

UNIVERSITY of  
MINNESOTA  
BULLETIN 1976  
1978

College of  
Forestry



UNIVERSITY OF MINNESOTA

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# College of Forestry

UNIVERSITY OF MINNESOTA

## **Curricular Programs of the College of Forestry**

### **FOREST RESOURCES CURRICULUM**

*with elective cores in . . .*

- Ecosystems and Silviculture
- Forest Management
- Management and Administration
- Measurements and Information Systems

### **FOREST SCIENCE CURRICULUM**

*with specializations in . . .*

- Natural Science
- Social Science

### **FOREST PRODUCTS CURRICULUM**

*with specializations in . . .*

- Marketing
- Production Management
- Pulp and Paper
- Residential Housing
- Wood Science and Technology

### **RECREATION RESOURCE MANAGEMENT CURRICULUM**

An Intercollegiate Program

## How To Use This Bulletin

This bulletin is the official source of information about the College of Forestry. The bulletin is organized as follows:

### I. Introduction

- The College
- Educational Objectives
- Human Rights

### II. General Academic Requirements

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All students and prospective students should also refer to the *General Information Bulletin*. Information on evening courses and summer school offerings is contained in the *Extension Classes Bulletin* and the *Summer Session Bulletin*, respectively. For information about alternative programs in related areas, consult the bulletins for the College of Agriculture, College of Biological Sciences, College of Business Administration, College of Liberal Arts, Graduate School, and Institute of Technology. Each of these bulletins is available in 130 Coffey Hall or may be obtained by writing to the Office of Admissions and Records, 130 Coffey Hall, University of Minnesota, St. Paul, Minnesota 55108.

The *Class Schedule*, published just before the registration period each quarter, gives the time and location of classes.

## FACILITIES OF THE COLLEGE



Green Hall

The College of Forestry, located on the St. Paul Campus of the University of Minnesota, consists of two buildings—Green Hall and the Kaufert Laboratory of Forest Products and Wood Science. Green Hall is the location of the Dean's Office, Office of Student Services, and Department of Forest Resources. The Department of Forest Products is located in the Kaufert Laboratory.

The college has established field centers for programs in education and research. Forest resources students spend one entire fall or spring quarter of upper division course work at the 3,700 acre Cloquet Forestry Center located at Cloquet, Minnesota. Forest resources 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. Also available for field laboratory work during the regular school year is the John H. Allison Forest which is located within 10 miles of the St. Paul Campus.



John H. Allison Forest



Kaufert Laboratory of Forest Products and Wood Science



Cloquet Forestry Center



Itasca Forestry and Biological Station

# College of Forestry

## I. INTRODUCTION

### The College

The University of Minnesota College of Forestry is an educational, research, and public service institution established for the benefit of the state's citizens. It has offered programs leading to degrees in forestry since 1903 and is recognized for its contributions to national and international forestry education. The college's most important role today and for the future is its unique opportunity to contribute to the educational and research dimensions of the total renewable natural resource systems. The college is concerned with producing well-educated graduates, relevant research findings and their applications, and an increasingly informed citizenry.

### Educational Objectives

The products and services from forests and foresters have been vital to people throughout history. Forests are becoming increasingly important. Strongly motivated, well-educated men and women are needed to provide wise and prudent management and development of forest resources to assure renewal while providing for the needs of people.

The educational objectives of the undergraduate programs of the College of Forestry are:

- to help students develop a basic understanding of the sciences, communications, mathematics, and man and society.
- to help students develop entry-level professional qualifications through specialized curricular offerings.
- to provide opportunity for a broad scope of professional alternatives through availability of elective cores and areas of specialization.
- to provide opportunity to those interested and capable of preparation for graduate study and careers in research and development, teaching, and extension work.

### Human Rights

The Board of Regents has committed itself and the University of Minnesota to the policy that there shall be no discrimination in the treatment of persons because of race, creed, color, sex, or national origin. This is a guiding policy in the admission of students in all colleges and in their academic pursuits. It is also to be a governing principle in University-owned and University-approved housing, in food services, student unions, extracurricular activities, and all other student and staff services. This policy must also be adhered to 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.

The University of Minnesota abides by the provisions of Title IX, federal legislation forbidding discrimination on the basis of sex, and abides by all other federal and state laws regarding equal opportunity.

## II. GENERAL ACADEMIC REQUIREMENTS

The College of Forestry offers professional education in a variety of areas in forestry, forest products, and related fields.

This section provides background material on the degrees offered, admission requirements, registration and class attendance, grading system, academic requirements, classification of students, and liberal education requirements for programs in the college.

For more detailed information about general academic requirements, contact the Office of Student Services, College of Forestry, 10 Green Hall, University of Minnesota, St. Paul, Minnesota 55108, (612) 373-0842.

### Degrees Offered

The bachelor of science (B.S.) degree is awarded to students completing the requirements of the undergraduate curricula offered in the College of Forestry.

**Requirements for the Bachelor's Degree in Forestry**—Candidates will be recommended for graduation upon completion of:

1. Required and elective courses prescribed in the curriculum to meet the 192-credit total.
2. All of the requirements with a GPA of 2.00. A student may graduate with a maximum of 5 credits of D in required forestry courses and 5 credits of D in other required courses.
3. Requirements for all students as noted (see page 15).
4. Residence and other general University requirements for graduation (see the *General Information Bulletin*).

**Graduation With Honors**—Students may earn undergraduate degrees with the honors "with distinction" or "with high distinction."

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 any curriculum, you will satisfy the 2-year residence requirement. Recommendations to the faculty for award of 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 conditions for residence and recommendation apply as for the degree with distinction.

If you should fail to meet in full the requirements stated above, your case will be referred to the Student Scholastic Standing Committee chairperson in 10 Green Hall for individual consideration.

## Admission Requirements

To be admitted to the College of Forestry you must first apply through the Office of Admissions and Records, 130 Coffey Hall, University of Minnesota, St. Paul, Minnesota 55108. Listed below are requirements for admission to the College of 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 who present satisfactory ACT or PSAT scores and have taken the required high school courses, including 3 years of mathematics, will be considered for admission. Admission decisions are based on a combination of high school rank percentile and test scores.

For those taking the ACT, the total of the high school rank percentile plus two times the ACT composite standard score must equal 85 or more. For applicants who have taken the PSAT, the total of the high school rank percentile plus the PSAT verbal standard score plus the PSAT mathematics standard score must equal at least 125.

High school courses required for admission to the College of Forestry are as follows:

- 3 units in English
- 1 unit in elementary algebra
- 1 unit in plane geometry
- 1 unit in higher algebra or equivalent courses
- 1 unit in natural science

**Non-High School Graduates**—Write the Office of Admissions and Records, 130 Coffey Hall, University of Minnesota, St. Paul, Minnesota 55108, for information about entering the University by examination. Also, consult the *General Information Bulletin*.

**Adult Special Students**—You may be admitted as an adult special student if you wish to register for particular courses to meet special needs rather than to pursue a degree. Normally adult special students are 24 years of age or older or already hold a Bachelor's degree.

Students who enter the College of Forestry as an adult special with the intention of transferring later to the Graduate School should be aware that they may petition to transfer to their graduate record only the credits earned in their first academic quarter or summer session (2 terms) as an adult or summer special student. Such work must be of graduate caliber and must be taught by a member of the graduate faculty. If the petition is approved, a student will be granted both residence and credit on the graduate record.

**Admission With Advanced Standing**—Credits earned at other accredited colleges and universities and in other colleges of the University of Minnesota that are appropriate for a student's course of study can be transferred to the College of Forestry. Transfer credits are evaluated by the Office of Admissions and Records and are designated as either required or elective credit. A transfer 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 of lower division forestry courses are not comparable to professional courses offered in the junior and senior years; i.e., courses numbered 3000 or over. You will be expected to complete in residence all required courses and all area requirements regardless of the number of excess elective credits you may have. If you have any questions about the use of transfer credits, go to the Office of Student Services, 10 Green Hall. If necessary, you

## General Academic Requirements

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will be referred to the Student Scholastic Standing Committee, which makes final decisions on evaluating transfer credits in terms of requirements of this college and its various curricula.

It is important in transferring to the College of Forestry to have planned your earlier programs carefully so that your credits may apply with the greatest efficiency to the particular curriculum you desire to enter. If you are beginning your work at an institution other than the College of Forestry and plan to transfer at a later date, see the program descriptions and curricular requirements in Section III of this bulletin. Pay special attention to the requirements for the freshman and sophomore years. Your college adviser will help you select courses that will meet specific curricular requirements. For further help contact the Office of Student Services.

**Transfer of Credit From Continuing Education and Extension**—Transfer to your permanent record of credits and grades for courses taken through the programs of Continuing Education and Extension of the University of Minnesota may be accomplished by submitting a petition requesting such action to the College of Forestry Student Scholastic Standing Committee located in the Office of Student Services, 10 Green Hall.

## Preforestry and Upper Division Classification

Students in lower division are classified as preforestry students. They attain upper division status in the various curricula of the College of Forestry upon completion of the following requirements.

*Forest Resources Curriculum*—Completion of the Itasca Forestry Session (see below).

*Forest Science Curriculum*—Completion of the Itasca Forestry Session (see below).

*Forest Products Curriculum*—Completion of all course requirements for the freshman and sophomore years.

*Recreation Resource Management Curriculum*—Completion of all course requirements for the freshman and sophomore years.

## Itasca Forestry Session

The Lake Itasca Forestry and Biological Station 3½-week summer session for foresters is required of all forest resources and forest science majors. This session must be completed between the sophomore and junior years. Students will be eligible to attend the Itasca Forestry Session if they have a minimum grade point average of 2.00 and have completed 80-90 credits, including the following preforestry courses:

- Rhet 1101—Communications I (4)
- Rhet 1102—Communications II (4)
- Math 1111—College Algebra and Analytical Geometry (5)
- Math 1142—Introduction to Calculus (5)
  - (or) Math 1211—Analysis I (5)
- Biol 1011—General Biology (5)
  - (or) EBB 3004—Fundamentals of Ecology (4)
- Biol 1103—General Botany (5)
- Chem 1004—General Principles (5)
- Chem 1005—General Principles (5)

## Registration and Class Attendance

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- Geo 1001—Physical Geology (5)\*\*
- Phys 1031—General Physics (5)
- Rhet 1222—Public Speaking (4)
- AgEc 1020—Principles of Macroeconomics (5)
- AgEc 1030—Principles of Microeconomics (4)
- CSci 3104—Introduction to Programming, Problem Solving (4)
- Stat 1051—Introduction to Ideas of Statistics (4)
  - (or) Stat 3081—Experimental Techniques, Statistical Inference (5)
- Soc 1001—Introduction to Sociology (4)
  - (or) Psy 1001—General Psychology (5)
  - (or) Anth 1002—Introduction to Anthropology (5)
  - (or) Geog 1302—Human Geography (4)

Students may not have more than 5 credits of D grades in their lower division required courses to qualify for attendance at the Itasca Forestry Session.

A 125 student maximum for the Itasca Forestry Session was established by the Lake Itasca Forestry and Biological Station Advisory Committee and the Department of Natural Resources. This controlled enrollment policy is based on the concern that a larger number of students and teaching personnel could be harmful to the ecology of the area. If there are more eligible students than the 125 that can be accommodated, selection will be based upon criteria for judging probability of success in completion of this program. It will be the *responsibility of the student* to supply the College of Forestry with a complete transcript of all academic work completed. All applications must be received by *July 1* of the year in which you plan to attend Itasca.

## Registration and Class Attendance

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

**Working With Your Faculty Adviser**—Upon entry into the college, you are assigned a faculty adviser on the basis of the curriculum you have chosen. Your adviser explains the curriculum, offers guidance in planning your program each quarter, and is concerned about your general progress. However, since the consequences of poor program planning are borne by the student and not the adviser, program planning in actuality is the responsibility of the student. 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*.

It is your responsibility to know and meet all requirements prescribed for graduation in the curriculum you select and, where applicable, for the elective core of specialization.

**Credit Load**—The normal load of work for each quarter is 14 to 18 credit hours. A credit hour requires an average of 3 hours of work per week. These hours 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. The quarterly credit load of students in the College of Forestry may vary according to the individual's ability or circumstance. To carry more than 21 hours of credit, you must have a B average in work of the previous quarter and must secure permission from the Student Scholastic Standing Committee.

\*\*Students transferring from colleges not offering Geo 1001 may attend the Itasca Forestry Session but must complete this course as a requirement for graduation.

## General Academic Requirements

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**Electives**—Consult your adviser about choosing electives. College of Forestry students may, upon approval of their adviser and the Student Scholastic Standing Committee, omit electives from the courses offered for graduation. These electives, in amounts not to exceed 10 credits, may be withheld from the list of courses applied toward a degree to raise the grade point average only in instances relating to securing junior classification or meeting the graduation requirement of a 2.00 grade point average. After a course has been withheld from the undergraduate record it may not be reinstated except by special examination or by repeating the course.

**Limitations on Use of Elective Credit**—Students in forestry are not required to take courses in physical education. No more than 9 credits in physical education may be counted toward a degree.

A maximum of 9 credits in music may be applied as elective credits toward a degree, with not more than 6 of these in Mus 1430 or in Concert Band.

**Quality Credits**—The number of free elective credits required for graduation may be decreased by 1 for every 5 grade points in excess of those required to reach an average of 3.00. Free electives are those you may choose without regard to curricular or all-college requirements. No 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 is based on courses taken in high school, the quality of this work, and results on the mathematics sections of the American College Testing (ACT) and the Preliminary Scholastic Aptitude Test (PSAT) scores. A refresher course at extra cost is required of students whose background in elementary and higher algebra proves insufficient for them to move into advanced courses.

In those programs requiring trigonometry, students with acceptable performance in high school trigonometry need not take Math 1008, Trigonometry, at the college level.

**Junior-Senior Advising Procedure**—Eligible junior and senior students in the College of Forestry may sign their own registration materials. Juniors and seniors in the forest resources and forest science curricula must complete the Itasca Forestry Session before earning this privilege. To be eligible in the forest products curriculum students must be in the upper division (completed 90 credits, 2.00 GPA, freshman communication, and all lower division courses). Recreation resource management students, *regardless of class standing*, must have their adviser sign their registration material.

**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 fees charged for regular membership in the class. The student does not take the final examination and does not earn a grade or credit for the course.

**Changes in Registration**—To change your registration you must obtain a change of registration form from the Office of Student Services, 10 Green Hall. Changes should be made only when necessary or highly desirable and should be made as early in a quarter as possible.

During the first 6 weeks of a quarter you may cancel a course without grade with only your adviser's approval. After the sixth calendar week you must have the approval of your adviser, the instructor, and the Student Scholastic Standing Committee. However, withdrawal from a course after the sixth week is strongly discouraged unless extenuating circumstances exist. *Cancellations during the last 2 weeks before the quarterly final examination period are seldom approved.* In such

## *Registration and Class Attendance*

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cases the instructor must indicate your grade at the time of cancellation. If the grade is passing, you may be permitted to cancel with W (withdrawal) on your report, or without grade. If it is failing, an N (no credit) will be recorded.

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 prorated 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**—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. Such examinations may be taken during the first quarter in residence without fee; after that time a fee of \$20 is required for each test attempted. 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.

**Extra Credit and Independent Study Registration**—Often students prefer to study some courses on their own rather than through the usual means of class participation and directed instruction. Opportunity to study in this way has long been available to College of Forestry students through the credit by examination procedure (or by other methods of evaluation) in almost any course in the college, after studying the material in whatever way they wish.

**Extra-Credit Registration**—Students may register for 1 to 3 extra credits in conjunction with a course they are taking with approval of their instructor. Students work independently, meeting such evaluative standards as the instructor sets. This provides the opportunity for more intensive study of a topic. Such registrations should not be used when the department offers a regular course which has the same objective. The usual regulations concerning fees, grades, and cancellations apply to extra credit registration.

Students should bring an Extra-Credit Special Permission Slip, approved by their instructor, to the Office of Admissions and Records. The registration card should show the course number followed by a capital "X" (example: ForP 1301X). Such registrations are not reserved.

**Independent Study Registration**—Under independent study students may take a course without attending class.

Registration for independent study work counts as part of the regular credit load, and regular fees are charged. Students must take the final examination at the regular time (or at a time directed by the instructor) and must meet prescribed deadlines for any other work required. The usual regulations about grades, incompletes, and cancellations apply.

Permission to register for independent study must be obtained from the instructor. Students should bring an Independent Study Special Permission Slip to the Office of Admissions and Records, 130 Coffey Hall, so that their registration can be checked. The registration card should show the course number followed by a capital "Y" (example: ForP 1301Y).

**Repeating Courses**—College of Forestry students may repeat courses in which they have received passing grades. Students who have grade point deficiencies may find repeating courses in which they received a D grade advantageous, because the grade and credit for the previous experience are deleted for purposes of calculating the present grade point average and the grade and credit received upon completion of the course the second time become the permanent record for that course.

## General Academic Requirements

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**Class Attendance**—On the St. Paul Campus attendance is compulsory for certain classes (dependent upon the instructor), 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 the instructor may properly wish to do so.

The following situations will be accepted by instructors to 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 the student was engaged in such activities is made by the Office of Student Affairs).

If you wish to make up work, you should confer directly with the instructor about the justifiable reasons 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.

## Grading System

Academic progress in the College of Forestry may be evaluated by one of two grading systems, the letter grade system (A-N) or the satisfactory-no credit (S-N) system. Required courses must be taken under the A-N system. Nonrequired courses, unless specifically prohibited, may be taken under the A-N or S-N system.

### GRADES

- A—Achievement that is outstanding relative to the level necessary to meet course requirements.
- B—Achievement significantly above the level necessary to meet course requirements.
- C—Achievement that meets the basic course requirements in every respect.
- D—Achievement worthy of credit even though it does not fully meet the basic course requirements in every respect.
- S—Achievement satisfactory to the instructor, for the program in which the student is registered. This definition is intended to imply that the standards for S may vary from one program to another.
- N—Assigned when the student does not earn an S or a D or higher and is not assigned an I. It stands for no credit.

### SUPPLEMENTARY SYMBOLS

- V—Registration as an auditor or visitor, a noncredit, nongrade registration.
- T—Posted as a preceding supplement to the original grade to indicate credits transferred from another institution or from one college or campus to another within the University when reevaluation is required.
- W—Indicates official cancellation from a course without grade. This is assigned in all cases of official cancellation during the first 6 weeks of classes irrespective of the student's standing. After 6 weeks, W is posted only if the student is not failing at

the time of official cancellation. The student's adviser and the Student Scholastic Standing Committee determine whether or not cancellation is permitted.

I—Assigned by an instructor to indicate an incomplete, in accordance with provisions announced in class at the beginning of the quarter, when in the instructor's opinion there is a reasonable expectation that the student can complete successfully the work of the course. An I that is not made up by the end of the student's next quarter of residence becomes an N; instructors may set dates within the quarter for makeup examinations. When an I is changed to a grade, the I is removed from the record.

X—Reported in a continuation course for which a grade cannot be determined until the full sequence of quarters is completed. The instructor submits a grade for each X when the student has completed the sequence.

### S-N SYSTEM

The S-N system is designed to reduce to some extent the pressure associated with the traditional grading system and to encourage students to seek greater breadth in the educational experience.

Under the S-N system the grade S stands for "satisfactory" and N for "no credit." S represents achievement that is satisfactory to the instructor for the program in which the student is registered. This definition is intended to imply that the standards for S may vary from one program to another. The instructor is obligated to define to a class in its early meetings, as explicitly as possible, the performance that will be necessary to earn the S. The symbol N is assigned when the student does not earn an S.

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

1. All courses available to undergraduate students (those numbered under 8000) are available on the S-N and the A-N basis except where specifically restricted by the department offering the course (consult course listings in this bulletin).
2. A baccalaureate candidate from the college may present a maximum of 25 percent of the residence credits offered for the degree in courses in which he or she received a grade of S.
3. The S-N system is available to every student of the college irrespective of academic standing.
4. S-N registration must be declared at the time of registration and may not be changed after the opening day of the third week of classes.
5. Required courses must be taken under the A-N system. Prerequisites for required courses and courses in the major must also be taken under the A-N system, unless exceptions are made.

A student's adviser or the Office of the Director of Student Services, 10 Green Hall, will answer questions about use of the S-N system.

**Choice of Grading System**—Choice of grading system for each course is made at the time of registration by entering the credits under the appropriate heading on the registration card. Subsequent changes from one option to another require a regular cancel-add form and may be made only through the second week of classes.

**Instructors' Definition of Standards**—Instructors may set different requirements and methods of appraisal for the different grading options. The circumstances under which I's may be assigned are also at the option of the instructor.

## **General Academic Requirements**

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In connection with all achievement symbols, but especially in connection with S, Twin Cities Campus Assembly legislation directs that instructors define to a class in its early meetings, as explicitly as possible, the performance that will be necessary to earn each grade.

You should ask for this information if it is not given.

### **Academic Requirements**

**Student Scholastic Standing Committee**—Almost every forestry student on occasion makes use of the Student Scholastic Standing Committee of the college. This is a faculty committee 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 regulations is maintained. If you have any questions concerning the interpretation of faculty regulations, you should consult with your advisor or inquire at the Office of Student Services. By means of a petition (forms are available in the Office of Student Services), you may request adjustment in your program where departure from normal procedure appears to be justified. These requests, after they have been approved by your advisor, are returned to the Office of Student Services, 10 Green Hall.

**Satisfactory Progress**—Students in the College of Forestry are expected to make satisfactory progress in the curriculum they have selected. The cases of students who do not meet this standard are considered by the Student Scholastic Standing Committee. It is always best for students to see their class instructor or their faculty advisor as soon as they feel they are in difficulty, rather than wait until they have already received a poor grade.

Student Scholastic Standing Committee policy relative to probation and discontinuation categories is presented below.

### **PROBATION**

**Freshman**—Students will be placed on probation at the end of 2 quarters or earlier if their GPA is below 1.90.

**Sophomores**—Students will be placed on probation at the end of 5 quarters or earlier if their GPA is below 2.00.

### **DISCONTINUATION POLICY**

**Freshman**—Students will be suspended at the end of 2 quarters or earlier if their GPA is below 1.60.

**Sophomores**—Students will be suspended at the end of 5 quarters or earlier if their GPA is below 1.90.

### **“DELAYED” SOPHOMORE STATUS**

Students who enter the College of Forestry at the upper division level and during the first quarter have a GPA of 1.90 or less will be placed in the “Delayed” Sophomore category and will not be allowed to take 5000-level courses.

Other students in the upper division who drop below 1.90 GPA will be placed in the “Delayed” Sophomore category and will not be allowed to take 5000-level courses.

## **Council on Liberal Education (CLE) Requirements**

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Students who complete less than 36 credits per year will be subject to committee clearance and must make an appointment to see the Student Scholastic Standing Committee chairperson before continuing in their classes the next quarter.

### **Classification of Students**

**Sophomore**—If you are within 18 credits of the number usually earned in your curriculum for the first year and have completed 3 quarters of college work, you are classified as a sophomore. The 3 quarters may include time spent at another collegiate institution. A sophomore who lacks no more than 12 credits from the total required for junior classification and who has a B average may be permitted to register for courses in the 5000 group. Students who have not attained junior classification and who have less than a C average are not permitted to register for courses numbered 5000 or above for which graduate credit is given.

**Junior**—You must have completed a total of 90 credits with a grade point average of at least 2.00 and the rhetoric communication requirement for junior classification.

**Senior**—To be classified as a senior, you must be no more than 9 credits short of the number required for the first 3 years in your curriculum (refer to Section III).

**Transfer Students**—If you transfer from a college outside the University and enter this college, you must have a grade point average of not less than 2.00. Nonresident students should contact the Office of Admissions and Records, University of Minnesota, St. Paul, Minnesota 55108.

### **Council on Liberal Education (CLE) Requirements**

In addition to the specific requirements for each curriculum, the University of Minnesota believes that all of its students, whatever their area of specialization or vocational goals, should have a broad liberal education. A liberal education can help students improve their communication skills and knowledge; give them a better understanding of the ways in which scientists contribute to their knowledge of themselves and their environment; allow them a greater historical and philosophic perspective on the nature of their own lives and the world in which they live; and permit them to better appreciate the cultural benefits derived from the study of literature and the arts.

Rapid and dynamic changes and innovations are occurring in all professions. Only those persons with wide horizons and with sensitivity will be able to make the wise value judgments and adjustments required by these changes. The college believes that liberal education goals can be encouraged and pursued concurrently with the development of technical professional competence in the student's speciality.

To help students achieve the goals of liberal education, the College of Forestry expects all students to distribute a part of their course work in each of the four categories listed below.

#### **I. Communication, Language, Symbolic Systems (26 credits)**

- A. English and Foreign Language Communication Skills
- B. Linguistics, Rhetoric, Logic, and Philosophic Analysis
- C. Mathematics

## General Academic Requirements

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### II. The Physical and Biological Sciences (25 credits)

- A. The Physical Universe
- B. The Biological Universe

### III. Man and Society (8-10 credits)

- A. Analysis of Human Behavior and Institutions
- B. Development of Civilization: Historical and Philosophical Studies

### IV. Artistic Expression (8-10 credits)

- A. Literature
- B. The Arts

In category I, students will be expected to take a minimum of 8 credits of freshman communication. Transfer students from other colleges with less than 8 credits in freshman communication or the equivalent will be placed in Communication I or II, depending upon their needs as revealed by the diagnostic testing program.

No more than 6 credits in any one discipline (e.g., economics, psychology, etc.) may be counted toward the category III requirements.

## SUGGESTED COURSES TO MEET CLE REQUIREMENTS

This is but a partial list of courses that may be used to fulfill distribution requirements. It is intended merely as a guide for the student. If you are in doubt about the use of a specific course, call the Office of Student Services, 373-0842.

### I. Communication, Language, Symbolic Systems—26 credits

- A. English and Foreign Language Communication Skills
  - Comm 1001-1002
  - Comp 1001-1002, 1027
  - Rhet 1101-1102, 1222, 1506, 3254, 3257, 3266, 3551, 3562
  - Spch 1101, 3605
- B. Linguistics, Logic, and Philosophic Analysis
  - Clas 1048, 3048
  - Ling 1001, 3001
  - Phil 1001-1002, 5201
- C. Mathematics
  - Math—all courses through 1511
  - Stat 1051, 3091, 5021

### II. The Physical and Biological Sciences—25 credits

- A. The Physical Universe
  - Ast 1011, 3051
  - BioC 1301-1302
  - Chem 1001-1002
  - Chem 1004-1005, 1006
  - Geo 1001, 1002, 1111
  - NSci 1004, 1005, 1006
  - Phys 1031, 1032
  - Soil 1122, 1262
- B. The Biological Universe
  - Biol 1011, 1103, 1104, 1106
  - Bot 1009, 1012
  - EBB 3004

## *Council on Liberal Education (CLE) Requirements*

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Ent 1005  
GCB 3022  
MicB 3102 or VB 3103  
Phsl 1002  
Zool 1013

### III. Man and Society—8-10 credits

#### A. Analysis of Human Behavior and Institutions

Afro 1025, 3055, 3061-3062, 3072, 3075-3076, 3091-3092, 3098, 5401  
AgEc 1020, 1030  
AmIn 3061, 5121  
Anth 1002  
Econ 1001-1002, 1004-1005, 3001-3002  
FSoS 1001, 1025  
FR 1201  
Geog 1301, 1311, 1401  
Jour 1003, 3021  
Pol 1001, 1025, 1026, 1027, 1031, 1051  
Psy 1001, 1004-1005, 3031  
Rhet 3250, 5165  
Soc 1001, 1002, 3101  
Spch 1103, 3401  
SSci 1111, 3111, 3205, 3304, 3402, 3507, 3601, 3981

#### B. Development of Civilization: Historical and Philosophical Studies

Afro 1015, 1025, 1036, 1441, 1442, 3081-3082  
AmIn 1101, 1102  
Clas 1001, 1002, 1003, 1004, 1005, 1006, 1042, 3071, 3072, 3073  
Hist—all courses through 1954  
Indc 1504, 1506  
Jour 5601  
Languages (Civilization and Culture)—Fren 3501-3502, Ital 3501-3502,  
Span 3501-3502, Russ 3501-3502-3503  
Phil 1002, 3001, 3002, 3003, 3004  
Pol 1041

### IV. Artistic Expression—8-10 credits

#### A. Literature

AmSt 1101, 1102, 1103  
Engl—all literature courses  
Foreign languages—all literature courses  
Hum—all courses  
Rhet—all literature courses, all humanities courses

#### B. The Arts

Afro 1301, 3105, 3301  
AmIn 5211, 5212  
Arch 1001, 1002, 1003  
ArtH 1001, 1008, 1015, 1016, 3009, 3011  
ArtS 1101, 1102, 1301, 1701, 1801  
Dsgn 1501, 1521, 5505  
Mus 1021—all courses above 1024  
Th 1101, 1321, 1326, 1504

**Rhetoric Communication Requirement**—Before you graduate from the College of Forestry, you must demonstrate proficiency in public speaking and in written

## **General Academic Requirements**

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composition. Rhet 1222 (Public Speaking) and Rhet 3551 (Professional Writing) or Rhet 3562 (Scientific and Technical Writing) must be taken by all students. Each course is offered for 4 credits. Most students register for Rhet 1222 (Public Speaking) as sophomores and complete Rhet 3551 or Rhet 3562 in their junior or senior year. Students with above average competence in communication skills may take exemption examination for Rhet 3551 and Rhet 3562. 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 3551 or 3562 requirement.

**Reserve Officers' Training Corps**—The ROTC through its three services—the Army, Navy, and Air Force—gives college 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 programs leading toward degrees, are United States citizens, and meet physical and other qualifications. The general requirements of the three services and their special characteristics are described in the *Army-Navy-Air 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.

### **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:

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 5000 or above) for graduate credit, with the prohibition that such courses are 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 College of Forestry 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.

If you lack no more than 9 credits from the total required for graduation, you may register in the Graduate School.

# III. PROGRAMS AND CURRICULA

## UNDERGRADUATE PROGRAMS IN FORESTRY

Forestry courses were offered 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 College of Forestry had its formal beginning. Since that time more than 3,000 foresters have earned undergraduate and graduate degrees.

The bachelor of science degree is granted upon completion of 192 credits of required and elective courses in the following curricula or majors:

### 1. Forest Resources Curriculum

*with elective cores in . . .*

- Ecosystems and Silviculture
- Forest Management
- Management and Administration
- Measurements and Information Systems

### 2. Forest Science Curriculum

*with specializations in . . .*

- Natural Science
- Social Science

### 3. Forest Products Curriculum

*with specializations in . . .*

- Marketing
- Production Management
- Pulp and Paper
- Residential Housing
- Wood Science and Technology

### 4. Recreation Resource Management

The College of Forestry is fully accredited by the Society of American Foresters, the national accrediting agency for United States forestry schools.

## Facilities

The College of Forestry's facilities for training in the fields of forest resources and forest products are located in St. Paul. They consist of two modern buildings, Green Hall and the Kaufert Laboratory of Forest Products and Wood Science. The college draws on many departments from both the St. Paul and Minneapolis Campuses for instruction in courses basic to the training of foresters and forest products specialists. Located next to Green Hall and the Kaufert Laboratory is the regional headquarters building of the North Central Forest Experiment Station of the U.S. Forest Service.

The following field laboratories are also used:

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 is concentrated at the Itasca Forestry and Biological Station and Cloquet Forestry Center.

## **Programs and Curricula**

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The *Lake Itasca Forestry and Biological Station* is located on Lake Itasca, the source of the Mississippi River in Itasca State Park. It provides a varied field laboratory experience for forest resources and forest science majors. Here, in a 3½-week summer term starting the last week in 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 at the station.

The *Cloquet Forestry Center* is located near the forest products manufacturing center of Cloquet in northeastern Minnesota. This center, comprises a tract of over 3,700 acres of virgin and second-growth timber, serves as a site for undergraduate, graduate, and continuing education. Forest resources students complete 18 credits of field-oriented instruction during spring quarter of the junior year or fall quarter of the senior year. Emphasis is placed on application of concepts and knowledge acquired in their course work to contemporary forestry management decisions and systems. Specific instruction in forest resource inventory and analysis, silviculture, engineering and harvesting, soil site productivity, and management is provided. Students visit local industries and interact with nearby state and federal forestry agencies. The center has housing, dining hall, classroom, laboratory, and library facilities available.

For students interested in work in the forest products industries or in public research organizations the *Kaufert Laboratory of Forest Products and Wood Science* has available many well-equipped laboratories in such areas as paper and fiber products, particleboard, wood chemistry, mechanical testing, biodeterioration, drying, and wood preservation. Local millwork and furniture plants, pulp and paper mills, building products marketing and sales group, and wood preservation companies provide added opportunity for training students in the major areas of utilization of wood fiber.

## **Work of Foresters**

The work of foresters is diverse. Forest resources graduates are concerned primarily with the scientific management of the forest, wildlife, recreation, range, and water resources on approximately one-third of the land area of the United States that is classified as forest land. Until recently public forest land-management agencies—federal, state, county, and municipal—employed most of the graduates in these fields. 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 specialized utilization fields of the forest products curriculum—marketing, production management, pulp and paper, residential housing, and wood science and technology—may find employment in the development, production, and marketing of forest products.

Brochures and leaflets describing employment opportunities for graduates of College of Forestry curricula are available in the Office of Student Services, 10 Green Hall.

## **General Information**

The first two years of work in all forestry curricula are devoted primarily to basic courses such as physics, chemistry, biology, mathematics, rhetoric, and

economics. Students also take elective courses as well as courses to satisfy category III (Man and Society) and category IV (Artistic Expression) of the Council on Liberal Education requirements (see pages 16-17). 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 term at the Lake Itasca Forestry and Biological Station at Itasca State Park is required of all forest resources and forest science majors, including transfer students. This requirement must be completed just prior to the junior year.

Forest resources students spend the spring quarter of their junior year or the fall quarter of their senior year at the Cloquet Forestry Center.

The growing complexity of the duties performed by foresters in the management of natural resources, which affect 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 (CLE) requirements.

Students registered in preforestry curricula at state universities, state community colleges, and private colleges should complete the basic course requirements included in the College of Forestry curricula if they are to receive full credit for transfer of 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 College of Forestry in 2 years.

Students are encouraged to obtain practical work experience in forestry or forest products industries during summer vacations. Although work experience is not required for graduation, the possession of such experience is an excellent recommendation when seeking employment. The College of Forestry assists students in obtaining summer employment with federal agencies such as the United States Forest Service, various state agencies, and private companies. The college operates a career opportunities program for graduates of its several curricula.

## Curricula and Requirements

Work leading to the bachelor of science degree, upon completion of 4 years of satisfactory work, is offered in the following curricula:

**Forest Resources**—This curriculum is designed to prepare students for professional management of forest lands. Forests occupy approximately one-third of the land area of the United States and provide wood fiber, wildlife, recreation, water, and grazing for the use and enjoyment of its citizens. Forest resources majors must select one of four elective cores: ecosystems and silviculture, forest management, management and administration, and measurement and information systems. These elective cores provide students an opportunity to strengthen their understanding of forestry in a specific area of interest; i.e., quantitative analysis, biology, administration and management, or a range of forest uses. Further information about the elective cores is available in the Office of Student Services, 10 Green Hall.

**Forest Science**—This curriculum provides an opportunity for preparation for graduate training directed toward research with a public or private organization, an academic position with a college or university, or other positions requiring advanced professional training. Students may elect either a natural or social science specialization in this curriculum.

**Forest Products**—This curriculum is designed to train students for a broad range of careers in the forest products industries. A selection of courses oriented toward specific professional objectives is available in the specialized programs.

## ***Programs and Curricula***

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**Recreation Resource Management**—This curriculum is designed to train recreation specialists for the broad area of recreation resource planning and management involving land and water areas in the expanding country, regional, state, and federal recreation programs. Students who complete this program may elect graduate study in more specialized training areas.

A detailed listing of requirements for these four curricula is found on the following pages.

### **Fees for Field Training Sessions**

The following fees and expenses are charged for the field training sessions at Cloquet and Itasca. These fees are subject to change.

#### **Cloquet Session (fall or spring quarter):**

##### **Tuition**

Minnesota residents and those with reciprocity . . . . . \$228.00  
Nonresidents . . . . . 690.00

Health fee . . . . . 24.50

In addition, a nominal charge will be made to each student for use of the dormitories.

**Itasca Forestry Session** (to be completed between the sophomore and junior years: starts in August and runs for 3½ weeks):

##### **Tuition**

Minnesota residents and those with reciprocity . . . . . \$ 84.00  
Nonresidents . . . . . 84.00

Students Services Fees . . . . . 9.80

In addition, a nominal charge is 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**

### **Forest Resources**

This curriculum provides a sequence of courses designed to prepare individuals for the scientific management of forest lands. Majors in this curriculum must elect one of four elective cores: ecosystems and silviculture, forest management, management and administration, or measurement and information systems. Courses included in the elective cores allow the student to gain additional knowledge and proficiency in a specialized area of study.

### **PREFORESTRY CORE**

#### **FRESHMAN YEAR**

Biol 1011—General Biology (5)  
(or) EBB 3004—Fundamentals of Ecology (4)

Biol 1103—General Botany (5)  
Chem 1004—General Principles (5)  
Chem 1005—General Principles (5)  
Geo 1001—Physical Geology (5)  
Math 1111—College Algebra and Analytical Geometry (5)  
Math 1142—Introduction to Calculus (5)  
(or) Math 1211—Analysis I (5)  
Phys 1031—General Physics (5)  
Rhet 1101—Communication I (4) (or pass English proficiency examination)  
Rhet 1102—Communication II (4) (or pass English proficiency examination)  
Students with a grade of C or better in high school mechanical drawing are exempt from AgEn 1010, Technical Drawing; others must take AgEn 1010  
Students with a grade of C or better in high school trigonometry are exempt from Math 1008, Trigonometry; others must take Math 1008  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (48)

### **SOPHOMORE YEAR**

AgEc 1020—Principles of Macroeconomics (5)  
AgEc 1030—Principles of Microeconomics (4)  
CSci 3104—Introduction to Programming, Problem Solving (4)  
ForP 1301—Wood As A Raw Material (4)  
Rhet 1222—Public Speaking (4)  
Soc 1001—Introduction to Sociology (4)  
(or) Psy 1001—General Psychology (5)  
(or) Anth 1002—Introduction to Anthropology (5)  
(or) Geog 1302—Human Geography (4)  
Stat 1051—Introduction to Ideas of Statistics (4)  
(or) Stat 3081—Experimental Techniques, Statistical Inference (5)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
FR 1100—Dendrology (4) and AgEn 1400—Surveying should be taken as sophomores if recommended by the adviser  
Total Required Credits (31)

### **ITASCA FIELD SESSION**

The Lake Itasca Forestry and Biological Station summer term for foresters (3½ weeks) is required of all forest resources and forest science majors. The term must be completed between the sophomore and junior years. To attend students must have completed all required lower division courses (see pages 8-9) and must have a minimum grade point average of 2.00.

FR 3100—Important Forest Plants (2)  
FR 3101—Forest Ecology (3)  
FR 3201—Field Forest Measurements (1)  
Total Required Credits (6)

### **PROFESSIONAL CORE**

#### **JUNIOR YEAR**

AgEn 1400—Surveying (3)  
FR 1100—Dendrology (4)

## **Programs and Curricula**

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FR 5100—Silviculture (3)  
FR 5114—Forest Hydrology and Soils (5)  
FR 5200—Aerial Photo Interpretation (3)  
FR 5212—Natural Resources Inventory (3)  
FR 5223—Timber Management Planning (3)  
FR 5232—Management of Recreational Lands (3)  
FR 5240—Meteorology and Forest Fire Management (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (31)

### **CLOQUET FORESTRY SESSION**

Students in the forest resources curriculum are required to attend the spring (junior year) or fall (senior year) Cloquet Forestry Session. Students must meet the following requirements:

1. Achieve a minimum grade point average of 2.00 at the end of the quarter preceding the Cloquet Session.
2. Complete the Itasca Forestry Session and AgEn 1400, FR 1100, 5100, 5114, 5200, 5212, 5223, 5232, and 5240.
3. Submit a certificate of physical fitness (obtained from the Health Service) prior to the end of the quarter before you plan to attend the Cloquet Session. This certificate must be turned in at the Office of Admissions and Records when you register.

FR 5101—Field Silviculture (3)  
FR 5216—Field Forest Soils (1)  
FR 5220—Forest Resources Inventory (3)  
FR 5225—Forest Resources Analysis (7)  
FR 5248—Harvesting and Engineering (3)  
FW 3167—Techniques of Wildlife Management (1)  
Total Required Credits (18)

### **SENIOR YEAR**

FR 5222—Forest Policy and Economics (5)  
FR 5244—Forest Resources Management (3)  
FW 3052—Principles: Fisheries and Wildlife Management (4)  
Rhet 3562—Scientific and Technical Writing (4)  
Elective and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (16)

### **TOTAL GRADUATION REQUIREMENTS**

Required courses listed above (150 credits), credits to satisfy CLE requirements, plus electives sufficient to total 192 credits must be completed for the bachelor of science degree. Twenty to 22 elective credits are required, as a minimum, to complete requirements for the bachelor of science degree. Majors in the forest resources curriculum must use their elective credits to complete an elective core.

## **ELECTIVE CORES**

### **ECOSYSTEMS AND SILVICULTURE**

This elective core is designed for students interested in the biological and physical aspects of forest ecosystems which are important to forest land use and management decisions. Focus is on subjects such as silvics, silviculture, water quality, soil-site relationships, and forest land use potentials.

#### **REQUIRED COURSES**

- Ent 5050—Forest Entomology (4)
- FR 5105—Intensive Silviculture (3)
- PIPa 5050—Forest Pathology (4)
- Soil 5422—Advanced Forest Soils (3)

#### **ELECTIVE COURSES**

- EBB 5014—Ecology of Plant Communities (5)
- EBB 3004—Fundamentals of Ecology (4)
- EBB 5015—Nutrients and Energy in Terrestrial Ecosystems (6)
- FR 3104—Forest Ecology (3)
- FR 1101—Introduction to Air and Water Quality (4)
- FR 3114—Forest Tree Biology (4)
- Bot 3131—Plant Physiology (4)
- FR 5102—Regional Silviculture (3)
- FR 5150—Forest Ecology Seminar (3)
- FR 5151—Multiple-Use Silviculture (3)
- Total Required Credits (22)

### **FOREST MANAGEMENT**

This elective core is designed for students interested in the wide range of forest uses and opportunities for and techniques of coordinating these uses. Focus is on subjects such as water, timber, forage, wildlife, and recreation.

#### **REQUIRED COURSES**

- Ent 5050—Forest Entomology (4)
- FR 5231—Range Management (3)
- PIPa 5050—Forest Pathology (4)
- Soil 5422—Advanced Forest Soils (3)

#### **ELECTIVE COURSES**

- ForP 5306—Manufacturing Processes (3)
- ForP 5309—Forest Products Quality Standards and Design of Wood Structures (5)
- FR 5102—Regional Silviculture (3)
- (or) FR 5105—Intensive Silviculture (3)
- FR 5153—Advanced Forest Hydrology (3)
- FR 5233—Principles of Outdoor Recreation Design and Planning (4)
- FR 5261—Advanced Forest Policy and Economics (3)
- FR 5262—Remote Sensing of Natural Resources (5)
- FR 5264—Quantitative Techniques in Forest Management (3)
- Total Required Credits (20)

### **MANAGEMENT AND ADMINISTRATION**

This elective core is designed for students interested in the administration of public or private organizations charged with the management of forest lands. Focus is on subjects such as economics, sociology, policy, political science, law, and administration.

#### **REQUIRED COURSES**

- FR 5260—Forest Administration (3)
- FR 5261—Advanced Forest Policy and Economics (3)
- FR 5264—Quantitative Techniques in Forest Management (3)

#### **ELECTIVE COURSES**

- AgEc 5600—Land Economics (3)
- Ent 5050—Forest Entomology (4)
- FR 5257—Recreation Land Policy (3)
- FR 5265—Forest Policy Issues (3)
- Mgmt 3001—Fundamentals of Management (4)
- PlPa 5050—Forest Pathology (4)
- Total Required Credits (20)

### **MEASUREMENT AND INFORMATION SYSTEMS**

This elective core is designed for the mathematically skilled student who is interested in the measurement and information systems that support forest land use and management decisions. Focus is on subjects such as biometrics, sampling, mensuration, remote sensing, computer sciences, and management information systems.

#### **REQUIRED COURSES**

- FR 5253—Advanced Mensuration (3)
- FR 5264—Quantitative Techniques in Forest Management (3)
- Stat 5021—Statistical Analysis I (5)
- Stat 5022—Statistical Analysis II (5)

#### **ELECTIVE COURSES**

- CE 5104—Photogrammetry (4)
- CSci 5101—Structure and Programming of Software Systems I (4)
- FR 5262—Remote Sensing of Natural Resources (5)
- Math 1221—Analysis II (5)
- Stat 5201—Sampling Methodology in Finite Populations (4)
- Stat 5301—Designing Experiments (4)
- Total Required Credits (21)

#### **TOTAL GRADUATION REQUIREMENTS FOR ELECTIVE CORES**

Required courses listed above (170-172 credits), additional credits to satisfy the CLE requirements, plus electives sufficient to total 192 credits must be completed for the degree.

## Forest Science

This curriculum is designed for students intending to pursue graduate work with a research or teaching objective, although it also can provide background with which a student may enter the field of forest management. At the end of the freshman year, the student must select between the two specializations: natural sciences or 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.

The curriculum encourages individuality in course selection and includes a senior research topic. An adviser will work closely with each student to advance the individual learning experience.

## NATURAL SCIENCE SPECIALIZATION

### FRESHMAN YEAR

- Biol 1011—General Biology (5)
- (or) EBB 3004—Fundamentals of Ecology (4)
- Biol 1103—General Botany (5)
- Chem 1004—General Principles (5)
- Chem 1005—General Principles (5)
- Geo 1001—Physical Geology (5)
- Math 1211—Analysis I (5)
- Math 1221—Analysis II (5)
- Math 1231—Analysis III (5)
- Rhet 1101—Communication I (4) (or pass English proficiency examination)
- Rhet 1102—Communication II (4) (or pass English proficiency examination)
- Stat 1051—Introduction to Ideas of Statistics (4)
- (or) Stat 3081—Experimental Techniques, Statistical Inference (5)
- Students with a grade of C or better in high school trigonometry are exempt from Math 1008, Trigonometry; others must take Math 1008
- Electives and CLE requirements to fulfill the overall requirements for graduation
- Total Required Credits (53)

### SOPHOMORE YEAR

- AgEc 1020—Principles of Macroeconomics\*\* (5)
- AgEc 1030—Principles of Microeconomics (4)
- Chem 3301—Organic Chemistry (5)
- Chem 3302—Organic Chemistry (5)
- ForP 1301—Wood as a Raw Material (4)
- Phys 1031—General Physics (5)
- Phys 1032—General Physics (5)
- Rhet 1222—Public Speaking (4)
- Electives and CLE requirements to fulfill requirements for graduation
- Total Required Credits (37)

### ITASCA FIELD SESSION

The Lake Itasca Forestry and Biological Station summer term for foresters (3½ weeks) is required of all forest resources and forest science majors. This term must be completed between the sophomore and junior years. To attend students must have

\*\*AgEc 1020 partially satisfies category III under the CLE requirements.

## **Programs and Curricula**

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completed all lower division courses (see pages 8-9) and must have a minimum grade point average of 2.00.

- FR 3100—Important Forest Plants (2)
- FR 3101—Forest Ecology (3)
- FR 3201—Field Forest Measurements (1)
- Total Required Credits (6)

### **JUNIOR YEAR**

- CSci 3104—Introduction to Programming, Problem Solving (4)
- FR 1100—Dendrology (4)
- FR 5100—Silviculture (3)
- FR 5114—Forest Hydrology and Soils (5)
- FR 5200—Aerial Photo Interpretation (3)
- FR 5212—Natural Resources Inventory (3)
- FR 5223—Timber Management Planning (3)
- FR 5240—Meteorology and Forest Fire Management (4)
- Rhet 3562—Scientific and Technical Writing (4)
- Electives and CLE requirements to fulfill the overall requirements for graduation
- Total Required Credits (33)

### **SENIOR YEAR**

- FR 5222—Forest Policy and Economics (5)
- FR 5401—Senior Topics (4)
- PIPa 5050—Forest Pathology (4)
- (or) Ent 5050—Forest Entomology (4)
- Electives and CLE requirements to fulfill the overall requirements for graduation
- Total Required Credits (13)

### **RECOMMENDED BUT NOT REQUIRED**

Students enrolled in the forest science curriculum are recommended but not required to attend the Cloquet Forestry Session. To attend students must meet the requirements listed on page 24, or see the director of student services, 10 Green Hall.

### **TOTAL GRADUATION REQUIREMENTS**

Required courses listed above (142 credits), additional credits to satisfy the CLE requirements, plus electives sufficient to total 192 credits must be completed for the bachelor of science degree.

## **SOCIAL SCIENCE SPECIALIZATION**

### **FRESHMAN YEAR**

- Biol 1011—General Biology (5)
- (or) EBB 3004—Fundamentals of Ecology (4)
- Biol 1103—General Botany (5)
- Chem 1004—General Principles (5)

Chem 1005—General Principles (5)  
Math 1211—Analysis I (5)  
Math 1221—Analysis II (5)  
Math 1231—Analysis III (5)  
Rhet 1101—Communication I (4) (or pass English proficiency examination)  
Rhet 1102—Communication II (4) (or pass English proficiency examination)  
Students with a grade of C or better in high school trigonometry are exempt from  
Math 1008, Trigonometry; others must take Math 1008  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (43)

### **SOPHOMORE YEAR**

AgEc 1020—Principles of Macroeconomics\* (5)  
AgEc 1030—Principles of Microeconomics (4)  
CSci 3104—Introduction to Programming, Problem Solving (4)  
ForP 1301—Wood as a Raw Material (4)  
Phys 1031—General Physics (5)  
Rhet 1222—Public Speaking (4)  
Soc 3801—Sociological Methods (3)  
Soc 3802—Sociological Methods (3)  
Soc 3803—Sociological Methods (3)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (35)

### **ITASCA FIELD SESSION**

The Lake Itasca Forestry and Biological Station summer term for foresters (3½ weeks) is required of all forest resources and forest science majors. This term must be completed between the sophomore and junior years. To attend students must have completed all required lower division courses (see pages 8-9) and must have a minimum grade point average of 2.00.

FR 3100—Important Forest Plants (2)  
FR 3101—Forest Ecology (3)  
FR 3201—Field Forest Measurements (1)  
Total Required Credits (6)

### **JUNIOR YEAR**

FR 1100—Dendrology (4)  
FR 5100—Silviculture (3)  
FR 5114—Forest Hydrology and Soils (5)  
FR 5200—Aerial Photo Interpretation (3)  
FR 5212—Natural Resources Inventory (3)  
FR 5223—Timber Management Planning (3)  
FR 5240—Meteorology and Forest Fire Management (4)  
FW 3052—Principles of Fisheries and Wildlife Management (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (29)

### **SENIOR YEAR**

FR 5222—Forest Policy and Economics (5)

\*AgEc 1020 partially satisfies category III under the CLE requirements.

## **Programs and Curricula**

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FR 5232—Management of Recreation Lands (3)

FR 5401—Senior Topics (4)

PIPa 5050—Forest Pathology (4)

(or) Ent 5050—Forest Entomology (4)

Rhet 3562—Scientific and Technical Writing (4)

Electives and CLE requirements to fulfill the overall requirements for graduation

Total Required Credits (20)

### **TOTAL GRADUATION REQUIREMENTS**

Required courses listed above (133 credits), additional credits to satisfy the CLE requirements, plus electives sufficient to total 192 credits must be completed for the bachelor of science degree.

## **Forest Products**

This curriculum is designed for students interested in careers involving the manufacture, marketing, utilization, and research development of wood-based materials ranging from laminated timbers to paper. Courses emphasize the chemical, physical, and mechanical properties of wood and the newest technologies for converting this raw material to its many final forms. By selecting one of the five specializations, students direct their study toward the type of activity they wish to enter upon graduation—marketing, production management, pulp and paper, residential housing, or wood science and technology. The specializations are similar enough that students completing one specialization are not precluded from seeking employment in one of the other areas. Beyond its professional employment goals, the curriculum is intended to provide business or engineering oriented students with a sound background in the economic and/or engineering sciences critical to the future development of wood as a renewable resource.

### **MARKETING SPECIALIZATION**

This specialization is designed for students interested in careers involving the sales, distribution, and market development of forest products. The technical emphasis is on the physical-mechanical nature of wood-base building materials including lumber, plywood, fiberboard, particle board, and newer composite products. In addition, course work emphasizes marketing principles and analysis, management science, computer applications, and economics. Career opportunities in this field include purchasing and selling all types of forest products at the wholesale and retail levels, work in urban renewal programs, technical sales, product promotion, and specialized marketing research.

### **FRESHMAN YEAR**

AgEn 3010—Architectural Drafting (4)

Biol 1103—General Botany (5)

Chem 1001—General Principles (5)

Chem 1002—General Principles (5)

Econ 1001—Principles of Macroeconomics (4)

Econ 1002—Principles of Microeconomics (4)

Math 1008—Trigonometry (3)

Math 1111—College Algebra and Analytical Geometry (5)

Rhet 1101—Communication I (or pass English proficiency examination) (4)

Rhet 1102—Communication II (or pass English proficiency examination) (4)

Students with a grade of B or better in high school trigonometry are exempt from Math 1008, Trigonometry; others must take Math 1008  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (43)

**SOPHOMORE YEAR**

Acct 1050—Principles of Accounting (4)  
Acct 1051—Principles of Accounting (4)  
ForP 1301—Wood as a Raw Material (4)  
ForP 1303—Wood Structure and Identification (2)  
Math 1142—Calculus (5)  
Mktg 3000—Principles of Marketing (4)  
Phys 1121—Physics for Architects (5)  
Phys 1122—Physics for Architects (5)  
Psy 1001—General Psychology (5)  
Rhet 1222—Public Speaking (4)  
Total Required Credits (42)

**JUNIOR YEAR**

BLaw 3058—Law of Contracts and Agency (4)  
ForP 3303—Forest Products Marketing (3)  
ForP 5300—Wood-Fluid Relationships (3)  
ForP 5301—Mechanical Properties (3)  
ForP 5303—Wood Deterioration and Preservation (3)  
ForP 5309—Forest Products Quality Standards and Design of Wood Structures (5)  
MIS 3099—Introduction to Programming Using Fortran (1)  
MIS 5100—Computers and Systems Design (4)  
OAM 3055—Introduction to Management Science (4)  
Psy 5751—Psychology of Advertising (4)  
QA 1050—Elementary Management Statistics (4)  
Rhet 3551—Professional Writing (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (42)

**SENIOR YEAR**

ForP 5304—Wood Drying Processes (3)  
ForP 5306—Manufacturing Processes (3)  
ForP 5307—Wood- Base Panel Technology (4)  
ForP 5308—Wood Preservation Processes (2)  
ForP 5331—Senior Seminar (1)  
ForP 5355—Mechanics and Structural Design With Wood Properties (4)  
ForP 5356—Advanced Forest Products Marketing (3)  
FR 5265—Forest Policy Issues (3)  
Mktg 3095—Marketing Research (4)  
Mktg 3098—Consumer Behavior (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (31)

**TOTAL GRADUATION REQUIREMENTS**

Required courses listed above (158 credits), CLE requirements in category IV (8 credits), plus electives (26 credits) for a total of 192 credits required for graduation.

## **PRODUCTION MANAGEMENT SPECIALIZATION**

This specialization is designed for students interested in pursuing a career in the production of forest products. Opportunities in this field include production management jobs associated with the manufacture of hardwood and softwood lumber, plywood, particleboard, and various secondary wood products.

### **FRESHMAN YEAR**

Biol 1103—General Botany (5)  
Chem 1004—General Principles of Chemistry (5)  
Chem 1005—General Principles of Chemistry (5)  
Math 1142—Calculus<sup>\*\*</sup> (5)  
Rhet 1101—Communication I (or pass English proficiency examination) (4)  
Rhet 1102—Communication II (or pass English proficiency examination) (4)  
Students with a grade of B or better in high school trigonometry are exempt from Math 1008, Trigonometry; others must take Math 1008  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (28)

### **SOPHOMORE YEAR**

AgEc 1020—Principles of Macroeconomics (5)  
AgEc 1030—Principles of Microeconomics (4)  
ForP 1301—Wood as a Raw Material (4)  
ForP 1303—Wood Structure and Identification (2)  
Phys 1121—Physics for Architects (5)  
Phys 1122—Physics for Architects (5)  
Psy 1001—General Psychology (5)  
QA 1050—Elementary Managerial Statistics (4)  
Rhet 1222—Public Speaking (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (38)

### **JUNIOR YEAR**

AgEn 5016—Computer Programming in Statistics (3)  
ForP 3303—Forest Products Marketing (3)  
ForP 5300—Wood-Fluid Relationships (3)  
ForP 5301—Mechanical Properties (3)  
ForP 5303—Wood Deterioration (3)  
ForP 5304—Wood Drying Processes (3)  
ForP 5308—Wood Preservation Processes (2)  
ForP 5309—Forest Products Quality Standards and Design of Wood Structures (5)  
IEOR 5000—Industrial Engineering Analysis (4)  
IEOR 5010—Introduction to Work Analysis (4)  
IR 3002—Systems: Labor Markets and the Management of Human Resources (4)  
OAM 3055—Introduction to Management Sciences (4)  
Rhet 3562—Scientific and Technical Writing (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (45)

<sup>\*\*</sup>Math 1142 will fulfill requirements for graduation in this specialization. This course is not sufficient for those students desiring further course work in industrial or mechanical engineering. For this reason, students are strongly urged to take the series Math 1211, 1221, 1231, instead of Math 1142.

### SENIOR YEAR

- ForP 5305—Pulp and Paper Technology (4)
- ForP 5306—Manufacturing Processes (3)
- ForP 5307—Wood-Base Panel Technology (4)
- ForP 5331—Senior Seminar (1)
- ForP 5355—Mechanics and Structural Design With Wood Products (4)
- FR 5265—Forest Policy Issues (3)
- IEOR 5020—Engineering Cost Accounting, Analysis, Control (4)
- IEOR 5030—Quality Control and Reliability (4)
- IR 3007—Collective Bargaining Negotiation and Modern Labor Relations (4)
- OAM 5056—Applications of Analytical Methods and Computers in Operations Management and Analysis (5)
- QA 3058—Linear Programming (4)
- Electives and CLE requirements to fulfill the overall requirements for graduation
- Total Required Credits (40)

### TOTAL GRADUATION REQUIREMENTS

Required courses listed above (151 credits), CLE requirements in category IV (8 credits), plus electives (33 credits) for a total of 192 credits required for graduation.

### PULP AND PAPER SPECIALIZATION

This specialization is intended primarily for students interested in pursuing a career in the pulp and paper industry. It provides in-depth training in mathematics, physics, chemistry, and the science and technology of wood and fiber products. In addition, a special group of pulp and paper and related engineering courses are included which deal with the technology of wood pulp production and the manufacture of paper and other fiber products.

### FRESHMAN YEAR

- Chem 1004—General Principles (5)
- Chem 1005—General Principles (5)
- Chem 1006—Principles of Solution Chemistry (4)
- Econ 1001—Principles of Macroeconomics (4)
- Math 1211—Analysis I (5)
- Math 1221—Analysis II (5)
- Math 1231—Analysis III (5)
- Rhet 1101—Communication I (4) (or pass English proficiency examination)
- Rhet 1102—Communication II (4) (or pass English proficiency examination)
- Electives and CLE requirements to fulfill the overall requirements for graduation
- Total Required Credits (41)

### SOPHOMORE YEAR

- Chem 3100—Quantitative Analysis (3)
- Chem 3101—Quantitative Analysis (2)
- Chem 3301—Elementary Organic Chemistry (5)
- Chem 3302—Elementary Organic Chemistry (5)
- ForP 1301—Wood as a Raw Material (4)
- ForP 1303—Wood Structure and Identification (2)
- Math 3211—Analysis IV (5)

## **Programs and Curricula**

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Math 3221—Introduction: Linear Algebra, Linear Differential Equations (5)  
Phys 1271—General Physics (4)  
Phys 1275—General Physics Lab (1)  
Phys 1281—General Physics (4)  
Phys 1285—General Physics Lab (1)  
Phys 1291—General Physics (4)  
Phys 1295—General Physics Lab (1)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (46)

### **JUNIOR YEAR**

AgEn 5016—Computer Programming and Statistics (3)  
CE 3400—Fluid Mechanics (4)  
ForP 5300—Wood-Fluid Relationships (3)  
ForP 5301—Mechanical Properties (3)  
ForP 5302—Wood Chemistry (3)  
ForP 5305—Pulp and Paper Technology (4)  
ForP 5310—Pulp and Paper Process Laboratory (3)  
ME 3301—Thermodynamics (4)  
Rhet 3562—Technical Writing (4)  
Stat 5021—Statistical Analysis I (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (35)

### **SENIOR YEAR**

Chem 5520—Elementary Physical Chemistry (3)  
ForP 5306—Manufacturing Processes (3)  
ForP 5312—Pulp and Paper Process Calculations (4)  
ForP 5313—Pulp and Paper Process Operations I (3)  
ForP 5314—Pulp and Paper Process Operations II (3)  
ForP 5315—Paper Engineering Laboratory (2)  
ForP 5316—Coated Product Developments (2)  
ForP 5317—Instrumentation and Process Control (2)  
ForP 5331—Senior Seminar (1)  
ForP 5359—Surface and Colloid Chemistry of Papermaking (3)  
FR 5265—Forest Policy Issues (3)  
Rhet 1222—Public Speaking (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (33)

### **SUGGESTED ELECTIVES**

CE 3500—Introduction to Environmental Engineering  
CE 5500—Analysis and Design of Waste Water Systems  
Chem 5521—Elementary Physical Chemistry  
ME 3303—Applied Thermodynamics  
ME 3701—Basic Measurements Lab I  
ME 3702—Basic Measurements Lab II

### **TOTAL GRADUATION REQUIREMENTS**

Required courses listed above (155 credits), requirements for categories III and IV (11 credits), plus electives (26 credits) for a total of 192 credits required for graduation.

## RESIDENTIAL HOUSING SPECIALIZATION

The main objective of this specialization is to train students for careers in the manufacture and merchandising of family housing units, with emphasis upon factory-built homes since they are assuming an ever-increasing importance world wide. In addition to forest products science courses the specialization includes study in architecture, mechanics, industrial engineering, and economics. Special emphasis is given to the efficient and effective use of wood products as engineering materials for building construction. Career opportunities include the field of light construction and other areas in the forest products industries.

### FRESHMAN YEAR

AgEc 1020—Principles of Macroeconomics (5)  
AgEc 1030—Principles of Microeconomics (4)  
AgEn 3010—Architectural Drafting (4)  
Biol 1103—General Botany (5)  
Chem 1004—General Principles (5)  
Chem 1005—General Principles (5)  
Math 1211—Analysis I (5)  
Rhet 1101—Communication I (4) (or pass English proficiency examination)  
Rhet 1102—Communication II (4) (or pass English proficiency examination)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (41)

### SOPHOMORE YEAR

ForP 1301—Wood as a Raw Material (4)  
ForP 1303—Wood Structure and Identification (2)  
ForP 3310—Manufactured Housing Systems (4)  
Math 1221—Analysis II (5)  
Math 1231—Analysis III (5)  
ME 3900—Introduction to Engineering Statistics (4)  
Mktg 3000—Principles of Marketing (4)  
Phys 1121—Physics for Architects (5)  
Phys 1122—Physics for Architects (5)  
Rhet 1222—Public Speaking (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (42)

### JUNIOR YEAR

AEM 3092—Statics and Mechanics of Materials (4)  
ForP 5300—Wood-Fluid Relationships (3)  
ForP 5303—Wood Deterioration (3)  
ForP 5304—Wood Drying Processes (3)  
ForP 5308—Wood Preservation Processes (2)  
ForP 5309—Forest Products Quality Standards and Design of Wood Structures (5)  
IEOR 5000—Introduction to Industrial Engineering Analysis (4)  
IEOR 5020—Engineering Cost Accounting, Analysis, Control (4)  
MIS 3099—Introduction to Programming Using Fortran (1)  
Rhet 3562—Scientific and Technical Writing (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (33)

## **Programs and Curricula**

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### **SENIOR YEAR**

AEM 3093—Mechanical Properties of Construction Materials (4)  
ForP 5306—Manufacturing Processes (3)  
ForP 5307—Wood-Base Panel Technology (4)  
ForP 5331—Senior Seminar (1)  
ForP 5355—Mechanics and Structural Design With Wood Products (4)  
FR 5265—Forest Policy Issues (3)  
IEOR 5010—Introduction to Work Analysis (4)  
IR 3007—Collective Bargaining Negotiations and Modern Labor Relations (4)  
Mktg 3095—Marketing Research (4)  
OAM 3055—Introduction to Management Sciences (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (35)

### **TOTAL GRADUATION REQUIREMENTS**

Required courses listed above (151 credits), CLE requirements in category III (3 credits) and category IV (8 credits), plus electives (30 credits) for a total of 192 credits required for graduation.

## **WOOD SCIENCE AND TECHNOLOGY SPECIALIZATION**

This specialization is designed for those desiring broad and general training in the field. It allows latitude in the selection of elective subjects to complement the basic training in the physical sciences, the fundamental properties of wood, and the technology of wood products manufacturing.

### **FRESHMAN YEAR**

AgEc 1020—Principles of Macroeconomics (5)  
Biol 1011—General Biology (5)  
Biol 1103—General Botany (5)  
Chem 1004—General Principles (5)  
Chem 1005—General Principles (5)  
Chem 1006—Principles of Solution Chemistry (4)  
Math 1211—Analysis I (5)  
Rhet 1101—Communication I (4) (or pass English proficiency examination)  
Rhet 1102—Communication II (4) (or pass English proficiency examination)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (42)

### **SOPHOMORE YEAR**

Chem 3301—Elementary Organic Chemistry (5)  
Chem 3302—Elementary Organic Chemistry (5)  
ForP 1301—Wood as a Raw Material (4)  
ForP 1303—Wood Structure and Identification (2)  
Math 1221—Analysis II (5)  
Math 1231—Analysis III (5)  
Phys 1271—General Physics (4)  
Phys 1275—General Physics Lab (1)  
Phys 1281—General Physics (4)  
Phys 1285—General Physics Lab (1)  
Phys 1291—General Physics (4)

## Recreation Resource Management

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Phys 1295—General Physics Lab (1)

Rhet 1222—Public Speaking (4)

Electives and CLE requirements to fulfill the overall requirements for graduation

Total Required Credits (45)

### JUNIOR YEAR

Chem 3100—Quantitative Analysis (3)

Chem 3101—Quantitative Analysis Lab (2)

ForP 5300—Wood-Fluid Relationships (3)

ForP 5301—Mechanical Properties (3)

ForP 5302—Wood Chemistry (3)

ForP 5303—Wood Deterioration and Preservation (3)

ForP 5309—Wood Product Quality Standards and Design of Wood Structures (5)

Math 3211—Analysis IV (5)

Rhet 3562—Scientific and Technical Writing (4)

Stat 5021—Statistical Analysis I (4)

Electives and CLE requirements to fulfill the overall requirements for graduation

Total Required Credits (35)

### SENIOR YEAR

Chem 5520—Elementary Physical Chemistry (3)

ForP 5304—Wood Drying Processes (3)

ForP 5305—Pulp and Paper Technology (4)

ForP 5306—Manufacturing Processes (3)

ForP 5307—Wood-Base Panel Technology (4)

ForP 5308—Wood Preservation Processes (2)

ForP 5331—Senior Seminar (1)

ForP 5335—Mechanics and Structural Design With Wood Products (4)

FR 5265—Forest Policy Issues (3)

Electives and CLE requirements to fulfill the overall requirements for graduation

Total Required Credits (27)

### TOTAL GRADUATION REQUIREMENTS

Required courses listed above (149 credits), CLE requirements in category III (3 credits) and category IV (8 credits), plus electives (32 credits) for a total of 192 credits required for graduation.

## Recreation Resource Management

This curriculum does not contain the traditional core of forestry courses. Students electing this program will not qualify as foresters under present federal civil service regulations or for membership in the Society of American Foresters. General objectives of the program are:

1. To educate specialists for broad recreation resource planning and management involving land and water areas.
2. To provide necessary background for participation in expanding regional, state, and 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.

## **Programs and Curricula**

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While this undergraduate program may be terminal for some, primarily it attracts students motivated toward and capable of graduate work. This is an interdisciplinary program administered by the College of Forestry with the assistance of special college committees.

### **FRESHMAN YEAR**

Biol 1011—General Biology (5)  
Biol 1103—General Botany (5)  
Chem 1004—General Principles (5)  
Chem 1005—General Principles (5)  
FR 1201—Conservation of Natural Resources (3)  
Geo 1001—Physical Geology (5)  
Geog 1301—Human Geography (5)  
(or) Geog 1401—Physical Geography (5)  
Math 1111—College Algebra, Analytic Geometry (5)  
(or) Math 1131—Finite Math (5)  
(or) Math 1201—Pre-Calculus (5)  
Rhet 1101—Communication I (4) (or pass English proficiency examination)  
Rhet 1102—Communication II (4) (or pass English proficiency examination)  
Soil 1122—Introduction to Soil Science (4)  
Students with a grade of C or better in high school mechanical drawing are exempt from AgEn 1010, Technical Drawing; others must take AgEn 1010  
Students with a grade of C or better in high school trigonometry are exempt from Math 1008, Trigonometry; others must take Math 1008  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (50)

### **SOPHOMORE YEAR**

AgEc 1020—Principles of Macroeconomics (5)  
AgEc 1030—Principles of Microeconomics (4)  
EBB 3004—Fundamentals of Ecology (4)  
FR 1100—Dendrology (4)  
LA 1024—Landscape Theory (4)  
(or) LA 1001—Environmental Design: Man and Environment (4)  
Math 1142—Introduction to Calculus (5)  
(or) Math 1211—Analysis I (5)  
Phys 1031—General Physics (5)  
Pol 1041—Contemporary Political Ideologies (4)  
(or) Pol 1027—Urban Politics (4)  
(or) Pol 1031—American Public Policy (4)  
Psy 1001—General Psychology (5)  
Rhet 1222—Public Speaking (4)  
Soc 1001—Man in Modern Society (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (48)

### **JUNIOR YEAR**

AgEc 3610—Community Resource Development (4)  
(or) AgEc 5620—Regional Economic Analysis (3-4)  
AgEn 1400—Surveying (4)  
AgEn 3410—Hydrology, Water Control (4)  
(or) FR 5114—Forest Hydrology and Soils (4)

## Master of Science and Ph.D. Programs

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FR 5232—Management of Recreational Lands (3)  
FW 3052—Principles of Fisheries and Wildlife Management (4)  
Rec 5150—Principles and Practices of Recreation (5)  
(or) Rec 5130—Recreation and Park Areas and Facilities (5)  
Rhet 3254—Advanced Public Speaking (4)  
(or) Rhet 3266—Discussion Methods (4)  
Rhet 3551—Professional Writing (4)  
(or) Rhet 3562—Technical Writing (4)  
Stat 5021—Statistical Analysis I (4)  
(or) Soc 3801—Sociological Methods (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation  
Total Required Credits (36)

### SENIOR YEAR

EBB 5014—Plant Communities (5)  
(or) EBB 5016—Ecological Plant Geography (5)  
FR 5200—Aerial Photo Interpretation (4)  
FR 5233—Principles of Outdoor Recreation Design and Planning (4)  
FR 5259—Recreation Land Amenities and the User (3)  
(or) FR 5257—Recreation Land Policy (3)  
RCD 5100—Interdisciplinary Seminar I (5)  
RCD 5101—Interdisciplinary Seminar II (5)  
Soc 5401—Social Organization (5)  
(or) Soc 5561—Rural Social Institutions (4)  
(or) Jour 5501—Communication and Public Opinion (4)  
Electives and CLE requirements to fulfill the overall requirements for graduation.  
Total Required Credits (31)

### TOTAL GRADUATION REQUIREMENTS

Required courses listed above (165 credits), additional courses to satisfy CLE requirements (8 credits), plus electives (19 credits) to total 192 credits must be completed for the degree.

## GRADUATE STUDY IN FORESTRY

Graduate study leading to the master of science (M.S.), the doctor of philosophy (Ph.D.) and the professional degree, master of forestry (M.F.), is offered through the Graduate School in cooperation with the College of Forestry.

## Master of Science and Ph.D. Programs

Graduate study leading to these degrees is intended for qualified students preparing for careers in research, extension work, administration, and teaching in the several recognized areas of specialization in forestry: silviculture, management, economics, administration, measurements, remote sensing, genetics, hydrology, physiology, ecology, recreation, marketing, wood/fiber science, and forest products engineering.

## **Master of Forestry Program**

The master of forestry program is designed to meet the need for additional professional study by qualified forestry school graduates primarily interested in administrative and technical work in forest management. Graduates of nonforestry curricula may enter the forestry profession through this program provided they have, or develop, an educational background that is approximately equivalent to that obtained in the pursuit of a bachelor's degree in forestry and their academic record warrants admission to the Graduate School.

Students registered for master of forestry work must fulfill the requirements for the master of science (Plan B) program of the Graduate School.

Students interested in graduate programs should consult the *Graduate School Bulletin* for details of requirements and should apply for admission to the Graduate School, University of Minnesota, Minneapolis, Minnesota 55455.

## IV. COURSE DESCRIPTIONS

**Course Numbering and Symbols**—Courses primarily for freshmen and sophomores are numbered 1000 through 1998; for juniors and seniors, 3000 through 3998; for juniors, seniors, and graduate students, 5000 through 5998. Courses numbered 8000 and above are restricted to students registered in the Graduate School.

The following symbols are used throughout the course descriptions in lieu of page footnotes:

§Credit will not be granted if the equivalent course listed after the section mark has been taken for credit.

¶Concurrent registration is required in the course listed after the paragraph mark.

\*Consent of instructor is required.

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.

### Forest Products (ForP)

- 1301. WOOD AS A RAW MATERIAL.** (4 cr; prereq Biol 1103 or §)  
The physical and chemical nature of solid wood and wood fibers as it relates to the requirements of major wood-based industries. World supply and consumption. Weekly demonstration laboratories dealing with structure and properties of wood and with manufacture of solid, particle, and fiber products.
- 1303. WOOD STRUCTURE AND IDENTIFICATION.** (2 cr; prereq 1301)  
Features of wood structure vital to the identification of various tree species and to understanding the physical properties of wood. Lecture and laboratory.
- 3303. FOREST PRODUCTS MARKETING.** (3 cr; prereq Mktg 3000)  
Historical and current considerations of forest products marketing at the manufacturing, wholesale, and retail levels. Lectures, guest speakers, and field trips.
- 3310. MANUFACTURED HOUSING SYSTEMS.** (4 cr)  
Development and principles of manufactured housing systems. Wood-frame construction technology. Strength and other properties of wood and wood-based materials as related to design. Material and design optimization. Insulation materials and heat loss.
- 3325. DIRECTED STUDY EXPERIENCE.** (1-5 cr; prereq §)  
Opportunity to pursue experiences not available under independent study or extra credit registration. The student develops, in consultation with the adviser for the project, a prospectus, and completes progress reports and a final report on his or her project.
- 5300. WOOD-FLUID RELATIONSHIPS.** (3 cr; prereq 1301)  
Moisture in wood and its relationship to density and specific gravity, shrinking and swelling, electrical properties, strength properties, thermoconductivity, sorption isotherms, dimensional stabilization, permeability and diffusion. Lectures only.
- 5301. MECHANICAL PROPERTIES.** (3 cr; prereq 1301)  
Basic mechanics and strength of materials as applied to wood products.
- 5302. WOOD CHEMISTRY.** (3 cr; prereq Chem 3302)  
Chemical composition, reactions, and analyses of wood, wood components, and derivatives.
- 5303. WOOD DETERIORATION.** (3 cr; prereq 1301)  
Deterioration of wood and wood products by bacteria, fungi, insects, marine organisms, fire, and weathering; methods of preservation and preservatives used. Lecture and laboratory.
- 5304. WOOD DRYING PROCESSES.** (3 cr; prereq 5300)  
Industrial processes employed for drying lumber, veneer, poles and timbers. Lectures, laboratory exercises, and plant visits.
- 5305. PULP AND PAPER TECHNOLOGY.** (4 cr; prereq 5300, 5302 or §)  
Pulping processes; fiber refining and processing; manufacture of paper; fiber and paper properties; recycling of paper; and water requirements and effluent treatment. Lecture and laboratory. Field trip optional.

## Course Descriptions

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- 5306. MANUFACTURING PROCESSES.** (3 cr; prereq 1301 or #)  
Manufacture of wood-based products from a systems point of view. Input requirements, machinery selection, methods of economic comparison. Technology related to lumber manufacture. Field trip required.
- 5307. WOOD-BASE PANEL TECHNOLOGY.** (4 cr; prereq 5305 or #)  
Design, manufacture, properties, and applications of plywood, particleboard, fiberboard, and composite panels. Adhesives and their application in the panel industry. Lecture, laboratory, and research project.
- 5308. WOOD PRESERVATION PROCESSES.** (2 cr; prereq 1301, 5300, 5303)  
Procedures and preservatives used to increase the resistance of wood products to fungi, insects, and fire. Lectures, laboratory exercises, and plant visits.
- 5309. FOREST PRODUCTS QUALITY STANDARDS AND DESIGN OF WOOD STRUCTURES.** (5 cr; prereq 1301 or #)  
Quality standards for forest products; industry practices for buying and selling major forest products. Considerations of quality in the design of structures using forest products. Use of industry strength and design data tables for construction of simple wood structures.
- 5310. PULP AND PAPER PROCESS LABORATORY.** (3 cr; prereq 5305)  
Chemical and mechanical pulping, pulp preparation, secondary fiber, de-inking, wet end additives. Laboratory problems and exercises supplemented by lectures.
- 5312. PULP AND PAPER PROCESS CALCULATIONS.** (4 cr; prereq ME 3301 or #; 4 lect and 3 rec hrs per wk)  
Chemical and physical process calculations; steady and unsteady state material and energy balances applied to pulping and papermaking processes.
- 5313. PULP AND PAPER PROCESS OPERATIONS I.** (3 cr; prereq CE 3400 or #; 3 lect and 3 rec hrs per wk)  
Application of the principles of momentum and heat transfer to unit operations in the pulp and paper industry: fluid transport, filtration, sheet forming, sedimentation, heat exchange, and evaporation
- 5314. PULP AND PAPER PROCESS OPERATIONS II.** (3 cr; prereq 5313 or #; 3 lect and 3 rec hrs per wk)  
Application of the principles of mass transfer to unit operations in the pulp and paper industry: distillation, gas absorption and stripping, leaching, extraction, crystallization, humidification, and drying.
- 5315. PAPER ENGINEERING LABORATORY.** (2 cr; prereq 5312 and AgEn 5016 or #; 2 lect and 1 lab hrs per wk)  
Experiments designed to illustrate and apply the principles of momentum, heat, and mass transfer using the pilot-plant paper machine.
- 5316. COATED PRODUCT DEVELOPMENTS.** (2 cr; prereq 5310 or #)  
Coating process and products (primarily paper); theory, techniques, and procedures for formulating and applying coatings; properties and uses of coated products.
- 5317. INSTRUMENTATION AND PROCESS CONTROL.** (2 cr; prereq 5312)  
Measurements, analog and digital control systems, instrumentation, computers, computer control, system maintenance, fluidics, special applications.
- 5331. SENIOR SEMINAR.** (1 cr; prereq sr)  
Current developments in forest products.
- 5350. WOODY TISSUE MICROTÉCHNIQUE.** (2 cr)  
Use of sliding and rotary microtomes, macerators, maceration, differential staining, and special techniques in preparation of woody tissue for microscopic study. Laboratory.
- 5351. MOISTURE RELATIONS IN WOOD.** (3 cr; prereq 5300)  
Moisture movement in wood relative to the microphysical and chemical structure and its influence on the development of stress during drying and subsequent use.
- 5353. ADVANCED WOOD CHEMISTRY.** (2 cr; prereq 5302, Chem 3100, 3101 or equiv; offered when feasible)  
Laboratory problems in the analysis of wood constituents and in the techniques of their isolation and purification.
- 5355. MECHANICS AND STRUCTURAL DESIGN WITH WOOD PRODUCTS.** (4 cr; prereq 5301)  
Mechanical behavior of lumber, plywood, and particleboard as applied to structural considerations in building construction. Lecture and laboratory.
- 5356. ADVANCED FOREST PRODUCTS MARKETING.** (3 cr; prereq 3303 or #)  
Lectures and case studies on retail, wholesale, manufacturer, and market analysis research concerning the forest products business.

- 5358. PULP AND PAPER TECHNOLOGY: SPECIAL TOPICS.** (2 cr; prereq 5310 or \$)  
Laboratory problems concerning the properties of wood fiber, paper, and paper products.
- 5359. SURFACE AND COLLOID CHEMISTRY OF PAPERMAKING.** (3 cr; prereq Chem 5520 or \$)  
Principles of surface and colloid chemistry applied to basic problems in pulp and paper manufacturing operations and product uses.
- 5360. STRUCTURE AND PROPERTIES OF IMPORTANT TROPICAL WOODS.** (2 cr; prereq 1303)  
Structure and methods of identification of commercially important tropical woods. Properties of these woods; relation of these properties to favored uses for the woods.
- 5401. SENIOR TOPICS.** (Cr ar; prereq sr)  
Independent study in a field of interest to a forestry major planned with the student's adviser.

**FOR GRADUATE STUDENTS ONLY**

- 8300. RESEARCH PROBLEMS: FOREST PRODUCTS ENGINEERING**
- 8301. RESEARCH PROBLEMS: FOREST UTILIZATION**

**Forest Resources (FR)**

- 1100. DENDROLOGY.** (4 cr; prereq Biol 1103)  
Identification, nomenclature, classification, and distribution of about 200 important forest trees. Preparation and use of keys, systems of natural classification, and field and laboratory methods of identification.
- 1101. INTRODUCTION TO AIR AND WATER QUALITY.** (4 cr)  
Air and water quality problems. Basic processes which govern the accretion, depletion, and cycles of specific types and sources of pollution. Methods of pollution abatement and influence of political, social, and economic pressures on the maintenance of a "quality environment."
- 1201. CONSERVATION OF NATURAL RESOURCES.** (3 cr)  
Renewable natural resources of the U.S. and the world; their utilization, interrelationship, and management treated from an economic standpoint; their importance to society and our responsibility for their conservation. Lectures and reports.
- 1202. SMALL WOODLANDS FORESTRY.** (3 cr for non-forestry majors, 2 cr for majors; prereq 1100 for majors)  
Status and problems of the small woodland owner. Factors influencing tree growth. Cutting practices and marketing products. Establishment and care of plantations, shelterbelts and windbreaks. Field trips.
- 1203. INTRODUCTION TO MINNESOTA'S NATURAL RESOURCES.** (3 cr, \$1201; for non-forestry students)  
Ecological, social, and economic implications of Minnesota's soil, water, forest, wildlife, and other resources are studied in field exercise and group discussions at nature centers and natural areas. Environmental teaching techniques for the elementary indoor classroom.
- 3100. IMPORTANT FOREST PLANTS.** (2 cr; prereq Biol 1103; given at Itasca)  
Identification of forest plants as related to forest types.
- 3101. FIELD FOREST ECOLOGY.** (3 cr; prereq college physics; given at Itasca)  
Field examination of succession, soils, silvical characteristics, tree classification, stand structure, and the ecology of regeneration.
- 3104. FOREST ECOLOGY.** (3 cr; prereq Itasca Session)  
Ecological concepts and principles as a basis for silvicultural practice. The forest as an ecosystem.
- 3114. FOREST TREE BIOLOGY.** (4 cr; prereq Chem 1004, 10 cr of biology)  
The growth, function, and genetics of forest trees. Lecture and laboratory.
- 3201. FIELD FOREST MEASUREMENTS.** (1 cr; prereq Math 1008; given at Itasca)  
Introduction to and use of instruments in forest mensuration.
- 3225. DIRECTED STUDY EXPERIENCE.** (1-5 cr; prereq \$)  
Opportunity to pursue experiences not available under independent study or extra credit registration. The student develops in consultation with the adviser for the project, a prospectus, and completes progress reports and a final report on his or her project.

## Course Descriptions

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- 5100. SILVICULTURE.** (3 cr; prereq Itasca Session, 1100, 3101)  
Introduction to silvics, silvicultural systems, intermediate cuttings, and related practices. Forest regeneration problems and techniques.
- 5101. FIELD SILVICULTURE.** (3 cr; prereq 5100; given at Cloquet)  
Timber stand improvement projects, stand examinations and prescriptions, seeding and planting, and related silvicultural practices. Lectures and fieldwork.
- 5102. REGIONAL SILVICULTURE.** (3 cr; prereq 5100 or #)  
Forest regions of North America emphasizing silvical, historical, geographic, economic, and other determinants of forest management. Topics and field trips on special problems of current concern.
- 5103. ADVANCED FOREST TREE BIOLOGY.** (3 cr; prereq #)  
Current applications and research in forest tree biology.
- 5105. INTENSIVE SILVICULTURE.** (3 cr; prereq sr in forestry)  
Principles and techniques underlying silvicultural systems aimed at high productivity. Current practices in various forest regions of the U.S. and the world. Lectures and guest speakers.
- 5114. FOREST HYDROLOGY AND SOILS.** (5 cr; prereq Itasca Session, Geo 1001, or #)  
Water and its relation to forests and forest management. Effects of managing the forest system on components of the hydrologic cycle with emphasis on soil water content, evapotranspiration and quantity and quality of runoff. Basic soil science including chemical and physical properties, soil genesis, and classification. Role of soils in determining tree species distribution and productivity.
- 5126. FIELD FOREST SOILS.** (1 cr; prereq 5114; given at Cloquet)  
Field examination of forest soils and their relationship to site productivity and forest management.
- 5150. FOREST ECOLOGY SEMINAR.** (3 cr; prereq sr, 3101, 5100, or #)  
Survey of classical concepts and contemporary developments in ecology as related to forestry. Discussion group format.
- 5151. MULTIPLE-USE SILVICULTURE.** (3 cr; prereq sr, 5100, or #)  
Wildlife production, aesthetics, wilderness area management, minor forest products, noise and air pollution, and other nontimber production forest uses. Classical and recent contributions.
- 5152. FOREST GENETICS.** (3 cr; prereq #)  
Genetic variation of forest-tree species and underlying principles; application of plant breeding principles to forestry.
- 5153. ADVANCED FOREST HYDROLOGY.** (3 cr; prereq 5114 or #)  
Current hydrologic problems in the management of forested watersheds. Analytical methods to evaluate effects of vegetation management on the quantity and quality of runoff.
- 5200. AERIAL PHOTO INTERPRETATION.** (3 cr; prereq AgEn 1400 or WM major or #)  
Types, characteristics, procurement, preparation, viewing, and interpretation of aerial photographs; introduction to mapping; applications to resource surveys and management.
- 5212. NATURAL RESOURCES INVENTORY.** (3 cr; prereq Itasca Session, 3201, 5200)  
Measurement of stand variables, forest products, forest growth and yield. Elementary statistics. Sampling methods for estimating characteristics of natural resources and resource use for management decision making. Lecture and laboratory.
- 5220. FOREST RESOURCES INVENTORY.** (3 cr; prereq 5200, 5212; given at Cloquet)  
Use of aerial photographs in property boundary location; interpretation and classification of forest vegetation types. Sampling methods for estimating natural resources and resource use for management decision making.
- 5222. FOREST POLICY AND ECONOMICS.** (5 cr; prereq AgEc 1030)  
Forest resource supply and consumption relationships, U.S. and world; legal and political factors; basic economic and financial analysis of forestry activities production, consumption, and investments.
- 5223. TIMBER MANAGEMENT PLANNING.** (3 cr; prereq Stat 1051 or 3081, Itasca Session, CSci 3104)  
Introduction to the fundamentals of planning, finance, forest regulation models, sustained yield of timber, and development of timber management plans.
- 5225. FOREST RESOURCES ANALYSIS.** (7 cr; prereq 5100, 5114, 5222, 5223; given at Cloquet)  
Compartment examination, analysis, planning and evaluation exercises. Prescription and presentation of development plans.
- 5231. RANGE MANAGEMENT.** (3 cr; prereq Biol 1011 or EBB 3004, Biol 1103 or #)  
Grazing animal production methods and their influence on forest and open range lands; public grazing land administration; relationship of grazing to other land uses.

- 5232. MANAGEMENT OF RECREATIONAL LANDS.** (3 cr; prereq jr in forestry or #)  
Recreational use of the forest and associated land and water. Policy problems arising from recreational demands.
- 5233. PRINCIPLES OF OUTDOOR RECREATION DESIGN AND PLANNING.** (4 cr; prereq 5232 or #)  
(Same as LA 5010) For advanced students associated with design, management, and planning of recreational facilities. Planning and design principles related to recreational land use and development; parks, campsites, water areas, highways, summer and winter recreational facilities.
- 5240. METEOROLOGY AND FOREST FIRE MANAGEMENT.** (4 cr; prereq ¶1100, Itasca Session, WM major or #)  
Fundamentals of meteorology and climatology and applications to forestry. Forest fire behavior, administration of forest fire control, and applications of prescribed burning.
- 5244. FOREST RESOURCES MANAGEMENT.** (3 cr; prereq 5222, sr)  
Forest resources management systems in the U.S. Interpretation and evaluation of resource information, alternative management strategies, and conflicting forest use and management decisions. Case studies.
- 5248. HARVESTING AND ENGINEERING.** (3 cr; prereq AgEn 1400; given at Cloquet)  
Harvesting systems, relationship to forest management, and preparation for and administration of timber sales. Location, construction, and maintenance of forest roads.
- 5253. ADVANCED FOREST MENSURATION.** (3 cr; prereq 5212, Stat 5022 or #)  
Applications of statistical and advanced mensuration methods in the analysis and interpretation of forestry data and forest survey sampling methods. Lecture and laboratory.
- 5257. RECREATION LAND POLICY.** (3 cr; prereq 5232 or #)  
Policy issues affecting the use and management of lands devoted entirely or in part to recreational objectives.
- 5259. RECREATION LAND AMENITIES AND THE USER.** (3 cr; prereq 5232, RRM major or grad student or #)  
Principles of management of parks, forests, and other areas for recreation visitors. The role of interpretive education. User preference in relation to administrative objectives. Individual and group influences. Lectures, discussions, reports, readings.
- 5260. FOREST ADMINISTRATION.** (3 cr; prereq Cloquet Session or #)  
Patterns and processes of administrative organization in forestry and related resource institutions. Personnel practices, supervision, direction and control. Planning and budgeting processes and problems.
- 5261. ADVANCED FOREST POLICY AND ECONOMICS.** (3 cr; prereq 5222 or #)  
Quantitative techniques for analyzing forestry policy and economic activities; economic analysis of forestry projects; political and legal processes in forestry. Review of literature on forest policy and economics; case studies.
- 5262. REMOTE SENSING OF NATURAL RESOURCES.** (5 cr; prereq 5200 or #)  
Advanced photo interpretation, flight planning, resource survey planning, contracting, nonphotographic remote sensing systems, image processing techniques.
- 5264. QUANTITATIVE TECHNIQUES IN FOREST MANAGEMENT.** (3 cr; prereq 5212, 5223)  
Forestry applications of quantitative techniques in allocation and other decision-making problems. Mathematical programming, simulation.
- 5265. FOREST POLICY ISSUES.** (3 cr)  
Evolution and resolution of forestry issues; systematic analysis of issues (defining them, assessing special interest group concerns, defining objectives and alternatives); selected issues such as sustained yield, clear-cutting, forest practice regulation, multiple and dominant use, and energy conservation.
- 5401. SENIOR TOPICS.** (Cr ar; prereq sr)  
Independent study in a field of interest to a forestry major planned with the student's adviser.
- 5406. FORESTRY WORKSHOP FOR TEACHERS.** (5 cr)  
Forest ecosystems and forest management studied in lecture and laboratory sessions conducted in a forest environment. In field exercises, techniques and materials are developed for teaching principles of forestry in indoor and outdoor classrooms. Tours to forest and wildlife research and management units and utilization locations, and discussions of contemporary forestry issues by guest lecturers.

**FOR GRADUATE STUDENTS ONLY**

- 8100. RESEARCH PROBLEMS: SILVICULTURE**

## Course Descriptions

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- 8101. RESEARCH PROBLEMS: FOREST-TREE PHYSIOLOGY
- 8102. RESEARCH PROBLEMS: FOREST-TREE GENETICS
- 8103. RESEARCH PROBLEMS: FOREST HYDROLOGY
- 8200. RESEARCH PROBLEMS: FOREST MANAGEMENT
- 8201. RESEARCH PROBLEMS: FOREST ECONOMICS
- 8202. RESEARCH PROBLEMS: FOREST MEASUREMENTS
- 8203. RESEARCH PROBLEMS: FOREST RECREATION
- 8204. RESEARCH PROBLEMS: FOREST POLICY
- 8205. RESEARCH PROBLEMS: REMOTE SENSING
- 8206. ADVANCED MANAGEMENT OF RECREATIONAL LANDS
- 8207. ECONOMIC ANALYSIS OF FORESTRY PROJECTS
- 8208. LEGAL AND POLITICAL PROCESSES IN FORESTRY
- 8209. SEMINAR: FORESTRY AND ECONOMIC DEVELOPMENT
- 8210. RESEARCH METHODS IN FORESTRY
- 8211. FOREST ECOSYSTEMS
- 8212. ADVANCED FIELD SILVICULTURE

## RELATED DEPARTMENTAL COURSES

Listed below are courses which are either required or recommended for the various curricula in the College of Forestry.

### Entomology (Ent)

- 5050. FOREST ENTOMOLOGY. (4 cr; prereq forestry major or #)  
Ecology and population management of forest insects with emphasis on tree factors and biological control. Lectures and laboratory.

### Fisheries and Wildlife (FW)

- 3052. PRINCIPLES OF FISHERIES AND WILDLIFE MANAGEMENT. (4 cr, \$5451, \$5561; prereq Biol 1106, EBB 3001 or 3004 or FR 3101, non-FW major)  
Introduction to fishery and wildlife population ecology; relations between fish and wildlife and their environments; management of fish and game populations and habitats; research methods; administration of fish and wildlife agencies.
- 3167. TECHNIQUES OF FOREST WILDLIFE MANAGEMENT. (1 cr; prereq 3052; offered at Cloquet)  
Biology and management of important forest wildlife species; methods of evaluating forest wildlife populations and habitats.
- 5129. MAMMALOLOGY. (5 cr, \$Zool 5129; prereq Zool 5124 or VB 1120 or #)  
Recent families and orders of mammals of the world and genera and species of mammals of North America, with emphasis on morphology, evolution, and zoogeographic history.

### Plant Pathology (PIPa)

- 5050. FOREST PATHOLOGY. (4 cr, \$1001; prereq Biol 1103 or equiv)  
Diseases of forest and shade trees; wood decay. Symptoms, etiology, and control. Lectures, laboratory, and field work.
- 5051. ADVANCED FOREST PATHOLOGY. (3 cr; prereq 5050 or equiv; offered 1976 and alt yrs)  
Basic concepts in the etiology, epidemiology, and pathogenesis of tree diseases and wood deterioration.

## Rhetoric (Rhet)

All students in the College of Forestry are required to take the following rhetoric courses: Rhet 1101 and 1102, Communication I and II; Rhet 1222, Public Speaking; and Rhet 3551, Professional Writing, or Rhet 3562, Scientific and Technical Writing. Additional requirements depend upon the particular curriculum for which the student is registered.

The Rhetoric Department also offers courses in humanities, literature, original writing, speech and dramatics. A number of these courses may be used to fulfill the distribution requirements in categories I, III, and IV. See the *College of Agriculture Bulletin* for course descriptions.

- 1101. COMMUNICATION I.** (4 cr)  
Writing from observation and personal experience. Emphasis on expository and descriptive prose that is clear, vigorous, honest, and economical. Attention to effectively written sentences and sound paragraph construction.
- 1102. COMMUNICATION II.** (4)  
Writing from research and personal observation. Emphasis on the research paper including techniques of drawing hypotheses, examining indexes and guides, selecting, evaluating, and organizing evidence, constructing paraphrases, and assembling footnotes and bibliography. Attention to effective sentences and forceful style.
- 1147. EFFICIENT READING.** (3 cr)  
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.
- 1222. PUBLIC SPEAKING.** (4 cr; prereq soph, completion of rhetoric communication requirement)  
Practical course in fundamentals of speechmaking. Emphasis on organizing the speech and projecting it to the audience.
- 1251. EFFECTIVE LISTENING.** (3 cr)  
Designed to increase listening comprehension by developing three central abilities. Reading, research, theory, and practice.
- 3551. PROFESSIONAL WRITING.** (4 cr; 3551 or 3562 is required of all students unless exempted through deptl exam; prereq jr)  
Projects and reports in professional communication: the résumé, application letter, interview; professional journals; the review of literature; specialized bibliographic tools; the feature article.
- 3562. SCIENTIFIC AND TECHNICAL WRITING.** (4 cr; 3562 or 3551 is required of all students unless exempted through deptl exam; prereq jr)  
Methods of exposition in scientific and technical writing; types of reports; audience analysis; continuous practice in report writing.

# V. STUDENT GOVERNMENT, FINANCIAL ASSISTANCE, AND CAREER OPPORTUNITY SERVICES

## Student Government

**Student-Faculty Board**—The Student-Faculty Board was created to establish and maintain open and meaningful communication among the faculty, student body, and administration of the College of Forestry. Its responsibility is to consider problems and to make recommendations to the dean concerning their resolution. Students on the board are chosen according to regulations designated in the Constitution of the college.

**Honor System**—Under the provisions of a self-governing honor system, the students in the College of Forestry rather than faculty members 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 for honesty is between student and student; the faculty does not place students on their honor.*

A student who observes an act of dishonesty during an examination period may take some appropriate step at the time to halt the act, or may report the incident later to the instructor or to a member of the College Honor Case Commission. The Honor Case Commission, comprised of student representatives from the various curricula, considers confidentially the situations reported. If it is clear that an act of scholastic dishonesty has occurred, the commission recommends to the Student Scholastic Standing Committee an appropriate action to be taken concerning the offending student. The membership of the Honor Case Commission is posted in 10 Green Hall together with a notice explaining how members may be contacted for information or assistance.

The honor system is essentially a preventive rather than a punitive system. New students are urged to discuss the honor system with other students registered in the college.

**St. Paul Campus Board of Colleges**—The St. Paul Campus Board of Colleges directs and coordinates student activities and encourages student leadership throughout the St. Paul Campus. Its membership is drawn from the Colleges of Agriculture, Biological Sciences, Forestry, Home Economics, and Veterinary Medicine. The board brings questions from the student body to the administration of the colleges and discusses and reaches decisions on matters of general interest.

The board cooperates with the Twin Cities Student Assembly and the Senate Committee on Student Affairs.

**Student Center Board of Governors**—The St. Paul Campus Student Center provides a varied program of social, cultural, and recreational activities and contributes in many ways to the educational objectives of the campus. Student participation in the activities of the Student Center is encouraged. The Board of Governors, whose members are students elected from 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 its various planning and programming committees should inquire at the information desk, first floor of the Student Center.

## **Career Opportunity Services**

The College of Forestry assists students in locating summer forestry work and permanent positions following graduation. The career opportunities coordinators are located in 8F Green Hall and in the Kaufert Laboratory. They bring job opportunities to the attention of students, advise students on individual job placement efforts, and assist in arranging interviews with employer representatives.

## **Financial Assistance**

Financial aid available to students includes: various scholarships supported by gifts from alumni, foundations, industry, and friends of the University and the College of Forestry; grants such as those of the Educational Opportunity and Regents' Student Aid Fund programs; loans from the National Defense Student Loan and the University Trust Fund Loan programs; and the College Work-Study program. One application to the Office of Student Financial Aid, 107 Armory, University of Minnesota, Minneapolis, Minnesota 55455, ensures consideration for all of these types of financial assistance. Application for scholarships specific to the College of Forestry can also be made directly to the Scholarship Committee of the College of Forestry.

Incoming freshmen should submit all applications for financial aid to the Office of Student Financial Aid. Application forms are available at the office of the principal or counselor of your high school or at the Office of Student Financial Aid. Financial aid information is sent to all Minnesota high schools in early October of each year; prospective students should consult with their high school principal or counselor at that time.

Applications from entering freshmen for aid for the fall quarter should be submitted by February 15 prior to the fall quarter they desire to enroll, and applicants are notified of the action taken by April 1. Students presently enrolled in the College of Forestry and transfer students should submit applications by March 1 for notification by August 1. Applications for Forest Products and Pulp and Paper Scholarships should be submitted to the Forest Products Scholarship Committee, College of Forestry, 203 Kaufert Laboratory.

Unless otherwise specified, selection of recipients for scholarships is based upon academic aptitude, vocational promise, personal attributes, leadership, and financial need.

## **INSTITUTE OF AGRICULTURE, FORESTRY, AND HOME ECONOMICS SCHOLARSHIPS AND AWARDS**

**Alpha Gamma Rho (Lambda Chapter) Scholarship**—To assist active members of Alpha Gamma Rho, Lambda Chapter.

**Alpha Zeta Traveling Scholarships**—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.

**University of Minnesota Memorial Fund Scholarship**—Preference given to children of deceased staff members of the University of Minnesota.

***Student Government, Financial Assistance, and  
Career Opportunity Services***

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**COLLEGE OF FORESTRY SCHOLARSHIPS AND AWARDS**

**Mary Dwight Akers Loan Fund**

Sponsor: Anonymous

Basis of Award: Limited loans as needed and approved by the dean.

**John H. Allison Scholarship**

Sponsor: Former members, Beta Chapter, Tau Phi Delta

Basis of Award: For students with special interests in forest economics, forest management, and related areas.

**Andersen Corporation Scholarship**

Sponsor: Andersen Corporation, Bayport, Minnesota

Basis of Award: Awarded to juniors and seniors enrolled in the residential housing specialization of the forest products curriculum on the basis of academic achievement and professional promise.

**Carolind Scholarship**

Sponsor: The late Dr. Ralph M. Lindgren

Basis of Award: Established to provide financial assistance to deserving and outstanding undergraduate students in the College of Forestry.

**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.

**Caleb Door Scholarships**

Sponsor: Caleb D. Dorr Fund

Basis of Award: Awarded annually to the forestry student in each class with the highest grade point average.

**Edward A. Everett Memorial Scholarship**

Sponsor: The late Edward 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.

**Henry Schmitz Forest Products Engineering**

Sponsor: Dr. Stanley J. and Mertie W. Buckman, Memphis, Tennessee

Basis of Award: Awarded to a junior or senior in the forest products curriculum on the basis of academic achievement and professional promise.

**Forest Products Marketing Scholarships**

Sponsor: Forest Industry Fraternity of Minneapolis and St. Paul

Basis of Award: Awarded to deserving and promising students entering the marketing specialization of the forest products curriculum.

**College of Forestry Scholarship Program**

Sponsor: Gifts from alumni of the College of Forestry

Basis of Award: For occasional small grants to especially needy and worthy students.

**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 College 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 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.

**Oscar L. Mather Scholarship**

Sponsor: Minnesota Federation of Women's Clubs and Mrs. Oscar L. Mather, Madison Lakes, Minnesota, in memory of her husband, a lumberman deeply interested in conservation.

Basis of Award: Book 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.

**Plum Creek Lumber Company Scholarship**

Sponsor: Plum Creek Lumber Company, Columbia Falls, Montana

Basis of Award: Awarded to juniors and seniors in the production management, marketing, and wood science and technology specialization of the forest products curriculum on the basis of academic achievement and professional promise.

**Pulp and Paper Scholarships**

Sponsors: Charles K. Blandin Foundation Scholarships, Boise Cascade Corporation Scholarship, DeZurik Corporation Scholarship, H. B. Fuller Company Scholarship, General Mills, Chemicals Incorporated and General Mills Foundation Scholarship, Helmick and Lutz Company Scholarship, Hoerner Waldorf Corporation Scholarship, Minnesota Section, Technical Association of the Pulp and Paper Industry Scholarship, Northwest Paper Foundation Scholarship, St. Regis Paper Company Scholarship, and Thiele Kaolin Company Scholarship

Basis of Award: Awarded to juniors and seniors in the pulp and paper specialization of the forest products curriculum on the basis of academic performance and professional promise.

## ***Student Government, Financial Assistance, and Career Opportunity Services***

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### **Henry Schmitz Memorial Scholarship Fund**

Sponsor: Gifts from alumni of the College of Forestry

Basis of Award: For occasional small grants to take care of special emergency needs.

### **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.

### **Augustus L. Searle Scholarship**

Sponsor: Augustus L. Searle

Basis of Award: To women in the College of Forestry, with preference to Minnesota residents.

### **Sonford Products Corporation Scholarship**

Sponsor: Sonford Products Corporation, St. Paul Park, Minnesota

Basis of Award: Awarded to juniors and seniors in the forest products curriculum on the basis of academic achievement and professional promise.

### **Helen A. Young Memorial Scholarship**

Sponsor: Mr. John Young, Rochester, Minnesota

Basis of Award: To assist qualified, competent, and needy students to initiate and complete their forestry education.

## VI. COLLEGE OF FORESTRY FACULTY

### *Dean Emeritus*

Frank H. Kaufert, Ph.D.

### *Professor Emeritus*

J. H. Allison, M.F.

R. M. Brown, M.F.

### *Professor*

Richard A. Skok, Ph.D., *dean*

Egolf V. Bakuzis, Ph.D.

Bruce A. Brown, Ph.D.

Robert W. Erickson, Ph.D.

David W. French, Ph.D.<sup>1</sup>

Roland O. Gertjens, Ph.D.

Alvin R. Hallgren, Ph.D.

Henry L. Hansen, Ph.D.

John G. Haygreen, Ph.D.

Ralph L. Hossfeld, Ph.D.

Frank D. Irving, Ph.D.

Herbert M. Kulman, Ph.D.<sup>2</sup>

Arnett C. Mace, Jr., Ph.D.

William H. Marshall, Ph.D.<sup>2</sup>

Lawrence C. Merriam, Jr. Ph.D.

Merle P. Meyer, Ph.D.

William R. Miles, Ph.D.

Marvin E. Smith, B.S.

Edward I. Sucoff, Ph.D.

Kenneth E. Winsness, M.F.

### *Associate Professor*

Alvin A. Alm, Ph.D.

Paul V. Ellefson, Ph.D.

Hans M. Gregersen, Ph.D.

David F. Grigal, Ph.D.<sup>4</sup>

Lewis T. Hendricks, Ph.D.

Carl A. Mohn, Ph.D.

Harold Scholten, Ph.D.

Robert D. Thompson, M.S.

Edwin H. White, Ph.D.

### *Assistant Professor*

James L. Bowyer, Ph.D.

Kenneth N. Brooks, Ph.D.

William Cromell<sup>5</sup>

Timothy B. Knopp, Ph.D.

Vilis Kurmis, Ph.D.

Ronald D. Neuman, Ph.D.

Dietmar W. Rose, Ph.D.

Donald E. Van Ormer, M.S.

### *Instructor*

Roy A. Mead, M.S.

Kurt N. Olson, M.S.

Rodney W. Sando, M.S.

Philip J. Splett, M.S.

### *Adjunct Professor*

John Crist, Ph.D.<sup>3</sup>

Douglas J. Gerrard, Ph.D.

Rolf Leary, Ph.D.<sup>3</sup>

David W. Lime, Ph.D.<sup>3</sup>

Allen L. Lundgren, Ph.D.<sup>3</sup>

### *Research Specialist*

Isabel F. Ahlgren, Ph.D.

### *Research Associate*

Clifford E. Ahlgren, M.S.

### *Teaching Specialist*

Thomas H. Schnadt, B.S.

### *Associate Scientist*

Raymond A. Jensen, B.S.

<sup>1</sup>Associate member from Department of Plant Pathology

<sup>2</sup>Associate member from Department of Entomology, Fisheries, and Wildlife

<sup>3</sup>Associate member from North Central Forest Experiment Station

<sup>4</sup>Associate member from Department of Soil Science

<sup>5</sup>Associate member from North Central Agricultural Experiment Station



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