professor

Virginia M. Nagle, B.A., Assistant Professor

Joseph Ordos, M.A., Assistant Professor

Robert M. Shank, M.F.A., Instructor

Hazel S. Stoeckeler, M.A., Associate Professor

Textiles and Clothing

Suzanne Davison, Ph.D., Professor

Ruth Franzen, M.A., Instructor

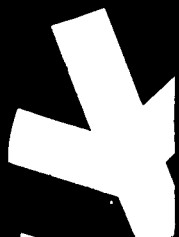
Margaret P. Grundereng, Ph.D., Associate Professor

Suzanne Hendricks, M.S., Instructor

Gloria Williams, M.A., Instructor

1969

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HOW TO USE THIS BULLETIN

This bulletin is the basic source of information on the School of Forestry. You should keep it at hand for ready reference. The Index in the back of the bulletin will refer you to information on specific points.

Section 1 describes the objectives or goals and facilities of the School of Forestry.

Section 2 outlines the information on General Academic Requirements, such as degrees offered, admission requirements, registration and class attendance, scholarship requirements, classification of students, the All-University Council on Liberal Education requirements, and junior-senior requirements.

Section 3 presents the programs and curricula in forestry.

Section 4 describes the courses offered.

Section 5 contains general information on student personnel services, student government, ROTC programs, and scholarships and awards.

Section 6 lists the departments offering primary courses related to School of Forestry programs.

In addition to this bulletin, you will be supplied at the time of registration with a copy of the *Class Schedule*. This is published just prior to each quarter and lists courses offered during the quarter, with time and place of class meetings.

EXPLANATION OF COURSE NUMBERS AND SYMBOLS

Courses primarily for freshmen and sophomores are numbered 1 through 49; for juniors and seniors, 50 through 99; for juniors, seniors, and graduate students, 100 through 199. Courses numbered 200 or above are restricted to students registered in the Graduate School.

If no prerequisites are listed, there are none, except insofar as the course number indicates a minimum class standing requirement.

The following symbols are used throughout this bulletin:

- Graduate students may prepare Plan B papers.
- † To receive credit, all courses listed before the single dagger must be completed.
- ‡ Students may enter sequence course in any quarter which precedes the double dagger.
- § No credit is granted if credit was received for equivalent course listed after section mark.
- ¶ Concurrent registration is allowed with the course listed after paragraph mark.
- # Consent of instructor is required.
- △ Consent of department or school offering course is required.
- x After a course number indicates course is offered more than 1 quarter.

When no departmental designation precedes the course number listed as a prerequisite, that prerequisite course is in the same department as the course being described. Therefore, a prerequisite reading "6 cr" means 6 credits in courses offered by the "same" department.

The four-digit number in parentheses after the course number is the new course number which will not be used prior to Fall, 1970.

UNIVERSITY OF MINNESOTA BULLETIN

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The contents of this bulletin and of other University bulletins, publications, or announcements are subject to change without notice.

UNIVERSITY OF MINNESOTA

Programs and Courses in

SCHOOL OF FORESTRY

FOREST RESOURCES DEVELOPMENT CURRICULUM

with Options in . . .

Multiple Use
Timber Production
Watershed Management
Forest Recreation
Forest Wildlife
Wood Products Utilization

FOREST SCIENCE

with Options in . . .

Natural Science
Social Science

FOREST PRODUCTS MARKETING

FOREST PRODUCTS ENGINEERING

RECREATION RESOURCE MANAGEMENT

UNIVERSITY OF MINNESOTA

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Robert P. Latham, M.S.

Associate Scientist

Raymond Jensen, B.S.

¹ Associate Member from Department of Plant Pathology.

² Acting Station Statistician.

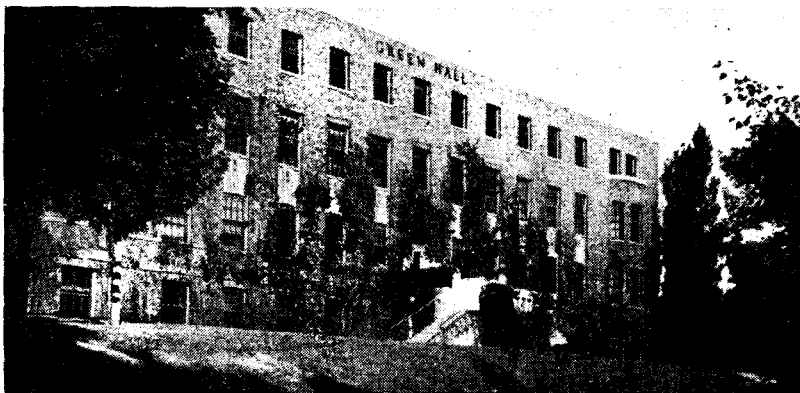
³ Associate Member from Department of Entomology, Fisheries, and Wildlife.

⁴ Associate Members from Cooperative Agricultural Extension Service.

⁵ Director of Quetico-Superior Wilderness Research Center.

⁶ Associate Member from Bureau of Sports, Fisheries, and Wildlife.

FACILITIES OF THE SCHOOL OF FORESTRY



Green Hall

The School of Forestry is located on the St. Paul Campus and consists of two modern buildings — Green Hall and the Forest Products Building. Green Hall is the headquarters for the School of Forestry. Students registered in the Forest Products Engineering and Forest Products Marketing curricula will take their professional courses in the Forest Products Building.

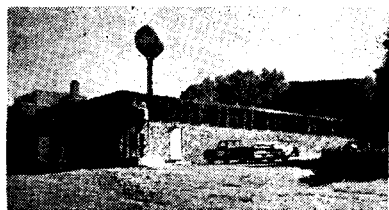
The school also has two outstanding field stations for education and research. Forest Resources Development and Forest Science majors spend 3½ weeks of the summer between their sophomore and junior years at the Itasca Forestry and Biological Station located in Itasca State Park. The entire spring quarter of the junior year or the fall quarter of the senior year for Forest Resources Development students is spent at the Cloquet Forest Research Center located at Cloquet, Minnesota.



Forest Products Building



Cloquet Forest Research Center



Forest Products Laboratory



Itasca Forestry and Biological Station

School of Forestry

SECTION I

INTRODUCTION

The Educational Objectives of the School of Forestry

The goals or objectives of the undergraduate educational program of the School of Forestry are:

1. Preparation of students through a program of liberal education included in all curricula for constructive living and leadership in a free society. To achieve this goal or objective students must complete a minimum group of courses in the following areas: (a) communication, language, symbolic systems; (b) the physical and biological sciences; (c) man and society; and (d) artistic expression. To understand more about the All-University Council on Liberal Education requirements and how they pertain to your specific curricula, refer to page 15.
2. Development of competence in the specialized area of a student's curriculum, with some curricula offering an opportunity for the orderly development of an added area of knowledge through "option" programs.
3. Provision of opportunity for qualified students to undertake graduate study and careers in science and development.

Forestry graduates are responsible for the management of forest lands covering about one-third of the land area of the United States. The educational program in the School of Forestry prepares students in the Forest Resources Development and Forest Science curricula in the art, science, and business of managing forest lands for all their products (timber, water, wildlife, grazing, and recreation). Graduates in the Forest Products Engineering and Forest Products Marketing curricula are involved throughout the nation in the harvesting, processing, distribution, and marketing of forest products.

The graduate forester is a professional. His training for the first 2 years consists of a broad background of the liberal arts—humanities and social sciences as well as the biological and natural sciences. He must be skilled in the art of communication and he must be well versed in mathematics. The last 2 years of his program are set aside for professional courses.

Our graduates must know both *how* and *why* phenomena and techniques operate as they do. Beyond accepting professional responsibilities, they must assume citizenship responsibilities in communities and provide active leader-

Section 1 — Introduction

ship in the solution of the many social, economic, and other existing problems. The school's program is directed toward the development of professionally trained individuals who possess leadership interest and potential.

University Policy on Equal Employment Opportunity

The University of Minnesota is guided by the principle that there shall be no differences in the treatment of persons because of race, creed, color, or national origin, and that equal opportunity and access to facilities shall be available to all. This principle is particularly applicable in the admission of students in all colleges, and in their academic pursuits. It is also applicable in University-owned or University-approved housing, in food services, student unions, extracurricular activities, and all other student services. It is a guiding policy in the employment of students either by the University or by outsiders through the University and in the employment of faculty and civil service staff.

SECTION 2

GENERAL ACADEMIC REQUIREMENTS

The College of Agriculture, Forestry, and Home Economics (AFHE) offers professional training leading to a wide variety of occupational outlets in the areas of agriculture, forestry, home economics, and related fields. Preprofessional preparation for veterinary medicine is also secured in this college program. For curricula in home economics, consult the *School of Home Economics Bulletin*. For curricula in agriculture, consult the *Agriculture Bulletin*.

Provided in Section 2 is background material on the School of Forestry, admission requirements, registration and class attendance, scholarship requirements, classification of students, and liberal education requirements. Students will find this material useful in planning their programs.

Degree Offered

The bachelor of science (B.S.) degree is awarded students completing the requirements of the undergraduate curricula offered in the School of Forestry. The credit requirements of curricula differ somewhat, being highest for Forest Resources Development because of the inclusion of the Itasca field program.

Requirements for Bachelor's Degree in Forestry — Candidates will be recommended for graduation after completing the following requirements: (a) the prescribed curriculum, including required and elective credits to make the total number of credits required; (b) an average of 2 grade points per credit — i.e., the cumulative grade point average must be 2.00 or more (2.00 = C). For additional quality requirements, see statements of prescribed curricula; (c) requirements for all students as noted (see page 15); (d) the residence and other general University requirements for graduation (see the *General Information Bulletin*).

Graduation with Honors — Undergraduate degrees may be awarded "with distinction" or "with high distinction." If you should fail to meet in full the requirements stated below, your case will be referred to the Student Scholastic Standing Committee for individual consideration.

The degree is granted "with distinction" if you attain a minimum grade point average of 3.00 for the entire curriculum. If you are a transfer student with less than 2 years of work in this college you will not be eligible for graduation with distinction. However, if you complete one-half the number of credits required for graduation in any curriculum, you will satisfy the 2-year residence requirements. Recommendations to the faculty for the degree "with distinction" are made through the Student Scholastic Standing Committee on the basis of scholarship and other evidence of satisfactory achievement and advancement in the curriculum pursued.

Your degree will be granted "with high distinction" if you attain a minimum grade point average of 3.50 for the entire curriculum. The same condi-

Section 2 — General Academic Requirements

tions for residence and recommendation apply as for the degree "with distinction."

Admission Requirements

To be admitted to the School of Forestry you must make application to the Office of Admissions and Records on the St. Paul Campus. Listed below are requirements for admission to the program in forestry. Other requirements and procedures having to do with nonresident admission, admission with advanced standing, adult special admission, and admission by examination appear in the *General Information Bulletin*.

High School Graduates — High school graduates in the upper 60 percent of their class may enter if they have completed 12 units in grades 10-12. Nine of these units should be in English, social studies and history, mathematics, natural science, and foreign languages. Distribution of these units with respect to forestry are outlined below:

3 units in English, 1 unit in elementary algebra, 1 unit in plane geometry, and 1 unit in higher algebra or equivalent courses, and 1 unit in natural science.

Exceptions to the specific requirements listed above may be made when additional information presented by the applicant indicates promise of academic success.

Adult Special Students — You may be admitted as a special student if you are a mature person (24 years of age or older) and wish to register for particular courses to meet special needs. Normally, an adult special student will not be in residence for an extended period of time, but only so long as is necessary to secure the information that is specifically desired.

Students who enter the School of Forestry as adult specials with the intention to transfer later to the Graduate School should be aware that a student may petition to transfer to his graduate record only the credits earned in his first academic quarter or summer as an adult or summer special student. Such work must be of graduate caliber and taught by a member of the graduate faculty. If his petition is approved, the student will be granted both residence and credit on his graduate record.

Non-High School Graduates — Write the Office of Admissions and Records for information about entering the University by examination. Also, see the *General Information Bulletin*.

Admission with Advanced Standing — Credits from other accredited colleges and universities and from other colleges of the University of Minnesota which are appropriate for a student's course of study can be transferred to the College of AFHE. These will be evaluated by the Office of Admissions and Records and will be designated as either required or elective credit. A course that is applied toward required credit is considered the equivalent of a specific course required in a curriculum here. Experience has shown that transfer credits for courses taken in forestry are frequently not applicable to courses offered in the junior and senior years, i.e., to courses numbered 50 or over.

Registration and Class Attendance

You will be expected to complete all required courses here and all area requirements regardless of the number of excess elective credits you may have.

Therefore, it is important in transferring to the School of Forestry to have planned your earlier programs carefully in order that your credits may apply with the greatest efficiency to the particular curriculum you desire to enter. If you are beginning your work in an institution other than the College of AFHE, and plan to transfer at a later date, refer to the appropriate program section of this bulletin. There you will find descriptions of the curricula and a listing of the required courses for each. You should note especially the requirements for the freshman and sophomore years. Your college adviser will help you select courses that will meet specific curricular requirements, and if you need further help you may write directly to the School of Forestry on the St. Paul Campus.

Examinations upon Entrance — If you are a new student you are expected to have completed the American College Testing program and the Minnesota High School Statewide Testing program. These may be taken at the time of registration if not completed previously. Other examinations given at entrance will test your aptitude and achievement in English. Your admission to the University will not depend upon the results of these examinations if you are otherwise qualified.

Proficiency Examinations in Introductory Courses — The College of AFHE desires to correlate the courses taught here, as far as possible, with the technical courses taught elsewhere. If you have previously taken considerable work in technical courses, it may be unnecessary for you to repeat all or even part of it. Satisfactory performance on examinations in selected introductory courses will permit you to substitute other courses for these. Students wishing to take proficiency examinations or to secure more information concerning them should contact the College Office in 215 Coffey Hall.

For information about taking special examinations for credit, see Index.

Registration and Class Attendance

Fees — For information about fees, see the *General Information Bulletin*.

Quantity of Work — The normal load of work for each quarter is 14 to 18 credit hours. A credit hour requires on the average 3 hours each week. These may be distributed as follows: 1 hour of lecture or recitation requiring 2 hours of preparation; 2 laboratory periods requiring 1 hour of preparation; or 3 laboratory periods requiring no outside preparation. Student programs in the School of Forestry may vary in load according to the student's ability or circumstance. To carry more than 18 hours of credit, you must have a C average (that is, a total grade point average of not less than 2.00). To carry more than 21 hours, you must have a B average in work of the previous quarter and must secure permission from the Student Scholastic Standing Committee.

Auditors — The approval of the Student Scholastic Standing Committee, your adviser, and the instructor is necessary if you wish to register for a course as an auditor. An auditor must enroll officially for a course and must

Section 2 — General Academic Requirements

pay the same fees charged for regular membership in the class. He does not take the final examination and is not given a grade or credit for the course.

Changes in Registration — To change your registration you must obtain change of registration forms from the Office of Admissions and Records. Changes should be made only when necessary or highly desirable and they should be made as early as possible in a quarter.

During the first 6 weeks you may cancel a course without grade and with only your adviser's approval. After the sixth calendar week you are required to have the approval of your adviser, the instructor, and the Student Scholastic Standing Committee. However, withdrawal from a course after the sixth calendar week of the quarter is strongly discouraged unless extenuating circumstances exist. *Cancellations within the last 2 weeks prior to the beginning of the quarterly final exam period will seldom be approved.* The instructor must indicate your grade at the time of cancellation. If the grade is passing, you will be permitted to cancel with W on your report, or without grade. If it is failing, this is indicated by a grade of F. *A student who is doing failing work and discontinues attending class after the sixth week but does not officially cancel will also receive a grade of F.*

During the first 3 days of the quarter you may add a course with the approval of your adviser only. After the first 3 days you must have the approval of your adviser, the instructor, and the Student Scholastic Standing Committee.

Cancellation of Entire Registration — If you leave college before the end of the quarter, you should cancel your registration at the time you discontinue attending class. Cancellation within the first 6 weeks entitles you to a refund proportional to the amount of time you attended class. If you do not attend classes at all, you are entitled to a full refund.

Class Attendance — On the St. Paul Campus attendance is compulsory for certain classes only, because of the nature of such classes. If you miss class for good reasons beyond your control, you have the privilege of requesting the instructor's assistance in making up the classwork you miss. The instructor is under no obligation, however, to give assistance if you willfully or deliberately absent yourself from class, although there are situations in which he may properly wish to do so.

The following situations will be accepted by instructors as reasons that would justify absence from class and a request for assistance in making up work: (a) illness certified by the Health Service or by the family physician; (b) emergencies caused by a death or serious illness in the immediate family; (c) absences approved by the Student Scholastic Standing Committee; and (d) participation in University-approved, cocurricular activities (certification that a student was absent from class because he was engaged in such activities will be made by the dean of students).

If you wish to make up work, you should confer directly with the instructor in regard to the justification for your absence and the possibility and ways of making up the classwork. The Student Scholastic Standing Committee will enter into the situation only when special emergencies (items b and c above) are involved and as an appeal agency.

Credit Without Class Attendance — If you wish to secure full credit for a course for which you have adequate training and preparation, you may apply for permission to take a *special examination*. It may be taken during the first quarter in residence without fees; after that time a fee of \$5 is required. Special examinations in which a grade of C or better is earned are recorded with credit and grade as part of the student's college record.

You may register for a course as a *reading course* (individual work) during the quarter in which the course is regularly offered, with the approval of your adviser, the instructor in the course, and the Student Scholastic Standing Committee, under the following conditions:

1. When a course normally offered is canceled because of inadequate registration.
2. When, because of conflicts, the student finds it impossible to schedule the course at the time it is offered.

It is assumed that you will complete the work of the course during the quarter in which you are registered for it and take the final examination at the regularly scheduled time.

Quality Credits — The number of free elective credits required for graduation may be decreased by 1 for each 5 grade points in excess of those required to reach an average of 2.70. Free electives are those you may choose without regard to curricular or all-College requirements. Not more than one-twelfth of the total number of credits required for graduation may be gained through excess grade points.

Grading System

Academic progress in the College of AFHE may be evaluated by one of two grading systems, the traditional letter grade system (A-F) or the P-N system now in use on a trial basis.

A-F System

Under the A-F system (A-B-C-D-F), each letter grade carries the following meaning and number of grade points per credit:

Grade	Grade Points Per Credit
A	4
B	3
C	2
D	1
F	0

The grade point average is determined by dividing the sum of the grade points by the sum of the credits passed and failed. Accumulative average of 2.00 (C) is required for graduation. Additional requirements related to the grade point average may be found in materials descriptive of specific curricula (see requirements for attaining junior status, page 14).

Section 2—General Academic Requirements

P-N System

An experimental grading system directed toward encouraging students to explore academic areas other than those closely related to the major and to develop a greater breadth of education is now available. The P-N system hopefully reduces to some extent the pressures associated with the traditional grading system.

Under the P-N system the symbol P stands for *pass* and N for *no credit*. The dividing line between P and N is approximately the same as that between D and F. N grades are not included in the computation of the grade point average, but credits of P will count toward graduation.

The following principles have been adopted as a guide for use of the P-N grading system by AFHE students:

1. All courses available to undergraduate students (those numbered under 200) are available on the P-N and the A-F basis except where specifically restricted by the department offering the course (consult course listings in this bulletin).
2. A candidate for the baccalaureate degree from the College of AFHE may present a maximum of 25 percent of the residence course credits offered for graduation in courses in which the student received a grade of "P."
3. The P-N system shall be available to a student of the College of AFHE irrespective of his academic standing.
4. A student will be limited to one course per quarter on the P-N grading system until such time as he has completed 36 credits. This option shall be in excess of any courses offered on the P-N basis only.
5. P-N registration must be declared at time of registration and may not be changed on or after the opening day of the quarter. A course for which a student has on some previous occasion registered on the A-F system shall not be taken at a later date on the P-N basis.
6. Where a course is identified by title and number in bulletin copy as being required, or as being *the* course recommended to fulfill a curriculum requirement, it will be taken under the A-F grading system. Prerequisites for required courses, and courses in the major, will be taken under the A-F system, unless exceptions are established.

Your adviser or the College Office will help you if you should have questions about use of the P-N system.

Other Symbols That May Be Used on the Transcript

The temporary grade of I (incomplete) may be assigned by the instructor when there is not sufficient information immediately available to permit assignment of a permanent grade.

An I which has not turned into permanent grade by the end of the sixth week of the next regular quarter of attendance shall become an F or N depending upon the grading system of registration. An extension of time may be

Academic Requirements

permitted for removal of I grades upon recommendation of the instructor concerned and with approval of the adviser and the AFHE Student Scholastic Standing Committee.

The registration symbol W indicates official cancellation from a class without grade. This symbol is assigned in all cases of official cancellations during the first 6 weeks of classes irrespective of the student's standing. After 6 weeks, W shall be posted only if the student is not failing at the time of official cancellation. Whether or not cancellation is permitted is within the authority of the student's adviser and the Student Scholastic Standing Committee to determine. A student who cancels officially or otherwise discontinues attendance of a class after the sixth week and is failing at the time shall receive an F or N.

The symbol X may be reported in continuation courses in which a student is permitted to continue but in which a grade cannot be determined until the sequence is completed. A grade will be submitted by the instructor for each X when the student has completed the entire sequence.

Registration as an auditor or visitor is indicated by the registration symbol V (visitor). Such registration requires the permission of the instructor and the adviser.

A symbol T (transferred) indicates credits transferred from another institution, or from one college to another within the University when reevaluation is required. It is posted as a preceding supplement to the original grade.

If you should wish additional information about grading symbols you may contact the Office of Admissions and Records, 220 Coffey Hall or the College Office, 215 Coffey Hall.

Academic Requirements

Satisfactory Progress — As a student in the School of Forestry you are expected to make satisfactory progress in the curriculum you have selected. This is interpreted to mean a C average. The cases of students who are not reaching this standard are considered by the Student Scholastic Standing Committee. It is always best for a student to see his class instructor or his faculty adviser as soon as he feels himself in difficulty rather than to wait until he has already received a poor grade.

In some curricula, as indicated in the curricular descriptions following, a higher grade point average is required.

Scholastic Probation — If a student's scholastic work should be considerably below a satisfactory level of performance, he will be placed on probation and his program or work will be restricted as seems advisable to the Student Scholastic Standing Committee.

A student will be placed on probation if, at the end of 3 quarters of work or earlier, he has not attained a grade point average of 1.75. At the end of 6 quarters or earlier, he will be placed on probation if he has not attained a grade point average of 1.90.

Section 2—General Academic Requirements

Exclusion from School of Forestry and College of AFHE—Students may be excluded from the school and college under one of the following headings:

1. *Dropped for Low Scholarship*—When it becomes apparent that a student's work is of a quality that will not lead to graduation, he will be dropped and usually will not be permitted to apply for readmission until 9 months later.

A freshman may be asked to withdraw when his grade point average is less than 1.50 after 2 or 3 quarters of work in this college. A sophomore may be dropped if his average is less than 1.75 after 6 quarters (or 5 quarters if he began his freshman work in the winter or spring quarter). When the factors which contributed to the unsatisfactory work have been removed or satisfactorily corrected, a student may petition for permission to return. Otherwise, he is encouraged to make other plans.

2. *Hold for Committee Clearance*—Sometimes a student's scholastic difficulty indicates that he should not continue for the time being even though the record hardly requires official drop action. In such case his later return must be approved by the Student Scholastic Standing Committee.

3. *Discontinued*—If a student is pursuing an appropriate course but is handicapped by conditions he cannot control (ill health, necessary outside work, etc.) he may be required to discontinue his registration until these conditions have improved. When discontinuance takes place at any time other than the end of the quarter, the courses for which he is registered may be recorded as canceled without grade (W).

Readmission—If a student is dropped, he may not return without the permission of the Student Scholastic Standing Committee. Credits earned at other institutions during the period of suspension will not apply toward graduation from this college unless permission to earn such credits was given in advance by the Student Scholastic Standing Committee. If he is permitted to return, he will be placed on probation and may be dropped again at any time when his work is unsatisfactory.

Classification of Students

Sophomore—If you are within 18 credits of the number usually earned in your curriculum for the first year and if you have completed 3 quarters of college work, you will be classified as a sophomore. The 3 quarters may include time spent at another institution of collegiate rank. A sophomore who lacks not more than 12 credits of being a junior and who has a B average may be permitted to register for courses in the 100 group. Students who have not attained junior classification and who are below a C average will not be permitted to register for courses numbered 100 or above for which graduate credit is given.

Junior—A total of 90 credits with a grade point average of at least 2.00 and completion of the rhetoric communications requirement is required for junior classification.

Senior—To be classified as a senior, you must not be more than 9 credits short of the number required for the first 3 years in your curriculum.

Transfer Students—If you transfer from a college outside the University and enter this college as a junior, you should have a grade point average of not less than 2.00 at the end of your first year. If you do not have this average, you will be classified as a sophomore.

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Requirements for All Students

Upper Division Classification for Forest Resources Development Curriculum — The student must have (1) a minimum grade point average of 2.00, and (2) 80-90 credits. Courses required are:

MeAg 3 — Technical Drawing (3)**
GeCh 4-5 — Inorganic Chemistry (10)
Biol 1-2 — General Biology (10)
Math T — Trigonometry (3)**
Math 10 — College Algebra (5)
Rhet 1, 2, 3 — Communications I, II, III (9)
Macro-Micro Economics (9)
Phys 1, 1A, and 2, 2A — Introductory Physics (8)
Rhet 22 — Public Speaking (3)
Geo 1 — Physical Geology (5)
BioC 1 — Elementary Biochemistry (5)
Plus credits to satisfy C.L.E. requirements and any elective credits.

There will be exceptions to the above list of required courses for Upper Division classification, but the student will have to petition to receive Upper Division classification if he does not have the above list of courses. This would mean that the above-listed courses would have to be completed before the Itasca Session (i.e., For 50, 54, and 56).

Requirements for All Students

All-University Council on Liberal Education

In addition to the specific requirements of each curriculum, the University of Minnesota believes that all of its students, whatever their area of specialization or their vocational goals, should hold in common the search for a liberal education. In the broadest sense a liberal education is one which frees us from the limitations placed by ignorance on our powers of judgment and choice. More specifically, a liberal education asks of us that we seek control over the general intellectual instruments for acquiring and communicating knowledge, primarily the instruments of language and number; that we seek understanding of the ways in which scientists contribute to man's knowledge of himself and his environment; that we seek historical and philosophic perspective on the nature of our own lives and the world in which we live; and that we seek appreciation of the creative insights into life and nature provided by literature and the arts.

Rapid and dynamic changes and innovations are constantly occurring in all professions. Only those persons with wide horizons, and with sensitivity and perspective, will be able to make the wise value judgment adjustments required by these changes. By encouraging a liberal education the college hopes to prepare a student to be poised, articulate, and able to communicate his ideas, and to have an appreciation of the value of interpersonal relationships. The college believes that these goals can be encouraged and sought

** Students with a grade of C or better in high school trigonometry are exempt from Math T, Trigonometry; others must take Math T. Students with a grade of C or better in high school drawing are exempt from MeAg 3, Technical Drawing; others must take MeAg 3.

Section 2—General Academic Requirements

concurrently with the development of technical professional competence in depth in the student's specialty.

To help students achieve the goals of liberal education, the College of Agriculture, Forestry, and Home Economics expects every student to distribute a part of his course work in each of the four categories listed below.

- I. Communication, Language, Symbolic Systems — 18 credits
 - A. English and Foreign Language Communication Skills
 - B. Linguistics, Rhetoric, Logic, and Philosophic Analysis
 - C. Mathematics
- II. The Physical and Biological Sciences — 15 credits
 - A. The Physical Universe
 - B. The Biological Universe
- III. Man and Society — 15 credits
 - A. The Analysis of Human Behavior and Institutions
 - B. The Development of Civilization: Historical and Philosophical Studies
- IV. Artistic Expression — 9 credits
 - A. Literature
 - B. The arts

In category I, students will be expected to take a minimum of 9 credits of freshman communication. This includes Communication I and II (6 credits) and Communication III (3 credits), depending upon the needs of the student as revealed by standardized diagnostic tests. Where deficiencies persist students will continue in the communication program until they have earned a total of 12 credits; but only 9 of these credits may be applied toward graduation. Transfer students from other colleges with less than 9 credits in freshman communication or the equivalent will be placed in Communication I, II, or III, depending upon their needs as revealed by the diagnostic testing program.

Public speaking and exposition (6 credits) will also be taken by all students. Most students register for Rhet 22, Public Speaking, as sophomores, and for Rhet 51, Exposition, during their junior or senior year.

Not more than 6 credits in any one discipline (e.g., history, economics, psychology) may be counted toward the category III requirement.

Council on Liberal Education Course List — Following is the list of courses which are particularly suitable for fulfilling the All-University Council on Liberal Education requirements in category III (Man and Society) and category IV (Artistic Expression).

III. Man and Society

A. The Analysis of Human Behavior and Institutions

AgEc 1, 2, 3
Anth 1A, 2A, 80, 100, 101, 150, 165
CPsy 80, 81
Econ 1, 2, 20
FamS 1, 1A, 25
Geog 1, 4, 41, 67, 78, 162
Spch 61
Jour 3, 90, 109
Pol A, B, 1, 2, 25, 26, 30

Requirements for All Students

Psy 1, 2
SSci 1, 2, 3, or 51, 52, 53
Soc 1, 2, 3, 14, 14A, 53

B. The Development of Civilization: Historical and Philosophical Studies

Anth 90
Clas 122, 123
History — all courses not requiring prerequisites (Hist 14A, 15A, 16A)
Languages: Fren 60-61-62, Ital 60-61-62, and Span 60-61-62; Heb 74, 75; Ort
75, 76, 77
NSci 171-172-173
Phil 3, 50-51-52, 53
Pol 40, 60, 61

IV. Artistic Expression

A. Literature

Clas 1, 2, 3, 4-5-6, 42, 46
Engl 21-22-23, 37-38-39, 52, 53, 54, 55, 56, 66, 67, 72-73-74
Foreign language literature courses
Hum 1-2-3, 4, 1A-2A-3A, 11, 12, 13, 21-22-23, 51, 52, 53, 54, 61, 62, 63, 71-
72-73
Rhet 31, 32, 34, 35, 36, 37, 41, 42, 43, 41A, 42A, 43A, 61, 62, 63, 64, 71, 73,
74

B. The Arts

Anth 166
Arch 1, 51, 52, 53
Arth 1, 2, 3, 4, 5, 47, 50, 56, 57, 58
ArtS 10, 11, 20, 23, 24, 25, 32, 33, 40, 41, 45
Mus 1, 4, 31-32-33, 34-35-36, 39 through 49 (see also 11 through 30 for indi-
vidual instruments)
HEc 20, 21, 120
Spch 3
Th 11, 12, 21, 22, 23

Rhet 22, Public Speaking, and Rhet 51, Exposition

Before you graduate from the College of AFHE you must demonstrate proficiency in public speaking and in written composition. Most students register for Rhet 22, Public Speaking as sophomores, and satisfy the Rhet 51 requirement by taking this course during their junior-senior year. An exemption examination for Rhet 51 is available to students of above-average competence in communication skills. This examination is given once each quarter at a time specified by the Department of Rhetoric. A course in advanced composition taken at some other college cannot be used to satisfy the Rhet 51 requirement.

Physical Education and Music

Students in forestry are not required to take courses in physical education. Not more than 9 credits in physical education or music may be counted toward graduation. Not more than 6 of the music credits may be in Mus 43, 44, 45, or in concert band.

Section 2 — General Academic Requirements

Junior-Senior Requirements

Junior-Senior Program

Specialization — In your sophomore year, after you have completed the equivalent of 5 quarters of residence, you are required to submit to the Office of Admissions and Records a specialization card which has been approved and signed by your adviser. On this card you indicate your choice of one of the curricula listed in this bulletin. If this specialization card is not filed at the designated time, your registration may be withheld. Advanced standing or transfer students must complete a specialization card in consultation with their adviser.

The curriculum indicated on your specialization card, becomes your curriculum required for graduation. Copies of the approved curriculum are sent to you, to your adviser, and to the Student Scholastic Standing Committee. In case the major is changed to a different field of work, a new adviser must be selected and your specialization card resubmitted, after obtaining approval of the Student Scholastic Standing Committee.

Electives — You should consult with your adviser as to your choice of electives. Electives taken by students registered in the College of AFHE may, upon approval of your adviser and the Student Scholastic Standing Committee, be omitted from the courses offered for graduation. These electives, in amounts not to exceed 10 credits, may be withheld (from the list of courses counted toward a degree) to raise the grade point average only in instances relating to the securing of junior classification or in meeting the graduation requirement of 2.00. After a course has been withheld from the undergraduate record as authorized above, it shall not be reinstated other than by special examination or through repeating the course.

Credit in the Graduate School — Credits for advanced courses earned while you are an undergraduate, in excess of those required for the baccalaureate degree, can be transferred to the Graduate School only under the following conditions: (a) If you have 9 credits or less of undergraduate work, taking into account required and sequence courses, you may carry a limited amount of graduate work (approved courses numbered 100 or above) for graduate credit, such courses not to be applied toward an undergraduate degree. The conditions as stated apply to the beginning of the quarter in which you are taking the courses for graduate credit. Transfer of credit must be arranged by petition to the Graduate School. In order to hold these credits available for use at the graduate level, a petition must be submitted to the college Student Scholastic Standing Committee at the time of registration for the last quarter, requesting that these specified credits be withheld from the undergraduate transcript. (b) If you lack 9 credits or less for graduation, taking into account required and sequence courses, you may register in the Graduate School.

SECTION 3

PROGRAMS AND CURRICULA

UNDERGRADUATE PROGRAMS IN FORESTRY

Forestry courses were given by the University of Minnesota as early as 1886 but professional work leading to the bachelor of science degree was not offered until 1903 when the present School of Forestry had its formal beginning. Since that time more than 2,400 foresters have been granted undergraduate and graduate degrees.

The bachelor of science degree is granted upon completion of 192-200 credits of required and elective courses in the following curricula or majors:

1. Forest Resources Development (200 credits)
 - Multiple Use Option
 - Timber Production Option
 - Watershed Management Option
 - Forest Recreation Option
 - Forest Wildlife Option
 - Wood Products Utilization Option
2. Forest Science (192 credits)
3. Forest Products Marketing (192 credits)
4. Forest Products Engineering (192 credits)
5. Recreation Resource Management (192 credits)

The School of Forestry is fully accredited by the Society of American Foresters, the national accrediting agency for United States forestry schools.

Facilities

The School of Forestry possesses excellent facilities for training in the fields of forest resources development and forest products. Located in St. Paul and consisting of two modern buildings, Green Hall and the Forest Products Building, it draws on many departments on both the St. Paul and the Minneapolis Campuses for instruction in courses basic to the training of foresters and forest products specialists. Also housed in Green Hall is the branch office of the U. S. Bureau of Sport Fisheries and Wildlife. Located next to Green Hall and the Forest Products Building is the regional headquarters building of the North Central Forest Experiment Station of the U. S. Forest Service.

The following field laboratories are available:

The *John H. Allison Forest* of over 300 acres, located within 10 miles of the campus, is available for field laboratory work during the regular school year. However, most of the field training for students specializing in these fields is

Section 3 — Programs and Curricula

concentrated at the Itasca Forestry and Biological Station and the Cloquet Forest Research Center.

The *Itasca Forestry and Biological Station* is located on Lake Itasca, the source of the Mississippi River in Itasca State Park. It provides an excellent field laboratory for forest resources development and forest science majors. Here in a 3½-week summer term, starting the last week of August, students have an opportunity to study forest botany, forest ecology, and field measurements on a 30,000-acre tract of virgin and second-growth forest, including practically all forest types found in Minnesota. Good housing, dining hall, and laboratory facilities are available.

The *Cloquet Forest Research Center* is located near the forest products manufacturing center of Cloquet in northeastern Minnesota and comprises a tract of over 3,700 acres of virgin and second-growth timber. The spring quarter of the junior year or the fall quarter of the senior year for forest resources development students is spent at Cloquet. Included is training in all aspects of forest establishment, management, harvest, and utilization. Also covered are aerial and forest surveys, wildlife, hydrology, recreation and forest protection from fire, insects, and diseases. Students visit local industries and study all forestry agencies in Minnesota and Wisconsin. Housing, dining hall facilities, and classrooms are available.

Available in Green Hall and the Forest Products Building, for training students interested in employment in the forest products industries and for building products marketing, are several well-equipped laboratories: wood working, wood chemistry, timber testing, and wood preservation. Local mill-work and furniture plants, pulp and paper mills, building products marketing and sales groups, and wood preservation concerns provide added opportunity for training students in the several wood-utilization fields.

The Work of Foresters

The work of foresters is diverse. Forest resources development graduates are concerned primarily with the scientific management of the forest, wildlife, recreation, grazing, and water resources on approximately one-third of the land area of the United States which is classified as forest land. Until recently public forest land-managing agencies — federal, state, county, and municipal — employed most of the graduates in these fields. Within the past 15 to 20 years, however, there has been increasing employment of forestry school graduates by private owners of forest lands — lumber, pulp and paper, plywood, and other wood-processing companies. Forest science majors are particularly well qualified for graduate study leading to research with industrial, governmental, or educational organizations or to technical and professional teaching at the college level.

Graduates trained in the several utilization fields — forest products marketing and forest products engineering — find employment in the development, production, and marketing of forest products.

Brochures and leaflets describing employment opportunities for graduates of these curricula are available from the school.

General Information

The first 2 years of work in all forestry curricula is devoted primarily to basic courses such as physics, chemistry, biology, mathematics, rhetoric, geology, economics, sociology, government, and surveying. Because the first year of basic work is somewhat similar in all curricula, students may transfer between curricula at the completion of their freshman year with little loss of credit.

The 3½-week Summer Session term at the Lake Itasca Forestry and Biological Station at Itasca State Park is required of all forest resources development and forest science majors, including transfer students. This requirement must be completed just prior to the junior year.

The spring quarter of the junior year or the fall quarter of the senior year for those in forest resources development options is spent at the Cloquet Forest Research Center.

The growing complexity of the duties performed by foresters in the management of natural resources affecting practically every phase of our society demands that they have knowledge and training in humanities and social sciences. This need is met through the All-University Council on Liberal Education (C.L.E.) requirements. Please see page 15.

Students registered in preforestry curricula at state, junior, and private colleges should complete the basic course requirements included in the School of Forestry curricula if they are to receive full credit on transfer for work completed. In addition, students registered in preforestry curricula should plan to transfer at least by the end of their second year if they expect to complete the professional course requirements of the School of Forestry in 2 years. Please see page 14.

Preforestry students must complete the 3½-week Summer Session requirement at the Lake Itasca Forestry and Biological Station between the sophomore and junior years.

Students are encouraged to obtain practical experience in forestry or the forest products industries during summer vacations. Although work experience is not required for graduation, students find that the possession of such experience is an excellent recommendation when seeking employment. The School of Forestry assists students in obtaining summer employment with such federal agencies as the United States Forest Service, various state agencies, and with private companies. The school operates a job placement program for graduates of its several curricula.

The college entrance requirements apply to high school graduates planning to register in forestry curricula. Students must have had at least 3 units of mathematics, including elementary algebra, plane geometry and higher algebra. Students with a low ACT (Math) score must complete a noncredit course, Math Z, at the University.

Curricula and Requirements

Work leading to the bachelor of science degree on the completion of 4 years of satisfactory work is offered in the following curricula:

Section 3 — Programs and Curricula

1. Forest Resources Development

- a. *Multiple Use Option* — Preparation for broad professional work in forest management on public and private forest lands.
- b. *Timber Production Option* — Preparation especially for timber production with particular emphasis on business and economics.
- c. *Watershed Management Option* — Preparation for the forest land manager particularly concerned with water as a major product of the land.
- d. *Forest Recreation Option* — Preparation for the forest land manager concerned with the recreational resource in the forest.
- e. *Forest Wildlife Option* — Preparation for the forest land manager concerned with providing desirable game habitat in the forest.
- f. *Wood Products Utilization Option* — Preparation for those desiring additional training in forest products production and marketing.

2. **Forest Science** — Preparation for advanced professional training directed toward research with public and private organizations, or toward college and university teaching; for work in other professional activities requiring advance training.

3. **Forest Products Marketing** — Preparation for work in marketing of forest products, in light construction, urban renewal, FHA and other government agencies, and certain phases of forest products production.

4. **Forest Products Engineering** — Preparation for work in forest products research, development, production, and technical sales. Research and development careers with governmental and private forest products laboratories.

5. **Recreation Resource Management** — An interdisciplinary curriculum jointly administered by the School of Forestry and agricultural departments within the College of AFHE. This prepares students for recreation resource specialists in the planning and management of regional, state, federal resource-oriented recreation programs, as well as for private planning agencies. This curriculum will also lead to graduate work in resource planning. (See also the *Agriculture Bulletin*.)

A detailed listing of these five curricula and options will be found on page 23.

During the first year, the work in all forestry curricula is similar and is devoted largely to a study of general courses. Required course work for the 4 years varies with curriculum and options (147-177 credits). In addition to completion of required courses, students must complete sufficient elective courses to make a total of 192-200 credits. No more than 7 credits of D quality work is permitted in required forestry courses.

Credit earned in ROTC can be applied toward graduation in the elective group.

The attention of all students is called to the Council on Liberal Education (C.L.E.) requirements. Please see page 15.

Fees for Field Training Sessions

(Not listed in *General Information Bulletin*)

The following fees and expenses are paid during the field-training sessions at Cloquet and Itasca. These fees are subject to change.

Cloquet Session (students in the forest resources development curriculum — spring quarter):

Tuition	
Residents of Minnesota	\$ 98.00
Nonresidents	280.00
Health fee	17.75

In addition, a nominal charge will be made to each student for use of the dormitories.

Lake Itasca Forestry and Biological Station Session (to be completed between the sophomore and junior years; starts late in August and runs for 3½ weeks).

Tuition	
Residents of Minnesota	\$ 49.00
Nonresidents	140.00
Incidental fee	15.25

In addition, a nominal charge will be made to each student for cabin rental. The Forestry Student Cooperative also pays 5 percent of its gross commissary operating expenses for use of dining hall facilities, breakage, etc.

CURRICULA IN FORESTRY

1. FOREST RESOURCES DEVELOPMENT

This curriculum is intended for students interested in forest land management. It includes options in multiple use, timber production, watershed management, forest recreation, forest wildlife, and wood products utilization. Students may enter graduate study from this curriculum.

Core Curriculum

(required of all options)

FRESHMAN YEAR

Biol 1, 2 — General Biology (10)
For 21 — Introduction to Forestry (2)
For 31 — Conservation of Natural Resources
 (3)
For 41 — Introduction to Forest Products
 (2)

GeCh 4, 5 — General Principles of Chem-
istry (10)
Geo 1 — Physical Geology (5)
Rhetoric — Freshman Communication re-
quirement (9)

Section 3 — Programs and Curricula

Students with a grade of C or better in high school trigonometry are exempt from Math T, Trigonometry; others must take Math T

Students with a grade of C or better in high school drawing are exempt from MeAg 3, Technical Drawing; others must take MeAg 3

Electives — from categories III and IV under C.L.E. requirements

Total credits (41) (not including courses listed under C.L.E. requirements)

SOPHOMORE YEAR

AgEc 1 — Introduction to Economics (3)

AgEc 2 — Principles of Macroeconomics (3)

AgEc 3 — Principles of Microeconomics (3)

BioC 1 — Elements of Biochemistry (5)

For 49 — Dendrology (4)

Math 10 — College Algebra, Analytic Geometry (5)

MeAg 42 — Surveying (4)

Phys 1, 1A, 2, 2A — Introduction to Physics (8)

Rhet 22 — Public Speaking (3)

Electives — from categories III and IV under C.L.E. requirements

Total credits (38) (including AgEc 1 and 2 but not including courses listed under the C.L.E. requirements)

Lake Itasca Forestry and Biological Station — Summer Session for Foresters (3½ weeks). Required of all forest resources development and forest science majors. Must be completed between sophomore and junior years. Trigonometry, a college course in botany or biology, and a college physics course are required for registration. Students must have a grade point average of 2.00.

For 50 — Important Forest Plants (2)

For 54 — Forest Ecology (3)

For 56 — Field Forest Measurements (1)

Total required credits (6)

JUNIOR YEAR

For 52 — Forest Mensuration (3)

For 53 — Forest Meteorology and Climatology (2)

For 100 — Forest Fire (2)

For 109 — Aerial Photo Interpretation (3)

For 111 — Statistical Methods in Forestry (4)

For 125 — Silviculture (3)

Soil 18 — Forest Soils (3)

Electives — from categories III and IV under C.L.E. requirements

Cloquet Forest Research Center — To attend the Cloquet spring or fall session, students must meet the following requirements:

1. A grade point average of at least 2.00 at the end of the quarter preceding the Cloquet session.
2. Completion of the Itasca summer session and For 100, 109, 111, 125, MeAg 42, and Soil 18.
3. Health Certificate — A certificate of physical fitness must be obtained from the Health Service (St. Paul Campus) prior to the end of the quarter in which you plan to attend the Cloquet Session. This certificate must then be turned in at the Office of Admissions and Records.

FW 67 — Techniques of Forest Wildlife Management (2)

For 128 — Field Silviculture (5)

For 130 — Forest Protection (2)

For 133 — Multiple Use (5)

For 134 — Aerial Photo Interpretation and Inventory (4)

Total credits (38) (not including courses listed under the C.L.E. requirements)

Forest Resources Development

SENIOR YEAR

- | | |
|--|---|
| For 123 — Forest Economics (3) | Rhet 51 — Exposition (3) |
| For 139 — Timber Management (3) | Rhet 52 — Technical Writing (3) |
| For 143 — Management of Recreational Lands (3) | (or) Rhet 54 — Advanced Public Speaking (3) |
| For 147 — Forest Administration (3) | (or) Rhet 56 — Discussion Methods (3) |
| For 199 — Senior Seminar (1) | |

Students having a grade of C or better in Rhet 22 and Rhet 51 are required to complete only 3 credits of additional rhetoric to be selected from courses listed; students having a D in either Rhet 22 or Rhet 51 shall take 6 credits of the courses listed, selected in consultation with their adviser

Electives — from categories III and IV under C.L.E. requirements

Total required credits (19) (not including courses listed under the C.L.E. requirements)

Total core curriculum requirement for all options is 160 credits

Multiple Use

In addition to the core curriculum, requirements in this option include:

JUNIOR YEAR

FW 50 — Principles of Fisheries, Wildlife Management (3)

Total required credits (41) (including core courses but not including added courses listed under C.L.E. requirements)

SENIOR YEAR

- | | |
|--|---|
| Ent 56 — Forest Entomology (4) | For 122 — Forest Business Practices (3) |
| For 51 — Logging (2) | For 129 — Regional Silviculture (3) |
| For 74 — Fundamental Wood Properties I: Wood Structure (3) | For 148 — Forest Hydrology (2) |
| For 105 — Range Management (3) | For 152 — Forest Tree Physiology (3) |
| | PlPa 51 — Forest Pathology (4) |

Total required credits (46) (including core courses but not including added courses listed under C.L.E. requirements)

SUGGESTED ELECTIVES

- | | |
|---|-----------------------------------|
| AgEc 25 — Principles of Accounting (4) | Math 40A — Calculus (5) |
| (or) Acct 24-25 — Accounting (6) | Psy 1, 2 — General Psychology (6) |
| BLaw 58 — Contracts (3) | Rhet 47 — Efficient Reading (3) |
| For 116 — Recreation Planning and Design (same as Hort 116) (4) | |

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (172 credits), plus credits to satisfy the C.L.E. requirement, plus electives sufficient to total 200 credits shall be completed for the degree

Timber Production Option

In addition to the core curriculum, requirements in this option include:

SOPHOMORE YEAR

- | | |
|---|-------------------------|
| AgEc 25 — Principles of Accounting (4) | BLaw 58 — Contracts (3) |
| (or) Acct 24 — Principles of Accounting (3) | |

Total required credits (45) (including core courses but not including courses listed under C.L.E. requirements)

Section 3 — Programs and Curricula

JUNIOR YEAR

Econ 65-66 — Intermediate Economic Analysis I, II (6)

Total required credits (44) (including core courses but not including courses listed under C.L.E. requirements)

SENIOR YEAR

AgEc 160 — Land Economics (3)

Ent 56 — Forest Entomology (4)

For 51 — Logging (2)

For 74 — Fundamental Wood Properties I:
Wood Structure (3)

For 122 — Forest Business Practices (3)

For 129 — Regional Silviculture (3)

PIPa 51 — Forest Pathology (4)

Total required credits (41) (including core courses but not including added courses listed under C.L.E. requirements)

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (177 credits), plus credits to satisfy the C.L.E. requirements, plus electives sufficient to total 200 credits shall be completed for the degree

Watershed Management Option

In addition to the core curriculum, requirements in this option include:

JUNIOR YEAR

For 148 — Forest Hydrology (2)

MeAg 84 — Hydrology, Erosion Control (3) (or) CE 161 — Hydrology (3)

Total required credits (43) (including core courses but not including courses listed under C.L.E. requirements)

SENIOR YEAR

For 51 — Logging (2)

For 105 — Range Management (3)

For 154 — Advanced Forest Hydrology (3)

Geo 115 — Geomorphology (4)

Soil 126 — Soil Physics (4)

Soil 133 — Microclimatology (3)

Total required credits (38) (including core courses but not including added courses listed under C.L.E. requirements)

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (166 credits), plus credits to satisfy the C.L.E. requirements, plus electives sufficient to total 200 credits shall be completed for the degree

Forest Recreation Option

In addition to the core curriculum, requirements in this option include:

FRESHMAN YEAR

Soc 1 — Man in Modern Society (3)

Soc 2 — American Community (3)

Total required credits (47) (including core courses but not including category IV courses under C.L.E. requirements)

SOPHOMORE YEAR

Psy 1, 2 — General Psychology (6)

Geog 4 — Human Geography (5)

Total required credits (49) (including core courses but not including category IV courses under C.L.E. requirements)

Forest Resources Development

JUNIOR YEAR

FW 50 — Principles of Fisheries, Wildlife Management (3)

Total required credits (41) (including core courses but not including category IV courses under C.L.E. requirements)

SENIOR YEAR

Ent 56 — Forest Entomology (4)

Soc 120 — Social Psychology (3)

(or) PIPa 51 — Forest Pathology (4)

For 116 — Principles of Outdoor Recreation Design, Planning (same as Hort 116) (4)

Total required credits (30) (including core courses but not including courses listed under C.L.E. requirements)

SUGGESTED ELECTIVES

AgEc 61 — Community Resource Development (3)

Geog 71 — Maps, Map Interpretation (3)

Hort 24 — Theory of Landscape Design (3)

For 105 — Range Management (3)

Jour 112 — Communication, Public Opinion (3)

For 157 — Recreation Land Policy (3)

Geog 66 — Geography of United States and Canada (3)

Pol 30 — American Public Policy (3)

Rec 49 — Social Aspects of Leisure (3)

TOTAL GRADUATION REQUIREMENTS

Required courses listed above including 15 credits of social sciences (173 credits), plus credits to satisfy the C.L.E. requirements, plus electives sufficient to total 200 credits shall be completed for the degree

Forest Wildlife Option

In addition to the core curriculum, requirements in this option include:

JUNIOR YEAR

FW 50 — Principles of Fisheries, Wildlife Management (3)

For 51 — Logging (2)

Total required credits (43) (including core courses but not including added courses listed under C.L.E. requirements)

SENIOR YEAR

Ecol 50 — Introduction to Ecology (3)

Ent 77 — Mammalogy (4)

Ent 56 — Forest Entomology (4)

For 105 — Range Management (3)

(or) PIPa 51 — Forest Pathology (4)

Zool 75, 76 — Introductory Ornithology (6)

Total required credits (39) (including core courses but not including added courses listed under C.L.E. requirements)

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (167 credits), plus credits to satisfy the C.L.E. requirements, plus electives sufficient to total 200 credits shall be completed for the degree

Section 3 — Programs and Curricula

Wood Products Utilization Option

In addition to the core curriculum, requirements in this option include:

SOPHOMORE YEAR

AgEc 25 — Principles of Accounting (4)

Total required credits (42) (including core courses but not including added courses listed under C.L.E. requirements)

JUNIOR YEAR

For 51 — Logging (2)

For 101 — Fundamental Wood Properties

For 74 — Fundamental Wood Properties I:
Wood Structure (3)

II: Wood-Fluid Relationships (3)

Total required credits (46) (including core courses but not including added courses listed under C.L.E. requirements)

SENIOR YEAR

For 87 — Forest Products Merchandising
(3)

For 113 — Wood Processing II: Fiber Products
Technology (4)

For 102 — Fundamental Wood Properties
III: Physical Properties (3)

For 114 — Wood Processing III: Machining
and Manufacturing Processes (3)

For 112 — Wood Processing I: Drying (3)

Mktg 57 — Principles of Marketing (3)

Total required credits (38) (including core courses but not including courses listed under C.L.E. requirements)

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (173 credits), plus credits to satisfy the C.L.E. requirements, plus electives sufficient to total 200 credits shall be completed for the degree

2. FOREST SCIENCE

This curriculum is designed for students intending to pursue graduate work with a research or teaching objective. Although designed with this intent, it does provide background with which a student may enter the field of resources management. At the end of his freshman year, the student must select between the two options, one in natural sciences, the other in social sciences.

Only students with an above-average high school record or a demonstrated potential for academic excellence following their freshman and sophomore years in college should attempt to follow this curriculum.

This curriculum encourages individuality in course selection and includes a senior research thesis. Your adviser will work closely with you to advance your learning experience at the University of Minnesota.

FRESHMAN YEAR

Biol 1, 2 — General Biology (10)

For 41 — Introduction to Forest Products
(2)

For 21 — Introduction to Forestry (2)

For 31 — Conservation of Natural Resources
(3)

GeCh 4, 5 — General Principles of Chem-
istry (10)

- Geo 1 — General Geology (5)
Math 10^{oo} — College Algebra, Analytic Geometry (5)
Students with a grade of C or better in high school trigonometry are exempt from Math T, Trigonometry; others must take Math T
Electives — from categories III and IV under C.L.E. requirements
Total required credits (46) (not including courses listed under C.L.E. requirements)
- (or) Math 15 — College Algebra (5)
Rhetoric — Freshman Communication requirement (9)

Natural Science Option

In addition to the core curriculum, requirements in this option include:

SOPHOMORE YEAR

- AgEc 1 — Introduction to Economics (3)
AgEc 2 — Principles of Macroeconomics (3)
AgEc 3 — Principles of Microeconomics (3)
For 49 — Dendrology (4)
Math 42, 43, 44 — Analytic Geometry and Calculus I, II, III (15)
(or) Math 21A — Analysis I: Algebra, Trigonometry, Analytic Geometry (5) (*and*)
Electives — from categories III and IV under C.L.E. requirements
Total required credits (44) (including AgEc 1 and 2 but not including other courses listed under C.L.E. requirements)
- Math 22A, 23A — Analysis II, III: Analytic Geometry, Calculus (10)
OrCh 61, 62 — Elementary Organic Chemistry (10)
Rhet 22 — Public Speaking (3)
Soil 18 — Forest Soils (3)

Lake Itasca Forestry and Biological Station — Summer Session for Foresters (3½ weeks). Required of all forest resources development and forest science majors. Must be completed between sophomore and junior years. Trigonometry, a college course in botany or biology, and a college physics course are required for registration. Students must have a grade point average of 2.00.

- For 50 — Important Forest Plants (2)
For 54 — Forest Ecology (3)
For 56 — Field Forest Measurements (1)
Total required credits (6)

JUNIOR YEAR

- For 52 — Forest Mensuration (3)
For 53 — Forest Meteorology and Climatology (2)
For 123 — Forest Economics (3)
For 125 — Silviculture (3)
For 139 — Timber Management (3)
Phys 1, 1A, 2, 2A, 3, 3A or equiv — Introduction to Physics (12)
PIPa 51 — Forest Pathology (4)
Rhet 51 — Exposition (3)
Total required credits (33)

SENIOR YEAR

- Biom 100 — Statistical Analysis I (5)
Ent 56 — Forest Entomology (4)
For 152 — Forest-Tree Physiology (3)
For 198 — Senior Topics (6)
For 199 — Senior Seminar (1)
Electives — from categories III and IV under C.L.E. requirements
Total required credits (22) (not including courses listed under C.L.E. requirements)
- Rhet 52 — Technical Writing (3)
(or) Rhet 54 — Advanced Public Speaking (3)
(or) Rhet 56 — Discussion Methods (3)
Total required credits (22)

^{oo} Students in natural science option with 4 years of high school mathematics should omit Math 10 or 15 and take Math 21A in sophomore year.

Section 3 — Programs and Curricula

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (151), plus additional credits to satisfy the C.L.E. requirements, plus electives sufficient to total 192 credits shall be completed for the degree

Social Science Option

In addition to the core curriculum, requirements in this option include:

SOPHOMORE YEAR

AgEc 1 — Introduction to Economics (3) Math 42, 43 — Analytic Geometry and Calculus I, II (10)
AgEc 2 — Principles of Macroeconomics (3) Psy 1, 2 — General Psychology (6)
AgEc 3 — Principles of Microeconomics (3) Rhet 22 — Public Speaking (3)
For 49 — Dendrology (4)

Electives — from categories III and IV under C.L.E. requirements

Total required credits (32) (not including courses listed under C.L.E. requirements)

Lake Itasca Forestry and Biological Station — Summer Session for Foresters (3½ weeks). Required of all forest resources development and forest science majors. Must be completed between sophomore and junior years. Trigonometry, a college course in botany or biology, and a college physics course are required for registration. Students must have a grade point average of 2.00.

For 50 — Important Forest Plants (2)

For 54 — Forest Ecology (3)

For 56 — Field Forest Measurements (1)

Total required credits (6)

JUNIOR YEAR

Biom 100 — Statistical Analysis I (5)

For 52 — Forest Mensuration (3)

For 53 — Forest Meteorology and Climatology (2)

For 122 — Forest Business Practices (3)

Math 43, 44 — Analytic Geometry and Calculus II, III (10)

(or) Math 22, 23 — Calculus II, III: Analytic Geometry and Calculus (10)

Pol 5 — American Government and Politics (5)

Rhet 51 — Exposition (3)

Soc 1 or 1A — Man in Modern Society (3)

Soc 2 — American Community (3)

(or) Soc 3 — Social Problems (3)

Soil 18 — Forest Soils (3)

Electives — from categories III and IV under C.L.E. requirements

Total required credits (40) (not including category IV courses under C.L.E. requirements)

SENIOR YEAR

For 123 — Forest Economics (3)

For 129 — Regional Silviculture (3)

For 139 — Timber Management (3)

For 198 — Senior Topics (6)

For 199 — Senior Seminar (1)

PlPa 51 — Forest Pathology (4)

(or) Ent 56 — Forest Entomology (4)

Rhet 52 — Technical Writing (3)

(or) Rhet 54 — Advanced Public Speaking (3)

(or) Rhet 56 — Discussion Methods (3)

Students having a grade of C or better in Rhet 22 and Rhet 51 are required to complete only 3 credits of additional rhetoric to be selected from the courses listed; students having a D in either Rhet 22 or Rhet 51 shall take 6 credits of the courses listed, selected in consultation with their adviser

Electives — from categories III and IV under C.L.E. requirements

Total required credits (23) (not including courses listed under C.L.E. requirements)

Forest Products Marketing

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (147 credits), plus additional credits to satisfy the C.L.E. requirements, plus electives sufficient to total 192 credits shall be completed for the degree

3. FOREST PRODUCTS MARKETING

This curriculum trains students for careers in the marketing of forest products. Courses are concentrated in the areas of business, construction, and wood science. Graduates qualify for sales, lumberyard management, and marketing positions with private industry, and for leadership positions with urban development and government agencies. Graduate programs are available in forest products marketing, research, and management.

FRESHMAN YEAR

- | | |
|---|---|
| Biol 1, 2 — General Biology (10)
For 21 — Introduction to Forestry (2)
For 31 — Conservation of Natural Resources (3)
For 41 — Introduction to Forest Products (2) | GeCh 4, 5 — General Principles of Chemistry (10)
Ind 9 — Building Construction Drafting (3)
Math 10 — College Algebra, Analytic Geometry (5)
Rhetoric — Freshman Communication requirement (9) |
|---|---|

Students with a grade of C or better in high school trigonometry are exempt from Math T, Trigonometry; others must take Math T

Students with a grade of C or better in high school drawing are exempt from MeAg 3, Technical Drawing; others must take MeAg 3

Total required credits (44) (not including courses listed under C.L.E. requirements)

SOPHOMORE YEAR

- | | |
|--|--|
| Acct 24, 25 — Principles of Accounting (6)
Econ 1 — Principles of Macroeconomics (4)
Econ 2 — Principles of Microeconomics (4)
For 49 — Dendrology (4)
Math 40A — Introduction to Calculus (5) | Mktg 57 — Marketing (3)
Phys 1, 1A, 2, 2A — Introduction to Physics (8)
Psy 1, 2 — General Psychology (6)
Rhet 22 — Public Speaking (3) |
|--|--|

Total required credits (43) (not including courses listed under C.L.E. requirements)

JUNIOR YEAR

- | | |
|--|--|
| Arch 71, 72, 73 — Building Developments (12)
For 74 — Fundamental Wood Properties I: Wood Structure (3)
For 87 — Forest Products Marketing (3)
For 101 — Fundamental Wood Properties II: Wood-Fluid Relations (3) | For 102 — Fundamental Wood Properties III: Physical Properties (3)
QA 52, 53, 54 — Quantitative Methods for Administration I, II, III (9)
Rhet 51 — Exposition (3) |
|--|--|

Total required credits (36) (not including courses listed under C.L.E. requirements)

SENIOR YEAR

- | | |
|---|---|
| BLaw 58 — Business Law: Contracts (3)
For 78 — Wood Products Quality Standards (3) | For 104 — Fundamental Wood Properties: Wood Deterioration (2) |
|---|---|

Section 3 — Programs and Curricula

- For 112 — Wood Processing I: Drying and Impregnation Technology (3)
For 113 — Wood Processing II: Fiber Products Technology (4)
For 114 — Wood Processing III: Machining and Manufacturing Processes (3)
For 115 — Wood Processing IV: Adhesive and Coating Technology (3)
For 122 — Forest Business Practices (3)
For 123 — Forest Economics (3)
For 176 — Design of Wood Structures (4)
For 187 — Advanced Forest Products Marketing (3)
For 199 — Senior Seminar (1)
Mktg 97 — Market Analysis Research I (3)
Mktg 97C — Marketing Research II (3)
Psy 156 — Psychology of Advertising (3)
Rhet 52 — Technical Writing (3)
(or) Rhet 54 — Advanced Public Speaking (3)
(or) Rhet 56 — Discussion Methods (3)

Students having a grade of C or better in Rhet 22 and Rhet 51 are required to complete only 3 credits of additional rhetoric to be selected from the courses listed; students having a D in either Rhet 22 or Rhet 51 shall take 6 credits of the courses listed, selected in consultation with their adviser

Total required credits (47) (not including courses listed under C.L.E. requirements)

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (170 credits), plus additional credits to satisfy the C.L.E. requirements, plus electives sufficient to total 192 credits shall be completed for the degree

4. FOREST PRODUCTS ENGINEERING

This curriculum is planned for students with an interest in the design, development, technology, and manufacture of wood products.

FRESHMAN YEAR

- Biol 1, 2 — General Biology (10)
GeCh 4, 5 — General Principles of Chemistry (10)
GeCh 6 — Principles of Solution Chemistry (4)
For 21 — Introduction to Forestry (2)
For 31 — Conservation of Natural Resources (3)
For 41 — Introduction to Forest Products (2)
Math 15 — College Algebra (5)
Rhetoric — Freshman Communication requirement (9)

Students with a grade of C or better in high school trigonometry are exempt from Math T, Trigonometry; others must take Math T

Students with a grade of C or better in high school drawing are exempt from MeAg 3, Technical Drawing; others must take MeAg 3

Total required credits (45) (not including courses listed under C.L.E. requirements)

SOPHOMORE YEAR

- AnCh 57A, 57B — Quantitative Analysis (5)
Econ 1 — Principles of Macroeconomics (4)
Econ 2 — Principles of Microeconomics (4)
For 49 — Dendrology (4)
Math 21A — Analysis I: Algebra, Trigonometry, Analytic Geometry (5)
Math 22A, 23A — Calculus II, III: Analytic Geometry (10)
OrCh 61, 62 — Elementary Organic Chemistry (10)
Rhet 22 — Public Speaking (3)

Total required credits (45) (not including courses listed under C.L.E. requirements)

Recreation Resource Management

JUNIOR YEAR

For 74 — Fundamental Wood Properties I: Wood Structure (3)	Math 31 — Calculus IV: Analytic Geometry (5)
For 101 — Fundamental Wood Properties II: Wood-Fluid Relationships (3)	Phys 7, 8, 9 — General Physics (15)
For 102 — Fundamental Wood Properties III: Physical Properties (3)	Rhet 51 — Exposition (3)
For 103 — Fundamental Wood Properties IV: Wood Chemistry (3)	Rhet 52 — Technical Writing (3) (or) Rhet 54 — Advanced Public Speaking (3)
For 104 — Fundamental Wood Properties V: Deterioration of Wood Products (2)	(or) Rhet 56 — Discussion Methods (3)
Total required credits (40) (not including courses listed under C.L.E. requirements)	

SENIOR YEAR

For 78 — Wood Products Quality Standards and Control (3)	For 176 — Design of Wood Structures (4)
For 112 — Wood Processing I: Drying and Impregnation Technology (3)	For 199 — Senior Seminar (1)
For 113 — Wood Processing II: Fiber Products Technology (4)	ME 99 — Introduction to Engineering Analysis (3)
For 114 — Wood Processing III: Machining and Manufacturing Processes (3)	MM 35 — Statics (4)
For 115 — Wood Processing IV: Adhesive and Coating Technology (3)	MM 37 — Deformable Body Mechanics (4)
	PCh 106A — Physical Chemistry Laboratory (2)
	PCh 107, 108 — Elementary Physical Chemistry (6)
Total required credits (40) (not including courses listed under C.L.E. requirements)	

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (170 credits), plus additional credits to satisfy the C.L.E. requirements, plus electives sufficient to total 192 credits shall be completed for the degree

5. RECREATION RESOURCE MANAGEMENT

This curriculum does not contain the traditional forestry core of courses. The student electing this program will not qualify as a forester under present Federal Civil Service regulations or for membership in the Society of American Foresters. General objectives of the program are:

1. To educate recreation resource specialists for broad recreation resource planning and management involving land and water areas.
2. To provide necessary background for participation in expanding regional, state, federal resource-oriented recreation programs as well as for private planning consultant employment.
3. To prepare students for graduate work in resource planning and management through forestry, agricultural economics, and other fields of study.

While this undergraduate program may be terminal for some, primarily it should attract students motivated toward and capable of graduate work. It

Section 3—Programs and Curricula

should attract a different type of student than the recreation option in forest resources development and career objectives will be different. This is an interdisciplinary program administered by the College Office with the assistance of special college committees.

FRESHMAN YEAR

- Biol 1, 2 — General Biology (10)
For 31 — Conservation of Natural Resources (3)
GeCh 4, 5 — General Principles of Chemistry (10)
Geo 1 — Physical Geology (5)
Students with a grade of C or better in high school trigonometry are exempt from Math T, Trigonometry; others must take Math T
Students with a grade of C or better in high school drawing are exempt from MeAg 3, Technical Drawing; others must take MeAg 3
Electives — from categories III and IV under C.L.E. requirements
Total required credits (47)

SOPHOMORE YEAR

- AgEc 1 — Introduction to Economics (3) (and) AgEc 2 — Principles of Macroeconomics (3) (and) AgEc 3 — Principles of Microeconomics (3)
(or) Econ 1 — Principles of Macroeconomics (4) (and) Econ 2 — Principles of Microeconomics (4) (and) Econ 65 — Intermediate Economics Analysis I (3)
For 49 — Dendrology (4)
Hort 22 — Woody Plant Materials II (3)
Hort 24 — Theory of Landscape Design (3)
Math 40A — Calculus (5)
Electives — from categories III and IV under C.L.E. requirements
Total required credits (47)
- (or) Math 42 — Analytic Geometry, Calculus I (5)
Phys 1, 1A, 2, 2A — Introduction to Physics (8)
Psy 1, 2 — General Psychology (6)
Rhet 22 — Public Speaking (3)
Soc 1 or 1A — Man in Modern Society (3)
Soc 2 — American Community (3)
(or) Soc 3 — Social Problems (3)
(or) Pol 40 — Contemporary Political Ideologies (3)

JUNIOR YEAR

- Biom 40 — Introductory Statistics (3)
Ecol 50 — Introduction to Ecology (3)
For 143 — Management of Recreational Lands (3)
FW 50 — Principles of Fisheries and Wildlife Management (3)
Hort 60 — Landscape Design (3)
MeAg 42 — Surveying (4)
Total required credits (35) (not including courses listed under C.L.E. requirements)
- MeAg 84 — Hydrology, Erosion Control (3)
Rec 49 — Social Aspects of Leisure (3)
Rhet 51 — Exposition (3)
Rhet 52 — Technical Writing (3)
(or) Rhet 54 — Advanced Public Speaking (3)
(or) Rhet 56 — Discussion Methods (3)
Soil 19 — Introduction to Soil Science (4)

SENIOR YEAR

- AgEc 61 — Community Resources Development (3)
Bot 130 — Ecology of Plant Communities (5)
For 109 — Aerial Photo Interpretation (3)
For 116 — Recreation Planning and Design (same as Hort 116) (4)
For 157 — Recreation Land Policy (3)
For 161 — Recreation Land Amenities and the User (3)
- RCD 100 — Resource and Community Development Seminars (3)
RCD 101 — Resource and Community Development Seminars (4)
Soc 120 — Social Psychology (3)
Soc 162 — Rural Social Institutions (3)
(or) Soc 140 — Social Organization (3)

Graduate Study in Forestry

Electives — from categories III and IV under C.L.E. requirements

Total required credits (34) (not including courses listed under C.L.E. requirements)

Students having a grade of C or better in Rhet 22 and Rhet 51 are required to complete only 3 credits of additional rhetoric to be selected from courses listed; students having a D in either Rhet 22 or Rhet 51 shall take 6 credits of the courses listed, selected in consultation with their adviser

SUGGESTED ELECTIVES

AgEc 162 — Regional Economic Analysis (3)	For 160 — Outdoor Recreation Economics (3)
AgEc 163 — Resource Economics Policy (3)	Jour 112 — Communication Public Opinion (3)
Biom 100 — Statistical Analysis I (5)	Jour 131 — Public Opinion, Persuasion (3)
Econ 66 — Intermediate Economic Analysis II (3)	Phil 151 — Aesthetics (3)
EdCI 105 — Audio-Visual Materials in Education (3)	Pol 167 — Political Behavior (3)
For 53 — Forest Meteorology, Climatology (2)	PubH 75 — Introduction to Environmental Health (3)
For 105 — Range Management (3)	Rec 23 — Recreation Leadership (3)
For 129 — Regional Silviculture (3)	Soc 106 — Planning (3)

TOTAL GRADUATION REQUIREMENTS

Required courses listed above (163 credits), plus additional credits to satisfy the C.L.E. requirements, plus electives sufficient to total 192 credits shall be completed for the degree

GRADUATE STUDY IN FORESTRY

Graduate study leading to the master of science (M.S.), doctor of philosophy (Ph.D.), and the professional degree, master of forestry (M.F.), is offered through the Graduate School in cooperation with the School of Forestry.

Master of Science and Ph.D. Programs

Graduate study leading to these degrees is intended for qualified students interested primarily in training for research and teaching in the several recognized forestry specializations: silviculture, management, economics, administration, measurements, aerial photogrammetry, genetics, watershed management, physiology, ecology, recreation, marketing, construction, and forest products engineering. Graduates interested in these programs should consult the *Graduate School Bulletin* for details, and requests for information and admission should be directed to the Graduate School, University of Minnesota, Minneapolis, Minnesota 55455.

Master of Forestry Program

The master of forestry program is designed to meet the need for added professional study by qualified forestry school graduates primarily interested in administrative and technical work in forest management. Graduates from

Section 3 — Programs and Curricula

nonforestry curricula may be eligible for this program provided minimum course background in related areas has been acquired.

Students registered for master of forestry work will fulfill the requirements listed under the master of science (Plan B) program of the Graduate School. Reading knowledge of a foreign language is not required for the master of forestry degree.

Graduates interested in the master of forestry program should consult the *Graduate School Bulletin* (master of science — Plan B) for details of requirements and should make application for admission with the Graduate School, University of Minnesota, Minneapolis, Minnesota 55455.

SECTION 4

COURSE DESCRIPTIONS

Forestry (For)

- 21 (1-200). **Introduction to Forestry.** Professional orientation and survey of forests and forestry. Introduction to basic forestry concepts and techniques. Lectures, demonstrations, field trips. (2 cr, §1)
- 31 (1-201). **Conservation of Natural Resources.** (3 cr, §11; open to nonforestry majors)
- 41 (1-300). **Introduction to Forest Products.** Discussion of major forest products industries in the United States and the world. Raw material characteristics and requirements. Importance of modern technology to efficient utilization. Lectures and demonstrations. (2 cr, §77)
- 46 (1-202). **Small Woodlands Forestry.** Tree identification. Care of woodlots. Establishment and maintenance of windbreaks, shelterbelts, Christmas trees, and erosion control plantings. Measuring, marketing, and use of wood on the farm. Lectures and laboratory. (3 cr; prereq Biol 2 or #)
- 49 (1-100). **Dendrology.** Identification, nomenclature, classification, and distribution of about 200 important forest trees. Includes the preparation and use of keys, systems of natural classification, and field and laboratory methods of identification. (4 cr; prereq Biol 2 or equiv)
- 50 (3-100). **Important Forest Plants.** Identification of forest plants as related to forest types. (2 cr; prereq Biol 2; given at Itasca)
- 51 (3-200). **Logging.** Principles and general methods of logging in the different forest regions of the United States, and the modifications required by forest management. (2 cr; prereq jr, sr, or #)
- 52 (3-202). **Forest Mensuration.** Measurement of stand variables, forest products, forest growth and yield. Use of volume and yield tables. Elementary statistics. Lectures and laboratory. (3 cr; prereq 56, Math 10)
- 53 (3-203). **Forest Meteorology and Climatology.** Meteorology and climatology in relation to forest ecology and geography, watershed management, and forest fires. Lectures and problems. (2 cr; prereq Phys 2 and 2A)
- 54 (3-101). **Forest Ecology.** Ecological principles. Silvical characteristics of tree and shrub species. Forest communities and environmental factors. (3 cr; prereq college physics; given at Itasca)
- 56 (3-201). **Field Forest Measurements.** Introduction to and use of instruments in forest mensuration. (1 cr; prereq Math T; given at Itasca)
- 74 (3-300). **Fundamental Wood Properties I: Wood Structure.** Discussion of the anatomy and identification of important commercial wood species. The variability of properties and relationship of properties to use as solid and fiber products. Lecture and laboratory. (3 cr; prereq 49 or #)
- 78 (3-302). **Forest Products Quality Standards.** Characteristics, grades, and uses of lumber products. Statistical methods of quality control applicable in primary and secondary wood products industries. (3 cr; prereq 74)

Section 4

- 87 (3-303). **Forest Products Marketing.** Historical and current considerations of forest products marketing at the manufacturing, wholesale, and retail levels. Lectures, guest speakers, and field trips. (3 cr; prereq Mktg 57 or #)
- 100 (5-230). **Forest Fire.** Fire behavior, effects, control, and use. (2 cr; prereq 49, 53 or #)
- 101 (5-300). **Fundamental Wood Properties II: Wood-Fluid Relationships.** A discussion of wood permeability and fluid movement above and below the fiber saturation point. Adsorption, hysteresis, swelling, and dimensional stabilization. (3 cr; prereq 74)
- 102 (5-301). **Fundamental Wood Properties III: Physical Properties.** Strength, time-strain relationships, heat transfer, and electrical properties. Lectures and demonstrations. (3 cr; prereq 101)
- 103 (5-302). **Fundamental Wood Properties IV: Wood Chemistry.** Chemical composition, reactions, and analysis of wood, wood components, and derivatives. (3 cr; prereq OrCh 61-62)
- 104 (5-303). **Fundamental Wood Properties V: Wood Deterioration.** Study of wood deterioration by bacteria, fungi, insects, marine organisms, fire, and weathering. Lectures, reading, discussion, arranged laboratories, and reports. (2 cr; prereq 74)
- 105 (5-231). **Range Management.** Grazing animal production on forest and open range lands; relationship to other land uses. (3 cr; prereq 53, Biol 2 or #)
- 109 (5-200). **Aerial Photo Interpretation.** Use of aerial photographs; preparation of planimetric and vegetative type maps. Photo interpretation and application to resource management. Lectures and laboratory. (3 cr; prereq 52, or #)
- 111 (5-201). **Statistical Methods in Forestry.** Sampling, decision-making using statistical tests, application of statistics to forest survey, inventory, and volume table selection. Lectures and laboratory. (4 cr; prereq 52, ¶109, or #)
- 112 (5-304). **Wood Processing I: Drying and Impregnation Technology.** Air drying, kiln drying, and specialized drying techniques. Treatment of wood for increased decay, fire, and weather resistance. Laboratory. (3 cr; prereq 101, 104 or #)
- 113 (5-305). **Wood Processing II: Fiber Products Technology.** Pulping processes, fiber refining and processing, manufacture of paper and fiber board products. Lecture and laboratory. Field trip required. (4 cr; prereq 101, 103 or #)
- 114 (5-306). **Wood Processing III: Machining and Manufacturing Processes.** Manufacture of lumber, veneer, and particle products. Field trip required. (3 cr; prereq 74)
- 115 (5-307). **Wood Processing IV: Adhesive and Coating Technology.** Adhesive products and their application to bonding of solid wood products, veneers, particles, and laminates. Protective coatings and their application to wood products. Lecture and laboratory. (3 cr; prereq 114 or #)
- 116 (5-233). **Principles of Outdoor Recreation Design and Planning.** (Same as Hort 116) For advanced students associated with design, management, and planning of recreation facilities. Planning and design principles related to recreational land use and development: parks, campsites, water areas, high-ways, summer and winter recreational facilities. (4 cr; prereq 143 or #)
- 122 (5-211). **Forest Business Practices.** Survey of timber sales procedures, forest tax procedures, forest finance, and government regulations and business analy-

Course Descriptions — Forestry

- sis techniques applied to forestry operations. Lectures, reports, and problems. (3 cr; prereq AgEc 3 or #)
- 123 (5-212). **Forest Economics.** An examination of the United States and world forest resource supply and consumption relationships; forest products industries and wood products users characteristics; aggregate and firm capital use theory for long period production processes; market systems for principal forest products; macro problems of the forest economy; and decision making in micro forest economic situations. Lectures and problems. (3 cr; AgEc 3 or #)
- 125 (5-100) **Silviculture.** Introduction to the silvicultural systems, intermediate cuttings, and related practices. Forest regeneration problems and techniques. (3 cr; prereq 49, 54, Soil 18 or #)
- 128 (5-101). **Field Silviculture.** Lectures and field work in relation to timber stand improvement projects, stand examinations and prescriptions, seeding and planting, and related silvicultural practices. (5 cr; prereq 125; given at Cloquet)
- 129 (5-102). **Regional Silviculture.** Silvicultural consideration of important forest species and types selected to represent a range of ecological, economic, and logging conditions throughout the United States. Lectures and reports. (3 cr; prereq 125 or #)
- 130 (5-234). **Forest Protection.** Field exercises in the behavior, effects, control, and use of fire. Identification and ecology of forest disease and insect problems. (2 cr; prereq 100 or #; given at Cloquet)
- 131 (5-250). **Forest Policy.** Public and private forest policies in the United States. Forest policies of other nations. Analysis of current policy issues. Lectures and reports. (3 cr; prereq sr or #)
- 133 (5-210). **Multiple Use.** Elements and interrelationships of forest administration, management, utilization, engineering, hydrology, and recreation. Lectures, field trips, and problems. (5 cr; prereq AgEc 3 and For 53; given at Cloquet)
- 134 (5-202). **Forest Inventory and Photographic Interpretation.** Type delineation, area measurement, map construction, cruise design, and timber measurement using aerial photos. (4 cr; prereq 109 and 111, MeAg 42; given at Cloquet)
- 136 (5-251). **Advanced Forest Economics.** Economics of forest resource development and forest products. (3 cr; prereq 123 or #)
- 139 (5-213). **Timber Management.** Inventory, regulation, and continuous production of timber crops. Economic analysis of specific production problems. Lectures and problems. (3 cr; prereq 111, ¶123, 125, 133, or #)
- 141 (5-150). **Principles of Silvics.** Principles underlying the silvical literature of special significance. (3 cr; prereq sr, 54, 125 or #)
- 143 (5-232). **Management of Recreational Lands.** Recreational use of the forest and associated land and water. Policy problems arising from recreational demands. (3 cr)
- 145 (5-151). **Advanced Silviculture.** A synthesis of silviculture knowledge through a review of the classical as well as recent contributions to silvicultural literature. Topical presentations, class discussion, and reports. (3 cr; prereq sr, 125 or #)
- 146 (5-252). **Remote Sensing of Natural Resources.** Photogrammetric systems, flight planning, contracting, contract inspection; advanced photo interpretation, mapping, and measurement problems. Laboratory. (3 cr; prereq sr, 109 or #; offered 1968-69 and alt yrs)

Section 4

- 147 (5-214). **Forest Administration.** Organization and administration of forestry enterprises. (3 cr; prereq 123, ¶133 or #)
- 148 (5-235). **Forest Hydrology.** Principles of managing the forested watershed including the effects of woody vegetation upon soil moisture, stream flow, and erosion. (2 cr; prereq 53, 54 or # for nonforestry majors, Soil 18, Geo 1 or #)
- 149 (5-253). **Advanced Forest Mensuration.** Applications of statistical and advanced mensurational methods in the analysis and interpretation of forestry data and forest survey sampling methods. Lectures and laboratory. (3 cr; prereq 111 or Biom 101 or #)
- 150 (5-152). **Forest Genetics.** Heredity and variation of important forest-tree species; applications of genetic principles in tree improvement. (3 cr; prereq For 49, GCB 66 or Bio 70, or #)
- 152 (5-103). **Forest-Tree Physiology.** The behavior of trees including energy balance, mineral nutrition, water relations and growth regulation. Application to practical forestry problems will be emphasized. (3 cr; prereq Biol 2, Phys 2, 2A, BioC 1)
- 153 (5-254). **Advanced Forest Management and Administration.** Traditional and contemporary forest management concepts and practices. Administrative science applications in technical organizations concerned with forest land management. (3 cr; prereq sr, 139, 147 or #; offered 1968-69 and alt yrs)
- 154 (5-255). **Advanced Forest Hydrology.** A study of the recent literature relating to management of the forested watershed. Methods of analyzing research data. (3 cr; prereq 148 or #)
- 155 (5-256). **Planning and Control in Forestry.** Analysis of forest management objectives and their relationship to forestry planning concepts, including systems analysis, and the control of significant biological and economic variables in forest production alternatives. (3 cr; prereq sr, 123, 139 or #; offered 1969-70 and alt yrs)
- 156 (5-400). **Introduction to Research.** Research philosophy, objectives, problem development, analytical principles, and presentation, illustrated by situations in forestry. (1 cr; prereq sr and #)
- 157 (5-257). **Recreational Land Policy.** Discussion and analysis of policy issues affecting the use and management of lands devoted entirely or in part to recreational objectives. (3 cr; prereq 143 or #)
- 158 (5-153). **Measurements of the Forest Environment and Plant Behavior.** (Same as Bot 158) Measurements of physical factors of the environment and plant characteristics of different forest communities are used to study relationships between forest plants and the environment in which they occur. (5 cr; prereq college physics, plant ecology or #; given at Itasca only)
- 160 (5-258). **Outdoor Recreation Economics.** The role of economic analysis in outdoor recreation; analysis of alternative methodologies for valuation and choice problems, including both supply and demand aspects; discussion and analysis of major trends and issues. Lectures, readings, discussions, reports. (3 cr; prereq 143 or 157, AgEc 3 or #)
- 161 (5-259). **Recreation Land Amenities and the User.** Concepts and management of parks, forests, and other recreation areas for recreation visitors. The role of interpretive education, user preference in relation to administrative objectives. Principles of area management, individual and group influences. Lecture, discussion, reports, reading. (3 cr; prereq 143 and #)

Course Descriptions — Forestry

- 162 (5-260). **Advanced Management of Recreational Lands.** Discussion of relationship of man as recreationist to the natural environment. Principles of manipulation of plant and animal communities for outdoor recreation objectives. Lectures, reading, discussion, reports. Field trips. (3 cr; prereq 143, Ecol 50 or equiv and #)
- 165A, B, C (5-154, 5-155, 5-156). **Measurement of Plant Environment Interactions.** (Same as Bot 186 and PIPh 186) Three independent laboratory units measuring response of intact plants to monitored environmental stimuli. (1-5 cr; prereq #)
- 165A. Energy budget, plant temperatures. (2 cr; offered 1968-69 and alt yrs)
- 165B. Photosynthesis, gas exchange. (1 cr; offered 1969-70 and alt yrs)
- 165C. Internal water balance. (2 cr; offered 1969-70 and alt yrs)
- 176 (5-308). **Design of Wood Structures.** Design procedure for solid and laminated wood columns, beams, and decks. Analysis of light frame roof and floor systems and wood-plywood components. (4 cr; prereq 102 or #)
- 178 (5-350). **Woody Tissue Microtechnique.** Use of sliding and rotary microtomes, hand sectioning, maceration; differential staining, and special techniques in preparation of woody tissue for microscopic study. Laboratory. (2 cr; prereq 74 or #)
- 181 (5-351). **Moisture Relations in Wood.** Study of moisture movement in wood related to the microphysical and chemical structure and its influence on the development of stress during drying and subsequent use. (3 cr; prereq 101)
- 182 (5-352). **Advanced Wood Preservation.** Study of factors governing toxicity, permanence, and effectiveness of wood preservatives to fungi, insects, and marine borers. Study of fire retardant and treatments. The permeability of wood, penetration of preservatives, and heat transfer. (3 cr; prereq 104 or equiv and 112)
- 184 (5-353). **Advanced Wood Chemistry.** Laboratory problems in the analysis of wood constituents and in the techniques of their isolation and purification. (2 cr; prereq 177, AnCh 57A, AnCh 57B or equiv; offered when feasible)
- 185 (5-354). **Principles of Adhesion in Manufactured Wood Products.** Theory of adhesion as applied to wood and to combinations of wood with other materials. (3 cr)
- 186 (5-355). **Mechanical Behavior of Wood.** Orthotropic nature of wood; elastic and inelastic behavior; effect of moisture, temperature, and time. Some consideration of plywood, particleboard, and fiberboard properties. (3 cr; prereq MM 35 and MM 37)
- 187 (5-356). **Advanced Forest Products Marketing.** Lectures and case studies of retail, wholesale, manufacture and market analysis research of forest products businesses. (3 cr; prereq 87, grad or #)
- 195 (5-358). **Advanced Wood Pulp and Paper.** Laboratory problems in the properties of wood pulp and of paper products. (2 cr; prereq 113, or ¶113)
- 198 (5-401). **Senior Topics.** Independent study in a field of direct interest to a senior forest science major or to other seniors with a 3.00 GPA. Work to be systematically planned with the student's adviser. (Cr ar)
- 199 (5-236). **Senior Seminar.** Discussions and presentation of papers on forestry problems, work experience, employment opportunities. (1 cr; prereq sr and Rhet 22)

Section 4

For Graduate Students Only

- 200x (8-100). Research Problems: Silviculture
- 203x (8-200). Research Problems: Forest Management
- 205x (8-201). Research Problems: Forest Economics
- 207x (8-300). Research Problems: Forest Products Engineering
- 213x (8-301). Research Problems: Forest Utilization
- 215x (8-101). Research Problems: Forest-Tree Physiology
- 217x (8-205). Research Problems: Remote Sensing and Photogrammetry
- 218x (8-202). Research Problems: Forest Measurements
- 219x (8-203). Research Problems: Forest Recreation
- 220x (8-102). Research Problems: Forest-Tree Genetics
- 221x (8-103). Research Problems: Forest Influences
- 222x (8-204). Research Problems: Forest Policy
- 230 (8-104). Forestry Synecology

SECTION 5

GENERAL INFORMATION

Student Personnel Services

Faculty Advisers — In choosing your curriculum from the many different offerings in the School of Forestry, you will be assisted by a member of the faculty who will become your adviser. Your adviser will interpret the program to you, will guide you in program planning, and will be concerned with your general progress. When you have problems and need special attention, your adviser may refer you to other faculty members, to the College Office, or to one of the specialized personnel agencies.

Student Scholastic Standing Committee — Almost every student on occasion makes use of the Student Scholastic Standing Committee in the College of AFHE. This is a committee of the faculty which interprets and enforces faculty regulations. It also may make exceptions to regulations when they work to the educational disadvantage of a particular student, provided the basic spirit of the regulation is maintained. If you have any questions concerning the interpretation of faculty regulations, you should consult with your adviser or call at the College Office. By means of petition, the forms for which are procured in the Office of Admissions and Records, you may request adjustments of your program where departure from normal procedures appears to be justified. These requests, after they have been approved by your adviser, are turned in to the College Office, 215 Coffey Hall.

If you transfer from another institution to the College of AFHE, your transfer credits are evaluated in the Office of Admissions and Records. You should see the admissions and records supervisor if you have any questions about the use of transfer credits. If necessary, you will be referred to the chairman of the Student Scholastic Standing Committee which makes final decisions in evaluating transfer credits in terms of this college and the requirements of the various curricula.

School and College Placement Services — The School of Forestry assists students in securing summer work and permanent positions following graduation. Also, the College Office will bring to your attention other job opportunities, and will assist in arranging interviews or contacts with representatives of employing agencies.

Student Government

Student Council — The Student Council directs and coordinates student activities and encourages student leadership throughout the St. Paul Campus. Its membership is drawn from all major areas of the College of AFHE, the College of Veterinary Medicine, and the College of Biological Sciences.

The council cooperates with the Minnesota Student Association (MSA) and the Senate Committee on Student Affairs. It brings questions from the student

Section 5

body to the administration of the colleges and discusses and reaches decisions on matters of general interest.

Honor System — Under the provisions of the Student Self-Government Honor System, the students on the St. Paul Campus, rather than the faculty, conduct examinations and quizzes. The honor system is operated on the assumption that honesty prevails among a large majority of students. Students place themselves on their honor not to give or receive aid during examinations. The responsibility of honesty is between student and student; the faculty does not place the student on his honor. Under the honor system the faculty permits students to conduct the examinations.

If you observe dishonesty during an examination period, you may take some appropriate step at the time to halt the dishonest act, or may report the incident later to the Honor Case Commission. The Honor Case Commission, comprised of students from the various areas, considers confidentially the various aspects of the situations reported. If it is clear that scholastic dishonesty has occurred, the commission recommends to the Student Scholastic Standing Committee of the faculty an appropriate action to be taken with respect to the offending student.

The honor system is essentially a preventive rather than a punitive system and provides for greater freedom of action on the part of students on this campus. New students are urged to discuss the honor system with students previously registered in the college. The membership of the Honor Case Commission is posted in the post office (in Coffey Hall) together with a notice as to how members may be contacted for information or assistance. Students from the various units of AFHE are members on this committee.

Student-Faculty Intermediary Board — When you encounter situations with respect to your classwork which in your opinion need attention or clarification, you are urged to bring the matter to the attention of the Student-Faculty Intermediary Board. This is a joint committee of students and faculty who are interested in maintaining helpful relationships between members of the student body and the faculty. The membership of this board is also posted in the St. Paul Campus post office.

Student Center Board of Governors — The St. Paul Campus Student Center provides a rich program of social, cultural, and recreational activities and contributes in many ways to the educational objectives of the campus. Student participation in this varied program is encouraged. An elected board, the St. Paul Campus Student Center Board of Governors, made up of students representing the various academic units on the St. Paul Campus, formulates policy for operation of the Student Center and establishes its budget. Students wishing information about the Student Center, its operation, and opportunities to serve on the various planning and programming committees should inquire at the Information Desk, first floor of the Student Center.

Reserve Officers' Training Corps

The ROTC through its three services — Army, Navy, and Air Force — gives college men students an opportunity to combine military or naval training with

their academic work. Students are eligible for ROTC enrollment if they are registered in academic courses leading toward degrees, if they are United States citizens, and if they meet physical and other qualifications. The general requirements of the three services and their special characteristics are described in the *Army-Navy-Air Force ROTC Bulletin*. Also you may make inquiries personally or by letter at the following offices in the University Armory: Military Science, room 108; Naval Science, room 203; Aerospace Studies, room 3.

Scholarships and Awards

Students entering as freshmen in the School of Forestry may apply for all-University freshman scholarships, and also for scholarships specific to the school. All applications are submitted on an application for financial aid to be sent to the Office of Student Financial Aid, 107 Armory, University of Minnesota, Minneapolis, Minnesota 55455. The University of Minnesota scholarship program is coordinated through the College Scholarship Service with headquarters in Princeton, New Jersey; consequently the parents of each applicant must submit the Parents' Confidential Statement. The forms referred to are available at the high school principal's or counselor's office. Scholarship information is sent to all Minnesota high schools in early October of each year, and prospective students should consult with their high school principals concerning them, or correspond directly with the Office of Student Financial Aid on the Minneapolis Campus, or with the College Office on the St. Paul Campus. Applicants should note the need for early submission of applications and conform to the established deadline date. (Generally the deadline is December 15 for scholarships that will be available the following fall.)

Additional scholarships or awards are distributed periodically to students in residence on the basis of specified criteria.

Selection of recipients for most scholarships is based upon academic aptitude, vocational promise, personal attributes, leadership, and, in most but not all of the scholarships, upon financial need.

Scholarships, Awards, Loans

All-University Student Loans and Scholarships

Loans — The Office of Student Financial Aid, 107 Armory, Minneapolis Campus, administers loan funds that have been set up to help students who are making normal progress toward an educational objective. Usually a student must have finished 2 quarters at the University before a loan will be granted, but emergency needs get special consideration.

Scholarships — This office also administers scholarships open to all students of the University. These include scholarships for entering freshmen as well as for upperclassmen.

Section 5

Agriculture and Forestry Scholarships and Awards

ALPHA GAMMA RHO (LAMBDA CHAPTER) SCHOLARSHIP — \$150 to assist active members of Alpha Gamma Rho, Lambda Chapter.

ALPHA ZETA TRAVELING SCHOLARSHIPS — Five awards of \$75 each to assist junior and senior students of high scholarship and strong professional interests to attend a meeting of an appropriate professional, scientific, or technical society or association.

CALEB DORR SCHOLARSHIPS — Cash and book awards made annually to the forestry student in each class with the highest grade point average.

School of Forestry Scholarships and Awards

CAROLIND SCHOLARSHIP

Sponsor: Dr Ralph M. Lindgren, St. Paul, Minnesota

Basis of Award: Established to provide financial assistance to deserving and outstanding undergraduate students in the College of Agriculture, Forestry, and Home Economics who are majoring in either forestry or forest pathology

CHAPMAN FOUNDATION FORESTRY SCHOLARSHIPS

Sponsor: A. Dale Chapman, Chapman Foundation, Palo Alto, California

Basis of Award: Awarded to freshmen and sophomores in the School of Forestry on the basis of academic aptitude, vocational promise, personal attributes, leadership, and need

E. G. CHEYNEY MEMORIAL SCHOLARSHIPS

Sponsor: The Minnesota Forestry Alumni Association

Basis of Award: Scholarships open to junior or senior students who have demonstrated outstanding ability and improvement in creative writing and speaking skills

E. A. EVERETT MEMORIAL SCHOLARSHIP

Sponsor: The late Edw. A. Everett

Basis of Award: Awarded to Upper Division forestry students on the basis of financial need, acceptable scholarship, and professional promise.

FEDERATED GARDEN CLUBS OF MINNESOTA SCHOLARSHIPS

Sponsor: Federated Garden Clubs of Minnesota

Basis of Award: Awarded to students in forestry on the basis of academic aptitude, vocational promise, personal attributes, leadership, and financial need

FOREST PRODUCTS MARKETING SCHOLARSHIPS

Sponsor: Twin Cities Hoo Hoo Club No. 12 and the Thomas Murdock Partridge Memorial Fund

Basis of Award: Awarded to deserving and promising students entering the Forest Products Marketing curriculum of the School of Forestry

ROBERT L. GOUDY MEMORIAL SCHOLARSHIP FUND

Sponsor: Mr. and Mrs. F. X. Corbett, Georgetown, Colorado

Basis of Award: Awarded to outstanding transfer students on the basis of academic ability, vocational promise, extracurricular activities, personality, and financial need

SAMUEL B. GREEN SCHOLARSHIP MEDAL

Sponsor: The late Mrs. Samuel B. Green in memory of her husband who established the School of Forestry in 1903 and directed it until 1910

Basis of Award: Awarded to the senior in forestry having the highest scholastic average at the end of the fall quarter

HOMELITE FORESTRY SCHOLARSHIPS

Sponsor: Homelite, Division of Textron, Inc., Port Chester, New York

Basis of Award: Awarded to juniors or seniors in forestry on the basis of academic achievement, leadership, vocational promise, and character

General Information

EDWARD L. LAWSON MEMORIAL AWARD

Sponsor: Edward L. Lawson Memorial Fund

Basis of Award: Prizes will be awarded on the basis of essays submitted to the Scholarship Committee of the School of Forestry. The subject of the essays will be on Forest Career Opportunities with the Minnesota Division of Forestry

OSCAR L. MATHER SCHOLARSHIP

Sponsor: Minnesota Federation of Women's Clubs and Mrs. Oscar L. Mather, Madison Lake, Minnesota, in memory of her husband, a lumberman deeply interested in conservation

Basis of Award: Awarded to a student in forestry displaying outstanding scholarship, leadership, and character

CHARLES LATHROP PACK AWARDS IN FORESTRY

Sponsor: Charles Lathrop Pack Foundation

Basis of Award: Awarded to regularly enrolled undergraduate students writing the best essays of a popular nature on forestry or conservation subjects

HENRY SCHMITZ STUDENT LEADERSHIP AWARD

Sponsor: Dr. Stanley J. and Mertie W. Buckman, Memphis, Tennessee

Basis of Award: One or more awards to juniors or seniors on the basis of demonstrated leadership and acceptable scholarship

XI SIGMA PI SCHOLARSHIP RECOGNITION

Sponsor: Delta Chapter, Xi Sigma Pi

Basis of Award: The forestry freshman with the highest scholastic rating has his name engraved on a permanent honor roll in Green Hall. The sophomore, junior and senior with the highest scholastic average are each awarded a 1-year subscription to a technical or professional forestry journal.

SECTION 6

COURSES OFFERED BY OTHER DEPARTMENTS

Agricultural Journalism (AgJo)

53. **Publicity.** For students planning careers in agriculture, forestry, and home economics, or veterinary medicine, or some allied industry in which the cooperation of the press and radio will be needed. Covers mass media relationships, news and direct mail writing, radio and TV broadcasting, and preparation of visuals. (3 cr; prereq rhet comm req)
134. **Rural Communication Media and Media Behavior.** Mass media behavior in rural communities; theoretical approaches relevant to problems of rural mass media behavior; analysis of research aimed at adult education efforts through mass media. (3 cr; prereq 53, Psy 2, Soc 14, or #)
135. **Communications in International Agricultural Development.** For United States and foreign students. Analyzes United States and foreign rural communications as development tools. Develops ability to plan and execute communication programs in developing nations. (3 cr; prereq 53 or Jour 1 and Jour 14, or #)

Students with an interest in both forestry and journalism may wish to explore possibilities of strengthening their training in communication. The *Agriculture Bulletin* gives details for a major program in agricultural journalism which could be readily adapted to make it a forestry-journalism curriculum.

Biometrics (Biom)

40. **Introductory Statistics.** Statistical concepts, use, presentation and interpretation of data, elementary probability and introduction to testing procedures. (3 cr; prereq college algebra or #)
100. **Statistical Analysis I.** Statistical procedures in agricultural research; tests of significance, simple regression and correlation analyses, analysis of variance. (5 cr; prereq college algebra)
101. **Introduction to Statistical Analysis II.** (Continuation of Biom 100) Application of statistical methods to experimental research; multiple regression and correlation, covariance and extension of analysis of variance techniques. (5 cr; prereq 100 or equiv)
110. **Computers in Agricultural and Biological Research.** Impact of computers on research, FORTRAN programming, use of current libraries in processing statistical data, simulation techniques. (3 cr; prereq 101 or equiv)
171. **Sampling Techniques in Agriculture.** Simple random sampling, stratified random sampling, systematic sampling, cluster sampling; applications in agriculture and biology. (3 cr; prereq 101 or equiv)
181. **Experimental Design.** Principles of design in agricultural experimentation. Application, analysis, and interpretation of basic designs including factorials, incomplete blocks, change-over and long-time experiments. (3 cr; prereq 101)

Courses Offered by Other Departments

For Graduate Students Only

- 202. Advanced Experimental Methods
- 220. Special Problems in Biometrics

Entomology (Ent)

- 56 (3-050). **Forest Entomology.** Lectures and laboratory dealing with the principles of controlling insects that attack trees and forest products; life history and habits of important representative species. (4 cr; prereq Biol 2 or equiv)

Fisheries and Wildlife (FW)

- 50 (3-050). **Principles of Fisheries and Wildlife Management.** Introduction to fishery and wildlife population ecology; relations between fish and wildlife and their environments; management of fish and game populations and habitats; management and research methods; administration of fish and wildlife agencies. (3 cr, §151, §161; for non-FW majors; prereq Biol 2 or equiv, Biol 80 or For 54, or Ecol 50)
- 67 (3-167). **Techniques of Forest Wildlife Management.** Biology and management of important forest wildlife species; methods of evaluating forest wildlife populations and habitats. (2 cr; prereq 50; given at Cloquet)
- 178 (5-678). **Fisheries and Wildlife Administration.** Organization and function of federal and state agencies; laws and regulations; and internal policies concerning personnel, budgets and financing, research management, law enforcement, and public education. (4 cr; prereq 50, 152, 162, or §)

Plant Pathology (PIPa)

- 51 (3-050). **Forest Pathology.** Diseases of forest and shade trees; wood decay. Symptoms, etiology, epidemiology, and control. Lectures and laboratory. (4 cr; prereq 6 cr in botany or Biol 2)
- 102 (5-051). **Advanced Forest Pathology.** Student discussion of important concepts in forest pathology. (2 cr; prereq 51 or equiv)

Rhetoric (Rhet)

Professor

Ralph G. Nichols, Ph.D., *head*
James I. Brown, Ph.D.
Ronald M. Brown, Ph.D.
Paul H. Cashman, Ph.D.
Francis E. Drake, Ph.D.
Thomas E. Pearsall, Ph.D.
William A. Rosendahl, Ph.D.
Eugene S. Wright, Ph.D.

Associate Professor

William M. Marchand, Ph.D.
Edward B. Savage, Ph.D.

Assistant Professor

Richard O. Horberg, Ph.D.
Sarah E. McBride, Ph.D.
Starling W. Price, Ph.D.

Instructor

Loree A. Brock, M.A.
Warren Y. Gore, M.A.
Carolyn J. Sorensen, M.A.
John F. White, M.A.

Section 6

All students in the College of AFHE are required to take the following courses in rhetoric: Freshman Communication (9 cr); Public Speaking (Rhet 22); and Exposition (Rhet 51). Additional requirements as to number of credits and specific courses depend upon the particular curriculum for which the student is registered.

The Rhetoric Department also offers courses in humanities, literature, original and technical writing, speech, and dramatics. A number of these courses may be used to fulfill the distribution requirements in Categories I, III, and IV of the C.L.E. requirement.

- 1 (1-101). **Communication I.** Writing from observation and experience. Attention to grammar, sentence and paragraph construction, punctuation, spelling. Integrated assignments in reading, listening, and speaking. Progress tests. (3 cr)
- 1H (1-111). **Honors Course: Freshman Communication I.** Writing from observation and experience. Integrated projects in reading, listening, speaking. (3 cr; prereq upper 10% on ACT [English] or by invitation)
- 2 (1-102). **Communication II.** The expository paper. Note-taking, outlining. Short themes, library research, term paper, documentation. Integrated assignments in reading, listening, and speaking. (3 cr; prereq 1)
- 2H (1-112). **Honors Course: Freshman Communication II.** Writing from library research. Integrated projects in reading, listening, speaking. (3 cr; prereq upper 10% on ACT [English] or grade of A in Communication I or by invitation)
- 3 (1-103). **Communication III.** Persuasion. Preparation and analysis of written and oral materials. The character, sources, and proper use of evidence. Integrated assignments in reading, listening, and speaking. (3 cr; prereq 2)
- 3H (1-113). **Honors Course: Freshman Communication III.** Persuasive communication. Integrated projects in writing, reading, listening, and speaking. (3 cr; prereq upper 10% on ACT [English] or grade of A in Communication II or by invitation)
- 22 (1-222). **Public Speaking.** Practical course in fundamentals of speechmaking. Emphasis upon organizing the speech and projecting it to the audience. (3 cr; prereq rhet comm req or equiv)
- 25 (1-225). **Parliamentary Procedure.** Parliamentary procedure applied to group organization and management. Duties of officers and disposition of motions emphasized. Individual participation stressed through role playing and other workshop procedures. (1 cr)
- 26 (1-506). **Original Writing.** For students interested in creative writing: description, narration, feature articles, short stories. (3 cr; prereq rhet comm req)
- 31 (1-401). **Introduction to Literature.** Analysis of literary structural forms and stylistic devices: poetry, drama, and prose fiction. (3 cr; prereq rhet comm req)
- 32 (1-442). **Novel and Short Story.** Analysis of selected European and American fiction. Emphasis on literary style in relation to themes of prose fiction. (3 cr; prereq rhet comm req)
- 34 (1-451). **Introduction to Dramatic Literature.** Selected readings from Greek literature to the present. Emphasis upon the development of dramatic art form. (3 cr; prereq rhet comm req)
- 35 (1-421). **English Literature I.** Historical and stylistic development from the Anglo-Saxon period through the Renaissance. (3 cr; prereq rhet comm req)

Courses Offered by Other Departments

- 36 (1-422). **English Literature II.** Historical and stylistic development from the Puritans through the neoclassical period. (3 cr; prereq rhet comm req)
- 37 (1-423). **English Literature III.** Historical and stylistic development from the Romantics to the present. (3 cr; prereq rhet comm req)
- 41 (1-301). **Humanities: The Enlightenment.** An introduction to the humanities. The development of rationalism and humanism. Readings in Pope, Voltaire, Locke, Rousseau, Tolstoy. (3 cr)
- 41A (1-311). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 41. (1 cr; prereq 41 or ¶42)
- 42 (1-302). **Humanities: The Industrial Revolution.** The classical economists and the romantic response. Readings in the classical, utopian, and Marxian economists, the romantic poets, Zola, Dostoyevsky, and Mill. (3 cr; prereq 41)
- 42A (1-312). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 42. (1 cr; prereq 42 or ¶42)
- 43 (1-303). **Humanities: Age of Darwin.** The effect of evolution upon religion and morality of a changing society. Creativity in science and art. Readings in the evolutionists, Nietzsche, Shaw, and Thomas Mann. (3 cr; prereq 41)
- 43A (1-313). **Humanities Symposium.** Discussion and analysis of problems arising in connection with Rhet 43. (1 cr; prereq 43 or ¶43)
- 47 (1-147). **Efficient Reading.** Designed to increase reading rate, comprehension, and vocabulary. For persons of average or above-average reading ability who wish to achieve or maintain superior scholastic status. Not a remedial course. (3 cr; Arts College students see *College of Liberal Arts Bulletin*)
- 48 (1-251). **Effective Listening.** Designed to increase listening comprehension by developing three central abilities. Readings, research, theory, and practice. (3 cr)
- 51 (3-551). **Exposition.** Informative writing, semitechnical and technical; letter of application; feature article; preparation for professional writing; review of usage and style. (3 cr; required of all students unless exempted through dept exam; prereq jr)
- 52 (3-562). **Technical Writing.** Methods of exposition in technical writing; types of reports; continuous practice in report writing. Designed to enable students to meet later professional responsibilities. (3 cr; prereq 51)
- 54 (3-254). **Advanced Public Speaking.** Training for specific speech situations most likely to be encountered professionally soon after graduation. Psychology of communication especially as related to use of visual aids, demonstration, performance methods, and radio. (3 cr; prereq 22)
- 56 (3-266). **Discussion Methods.** Study of and practice in structured and unstructured discussion. Emphasis on group dynamics and the psychology of leadership. Practice in leading meetings, debating, planning radio programs, organizing in-service training programs, evaluating group progress. (3 cr; prereq rhet comm req)
- 61* (3-371). **Humanities: Individualism — An American Problem.** Examination and evaluation of conflicts arising from varied interpretations of individualistic

* * Students may take any combination of Rhet 61, 62, 63.

Section 6

- traditions in America. Readings in Emerson, Thoreau, Mark Twain, Frank Lloyd Wright, Herbert Hoover. (3 cr)
- 62** (3-372). **Humanities: Religion in American Thought and Experience.** Examination of the diverse values centered in American religious and philosophical thinking from the 17th century to the present. Readings in Jonathan Edwards, Emerson, Williams James, John Dewey, and others. (3 cr)
- 63** (3-373). **Humanities: Nationalism in American Thought and Experience.** Examination of the growth of political and cultural nationalism in America. Readings in Jefferson, Webster, Calhoun, Turner, Henry James, and John Dos Passos. (3 cr)
- 64 (3-374). **Special Problems in Humanities.** Primarily for supervised reading and research on problems not covered in regularly offered courses. (1-3 cr; prereq #)
- 71 (3-455). **Shakespeare.** Reading of selected plays from the early, middle, and late periods. Emphasis upon the understanding of Elizabethan dramatic art. (3 cr; prereq rhet comm req)
- 73 (3-471). **American Literature I.** Historical and stylistic development from early account of the new continent to the end of the 19th century. (3 cr; prereq rhet comm req)
- 74 (3-472). **American Literature II.** Historical and stylistic development since 1900. (3 cr; prereq rhet comm req)
- 91 (0-291). **American Speech for Foreign Students.** Primarily for graduate students who wish to improve their command of oral English. Individual attention; laboratory procedure. Audio-visual equipment used to expedite work in vocabulary, enunciation, and pronunciation. (No cr; 3 hrs per wk)
- 92 (3-192). **Communication Problems for Foreign Exchange Groups.** For any exchange group composed of members of similar national origins. English studied as a second language. (3 cr; prereq elementary knowledge of oral and written English)
- 141 (5-301). **Humanities Seminar: The Individual and Society.** Examination of contemporary ethical and cultural values as manifested in such conflicts as liberty and authority, freedom and organization, art and technology, science and religion. (3 cr; prereq 41, 42, 43 or #)
- 147 (5-147). **Adult Reading Programs.** Problems, methods, and research in this field. Survey and evaluation of program designs, including those suitable for TV. (2 cr)
- 151 (5-551). **Report and Thesis Writing.** For graduate students and for seniors anticipating graduate work. Organization of reports and theses; library investigation; presentation of data; methods of documentation. Emphasis upon revision of manuscripts and improvement in style of writing. (3 cr; prereq 51 or #)
- 169 (5-169). **Communication Problems and Processes.** An analysis of contemporary communication theories and research. Problems of language, perception, and status in the application of communication theory to professional activity and growth. (3 cr; prereq grad)

** Students may take any combination of Rhet 61, 62, 63.

Courses Offered by Other Departments

For Graduate Students Only

251 (8-251). Seminar: Listening Comprehension

Soil Science (Soil)

18. **Forest Soils.** Origin and classification of forest soils; factors of soil formation; forest soil organisms; forest floor; physical and chemical properties; soil water and erosion control; management of forest nursery soils. (3 cr, §19; prereq soph, GeCh 5)
- 18B. **Forest Soils Laboratory.** Laboratory study of selected physical, chemical, and microbiological properties of soil. (1 cr; prereq 18 or ¶18)

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ADDITIONAL INFORMATION

PUBLICATIONS

For additional information about the profession of forestry write the:

Society of American Foresters
425 Mills Building
704 — 17th Street N.W.
Washington, D.C. 20006

School of Forestry
University of Minnesota
St. Paul, Minnesota 55101

Forest Service
U.S. Department of Agriculture
Washington, D.C.

The American Forestry
Association
919 — 17th Street N.W.
Washington, D.C. 20006

For additional information about the School of Forestry write for its brochure.

For added information on the University, send for a *General Information Bulletin*, University of Minnesota, Minneapolis, Minnesota 55455.

MOTION PICTURES

Careers in Forestry (28-minute, color)

New Horizons in Wood (28-minute, color)

Interested groups or individuals may obtain these films from:

Visual Aids Department
Coffey Hall — University of Minnesota
St. Paul, Minnesota 55101
