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South Dakota State University 1978-79 Graduate School Bulletin

South Dakota State University

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ADDENDUM

OFFICERS OF ADMINISTRATION
Darrell Jensen, Dean, Division of Education, Associate Professor of Education; Ph.D., University of Iowa, 1971. Carol J. Peterson, Dean, College of Nursing, Professor of Nursing; Ph.D., University of Minnesota, 1969.

ADMISSION TO THE GRADUATE SCHOOL
Change of Status
Add: Complete transcripts are required for admission to a degree program. (Page 2)

Graduate Study by University Staff
Forms are obtainable from the Finance-Personnel Office (Page 5)

TUITION AND FEES
Thesis binding fee change from $5.00 to $7.00. (Page 6)
Footnote: graduate assistants, fellows and trainees on contract with the university pay one-third the resident tuition per credit. Students who are 65 or older pay one-fourth tuition. (Page 6)

Pages i-v reflect changes since the original printing of this bulletin (Vol. XLVIII, April 1977, Number 2) and are to be considered part of and subject to the same conditions as the original bulletin.

GRADUATE FACULTY STAFF CHANGES
See page ii.

COURSE CHANGES
See page iii.

PROGRAM CHANGES
See College of Nursing, page iv - v.

Due to conditions which may arise beyond the control of South Dakota State University, statements in this catalog may be changed without notice. In so far as possible, courses listed and approved by the Regents of Education will be offered; but the university reserves the right to modify any statement in accordance with finances and other unforeseen circumstances.

NOTICE
South Dakota State University offers all educational programs, materials, and services to all people without regard to age, race, color, religion, sex, handicap, or national origin, and is an Affirmative Action/Equal Opportunity Employer (Male/Female).

78 79 Graduate School Edition

SOUTH DAKOTA STATE UNIVERSITY BULLETIN

Volume XLVIII, April 1977, Number 2 (Second printing with revisions)
Published quarterly by South Dakota State University
Second-class postage paid at Brookings, S.D. 57007

For educational purposes, 3,200 printed at an estimated cost of 46 cents each—3-78—2304
1978-79 ACADEMIC CALENDAR

1978 Summer Session

May 15, Mon.-June 2, Fri. - Interim 3-week session
June 5, Mon. - Registration, eight-week session and first four-week session, 8 a.m. - 12 noon
June 5, Mon. - Aug. 1, Tues. - Eight-week session
June 5, - June 30, Fri. - First 4-week session
June 16, Fri. - Graduation cards due for Graduate students graduating Summer 1978
July 3, Mon. - No classes
July 4, Tues. - Holiday
July 5, Wed. - Aug. 1, Tues. - Second 4-week session
July 10, Mon. - Theses due, Graduate Office
July 20, Thurs. - Last day for final orals
July 27, Thurs. - Corrected theses due, Graduate Office
Aug. 1, Tues. - Classes close at 4:20 p.m.
Aug. 4, Fri. - Grades due in Registrar's Office by 5 p.m.

1978 First Semester

Aug. 28, 29, Mon., Tues. - Registration
Aug. 30, Wed - Classes begin
Sept. 4, Mon. - Labor Day holiday
Sept. 13, Wed. - Last day to add or drop a course and adjust final fees
Oct. 6, Fri. - Last day to submit graduation card
Oct. 9, Mon. - Pioneer's Day holiday
Nov. 10, Fri. - Veteran's Day holiday
Nov. 13, Mon. - Last day a course may be dropped
Nov. 22, Wed. - Monday classes
Nov. 22, Wed. - Theses due, Graduate Office
Nov. 22, Wed. - Classes close at 5:20 p.m., Thanksgiving recess
Nov. 27, Mon. - Classes resume
Dec. 5, Tues. - Last day for final orals
Dec. 11, Mon. - Corrected Theses due, Graduate Office
Dec. 16, Sat. - Graduation 10 a.m.
Dec. 18-22, Mon. thru Fri. - Semester exams
Dec. 28, Thurs. - Grades due in Registrar's Office by 5 p.m.

1979 Second Semester

Jan. 8, 9, Mon., Tues. - Registration
Jan. 10, Wed. Classes begin
Jan. 23, Tues. - Last day to add or drop a course and adjust final fees
Feb. 15, Thurs. - Monday classes
Feb. 19, Mon. - Washington's Birthday holiday
Feb. 23, Fri. - Last day to submit a graduation card
Mar. 2, Fri. - Classes close at 5:20 p.m., Spring recess
Mar. 12, Mon. - Classes resume
Mar. 27, Tues. - Last day a course may be dropped
Apr. 11, Wed. - Monday classes
Apr. 12, Thurs. - Theses due, Graduate Office
Apr. 12, Thurs. - Classes close at 5:20 p.m., Easter recess
Apr. 17, Tues. - Classes resume
Apr. 24, Tues. - Last day for final orals
Apr. 30, Mon. - Corrected theses due, Graduate Office
May 5, Sat. - 93rd Annual Commencement, 10 a.m.
May 7-11, Mon. thru Fri. - Semester exams
May 16, Wed. - Grades due in Registrar's Office by 5 p.m.
GRADUATE FACULTY STAFF CHANGES

Agricultural Engineering
change to Professor: DeBoer, Hellickson

Animal Science
Assoc. Professor J. W. McCarty, acting head
change to Assoc. Professor: Libal, delete Tuma

Botany-Biology
change to Professor: Granholm

Dairy Science
Assoc. Professor Myers Owens, acting head, delete Martin

Economics
change to Assoc. Professor: Lamberton

Education
Assoc. Professor Darrell Jensen, dean

Electrical Engineering
change to Professor: Nelson

Entomology-Zoology
delete Professor Stone (USDA)

General Engineering:
add Graetz, Knofczynski; delete Sandfort

Geography
add Assoc. Professor Opheim, Weinkauf,
Asst. Professor Ostergren; delete (USD) after Reeves

HPER
delete Assoc. Professor Boetel

Home Ec Ed
Asst. Professor D. Kluckman, acting head

Journalism & Mass Communicatin
Professor Richard W. Lee, chairman
add Assoc. Prof. Laird

Mathematics
change to Professor: Yocom

Mechanical Engineering
Assoc. Professor C. W. Knofczynski, acting head; change to Professor: Eno, Wnuk; delete Sandfort

Microbiology
delete Assoc. Professor Ellis

Physics
change to Professor: Tunheim;
add Assoc. Professor Leisure

Planning
change to Professor: Daves, Wagner; add Assoc. Professor Everett; delete Associate Professor Betz

Plant Science
delete Professor Penny (USDA)

Rural Sociology
change to Professor: Wagner; add Associate Professor Hess

Speech
Assoc. Professor Judith Zivanovic, chairperson; change to Professor: Widvey; add Professor Hoogestraat

Statistics
add Asst. Prof. Brown; delete Prof. Rumbaugh

Veterinary Science
Professor Vorhies, head; add Assoc. Professors Kirkbride, McAdaragh; delete Ellis, Reed, Ruth

Wildlife & Fisheries Science
delete Professor Hales (USDI)
THE GRADUATE BULLETIN

South Dakota State University—Brookings, South Dakota

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V. DUANE EVERETT, Acting Dean, Division of Education, Professor of Education, Ed.D., 1966, University of Nebraska.
AHLICE GILBERT, Dean, College of Home Economics, Professor of Home Economics Education; Ph.D., 1974, Iowa State University.
RAYMOND E. HOPPENSE, Dean, College of Pharmacy, Professor of Pharmacy; Ph.D., 1958, University of Minnesota.
GENEVIEVE B. JOHNSON, Dean, College of Nursing, Professor of Nursing; D.Ed., 1969, Columbia University.
R. MILTON RICH, Director Continuing Adult Education; M.S., 1949, South Dakota State University.
JUNIS O. STORRY, Dean, College of Engineering, Director of Engineering Experiment Station, Professor of Electrical Engineering; Ph.D., 1967, Iowa State University.
The Graduate School

GENERAL INFORMATION

An act of the Territorial Legislature, approved in 1881, provided for the establishment of what is now South Dakota State University. The institution granted its first Master of Science degree in 1891, its first Master of Education degree and its first Doctor of Philosophy degree in 1958. All graduate work was supervised by a committee until 1957, when the Graduate School was established.

A Graduate Council of seven members elected from the Graduate Faculty assists the Graduate Dean. The council includes: The Graduate Dean (chairman); two members from biological science; two members from physical science; two members from social science; and one member from education. The Dean of the Library serves as an ex officio member.

The Graduate Faculty is composed of the University President, Vice President for Academic Affairs, college deans, heads of departments in which graduate courses are given, and other faculty, chosen on the basis of their training and experience, in accordance with the policies of the Graduate School. All matters of policy and standards are acted on by the Graduate Faculty. In addition, Graduate Faculty are authorized to serve as adviser to graduate students or on their examining committee and to teach courses for graduate credit.

This bulletin deals only with the graduate programs of the institution. For material on undergraduate programs and for general information concerning South Dakota State, refer to the General Catalog. Information concerning summer school is published in the Summer Session Bulletin which may be obtained from the Graduate Office or from the Office of Student Services.

PURPOSES

The Graduate School provides an atmosphere for qualified students to obtain rigorous advanced education in a variety of fields in preparation for service and leadership in their professions and society. It also promotes scholarly pursuits and scientific research for the advancement of knowledge within a climate of freedom of inquiry.

ACCREDITATION

South Dakota State University is a land-grant university and as such subscribes to the land-grant philosophy of education, research, and extension as its three-fold mission. The Graduate School is a separate administrative unit composed of selected scholars within the university.

The graduate program of South Dakota State is accredited through the Doctoral degree by the North Central Association of Colleges and Secondary Schools, the regional accrediting agency for 19 states including South Dakota. The Graduate School is a member of the Council of Graduate Schools in the United States and the Midwestern Association of Graduate Schools.

The departments of Agricultural, Civil, Electrical, and Mechanical Engineering are accredited by the Engineers Council for Professional Development.

The curriculum in Journalism is accredited by the American Council on Education for Journalism.

The Chemistry Department is accredited by the American Chemical Society.

Preparation of secondary teachers, administrators and guidance counselors at the graduate level is accredited by the National Council for Accreditation of Teacher Education.

The University also holds membership in the American Council on Education, the National Association of State Universities and Land-Grant Colleges, the American Society for Engineering Education, The Association of Accredited Schools and Departments of Journalism, the American Library Association, the National Commission on Accrediting Agencies and the American Chemical Society.

ADMISSION TO THE GRADUATE SCHOOL

Students taking work beyond the Bachelor's degree, whether or not they intend to work for an advanced degree, may be classified as graduate students. Before enrolling in any graduate course, they must be admitted to the Graduate School.
To apply, a form supplied by the Graduate Office must be submitted to that office 15 days prior to the opening of the term. With the application, the following must be provided:

1. One official transcript of undergraduate coursework. This applies to graduates of South Dakota State as well as to graduates of other institutions. However, South Dakota State graduates who do not intend to work toward an advanced degree need not furnish a transcript. If some graduate work has been taken at another institution, one official transcript must be supplied for this also, even though the applicant may not wish to apply some of this work toward a degree here. For those making application prior to obtaining their Bachelor's degree, an incomplete transcript must be filed with the application. A complete transcript must then be filed during the first term in which the student takes graduate work. (Foreign students must submit a complete transcript at time of application).

2. An application fee of $15 except by former South Dakota State University, University of South Dakota, Dakota State College, Northern State College, Black Hills State College, or South Dakota School of Mines and Technology students.

3. A report of physical examination. This is required of all students except those taking less than 7 credits per semester, or those enrolled as undergraduates at South Dakota State during the previous year.

4. Two letters of recommendation from persons acquainted with the academic ability of the applicant. The Education Division requests that the two letters of recommendation come from persons having knowledge of the professional competency of the individual. These letters on forms supplied by the Graduate Office should be sent directly to the Graduate Office by the person writing them.

5. Students from foreign countries must also send the following with their applications:
   a. A statement as to whether financial assistance will be required from this institution.
   b. The results of the Test of English as a Foreign Language (TOEFL).

   Note: Students from foreign countries should file their applications at least four months in advance of registration.

After an application for admission and supporting documents are received, they are reviewed by the department concerned. Using the recommendations from the department, the Dean of the Graduate School acts on the application. He then notifies the applicant, the department or committee concerned, the Dean of Student Services and the Office of the Registrar.

Admission to the Graduate School requires that the applicant be a graduate of or a candidate for a degree from an institution of higher learning. The institution must be one of recognized standing, whose requirements are substantially the same as those of the department(s) of South Dakota State in which the advanced degree will be taken.

Transient Application

Students expecting to enroll in a limited number of courses (not over 10 hours) and who do not expect to work toward a degree, may use the transient application form, which does not require a transcript. Certification of Completion of a Bachelor's degree from an accredited institution is required, however.

Admission Without Condition

An applicant may be admitted without condition if a Bachelor's degree has been earned, all undergraduate prerequisites satisfactorily completed for major and minor fields of study, and had an average of "B" (3.0 or higher on a 4-point grading system; A=4, B=3, C=2, D=1); during the last two academic years of undergraduate work.
**Provisional Admission**

Provisional admission may be granted if:

1. The applicant has a 3.0 or higher grade point average for the last 3 semesters but has not completed the last semester of undergraduate study. Admission is provisional until the Bachelor's degree is granted. (Provided a 3.0 or higher grade point average is maintained for the last two years.)

2. The applicant lacks prerequisite undergraduate courses specified by the major department. Admission is provisional until these courses have been completed without graduate credit and to the satisfaction of the department.

3. The applicant has a low grade point average between 2.4 and 3.0 for his junior-senior years.

A student admitted provisionally must remove any provisions as soon as possible. Departments will assign advisers to such students. Failure of a student to do satisfactory graduate work at any point in his program is sufficient grounds for dismissal or reclassification as a nondegree or Special student.

Students with a junior-senior grade point average below 2.75 and who have pass-fail (or equivalent) grades shall have instructors for such courses furnish letter grades or furnish satisfactory G.R.E. scores.

**Nondegree Admission**

Students not meeting the above admission requirements, those enrolled only in evening or Extension classes, those not working toward a degree or transient students may be granted admission and take courses as nondegree or special students.

Students with nondegree or Special student status may request and be granted a change in status to work toward a degree provided 10 credits of graduate work have been completed with grades of "B" and provided the student enrolls full time in on-campus courses. Generally no more than 10 credits under nondegree or Special student status may be applied toward a degree. Any change in this status will have to be approved by the department concerned and the Graduate Dean.

Nondegree or Special students may not be granted Graduate Assistantships nor enroll for thesis credits. The Graduate Dean will act as adviser for these students.

**Change of Status**

Students admitted provisionally or as Special students (nondegree) may request a change of status after satisfactorily completing 10 hours or more of graduate work. This request should be submitted to the Graduate School, after which it will be submitted to the appropriate department for a recommendation.

**Readmission**

Students formerly enrolled as graduate students at South Dakota State (not enrolled the previous semester) must apply for readmission at least one month prior to registration. Forms for this purpose should be obtained from the Graduate School.

Official transcripts for graduate work taken at other institutions since enrollment must be furnished at this time.

It may be desirable to arrange for a personal interview with the head of the major department prior to registration.

**Graduate Record Examination**

Submission of the results of a Graduate Record Examination is not a requirement for admission to the Graduate School. However, any department may impose such a requirement, either prior to admission or during the time graduate work is being conducted.

**Graduate Credit for Seniors**

Seniors within 15 credits of completing a Bachelor's degree at South Dakota State may request permission from the Dean to take not more than 6 credits of 600 or 700 level courses for graduate credit. Permission requires the student to have a grade point average of 2.5, or a junior-senior grade point average of 3.0 or better and not enroll for more than 18 credits (9 credits during summer school). Forms for requesting permission to take courses for graduate credit should be obtained from the Graduate Office.
**Graduate Study by University Staff**

Full-time members of the research, instructional, or extension staffs may enroll for up to seven credits of course work per semester. Two credits may be carried during the Summer Session. Not more than 12 credits may be carried during the calendar year. Staff will pay application fee.

Permission to enroll must be obtained from the head of the department, Dean of the College, and the President. The proper form, obtained from the President's Office, should be completed and presented to the Office of Student Services, when registering. Staff members, wishing to take courses but not working toward a degree at this institution, should obtain and complete an application form (available at the Graduate Office). Staff members (below rank of Assistant Professor) intending to work toward a degree at this institution must complete the usual graduate school application form.

Staff members above the rank of instructor, including courtesy appointments, may not work toward an advanced degree at this institution.

**Departmental Requirements**

Individual departments may impose additional admission requirements to their department. Inquire of the department in which you are interested concerning such requirements. Applicants for a graduate degree in guidance and counseling, for example, must meet the following additional requirements:

1. Hold a personal interview with the supervisor of counselor education, who may require the applicant to meet with a board prior to approving admission. Such a board would include staff members from guidance and counseling, education and the applicant's supporting field.
2. Two letters of recommendation (on forms supplied by the Graduate School) supporting the application from persons having knowledge of the professional competency of the individual.
3. Evidence of satisfactory physical and mental health as determined by the Director of Student Health Services at South Dakota State.

Students in guidance and counseling may be required to present evidence of satisfactory physical and mental health prior to readmission or continuation of the program.

**Post-Doctoral Study**

Post-doctoral students or eminent scholars who desire temporarily the privileges of the research facilities, staff counsel, library or seminars at the institution and who are not candidates for a degree, may pursue study upon recommendation of the head of the department and Dean and/or Director concerned and approval of the Dean of the Graduate School and the President.

**REGISTRATION**

Details of the procedure for registering are in the semester schedule available prior to each registration. Graduate students report to the Graduate Office as the first step of their registration, to receive further instructions.

**Normal and Maximum Credit Loads**

The normal credit load per semester during the academic year is 12 credits for the full-time student. During the four week summer session the load is 3 credits. During the eight week summer session it is 6 credits (maximum of 9, except 10 for students with a G.P.A. of 3.25 or higher). Workshops are included in these normal and maximum loads.

The maximum credit load for graduate assistants is as follows:

<table>
<thead>
<tr>
<th>Maximum credits student may carry during the:</th>
<th>Academic Year</th>
<th>Summer Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-fourth time assistant</td>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>One-half time assistant</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td>Three-fourths time assistant</td>
<td>15</td>
<td>3</td>
</tr>
</tbody>
</table>

In calculating credit loads, audit courses are included at full value. Undergraduate courses are also included at full value.
South Dakota State University

TUITION AND FEES*

Academic year:

- Application fee (new students only) .................................................. $15.00
- Tuition per credit hour, undergraduate level courses (resident) ................. $17.50
- Tuition per credit hour, undergraduate level courses (non-resident) .......... $41.00
- Tuition per credit hour, graduate level courses (resident) ...................... $28.75
- Tuition per credit hour, graduate level courses (non-resident) ............... $55.00
- University Fee—Graduates, 0-3.9 credits ........................................... $10.00
- 4 credits and above .............................................................................. $25.00

Fee

- $10.00 Activity Card stamped “Limited Activity”
- $25.00 Activity Card stamped “Restricted Activity.” No health service coverage and ID card not good for Athletic Events.
- $68.00 Activity Card stamped “Full Activity.”

Optional Activity

1. All students enrolled 0-3.9 credits may at their option purchase a full activity card at an additional cost of $58.00.
2. All students enrolled 4-6.9 credits may at their option purchase a full activity card at an additional cost of $43.00.
3. No student may opt to remove him or herself from one mandatory fee level to a lower level.

Extension courses: Tuition per credit hour (graduate level) ....................... $27.50
(undergraduate level) ................................................................. $20.50

Summer Sessions:

See Summer Session catalog for tuition and fees.

Other Fees:

- Late registration fee: A late registration fee of $10 is charged all students who enroll and pay their registration costs after the time announced for that purpose.
- Fees for auditing courses: The regular tuition per credit will be charged for auditing a course. Fee waived for all personnel on University contract. Registration as an auditor requires the consent of the department concerned. Such registration carries permission to listen only, and no examination or credit is given. Registration for audit is accomplished by add slip after registration day.

Additional Fees for Graduate Students

Before the thesis for a degree is presented to the Graduate Office in final form, a $5 payment must be made to cover in part the cost of binding the two library copies.

Before the Doctor of Philosophy degree is granted the candidate must pay $25 to cover the cost of microfilming the thesis and publishing the abstract in “Microfilm Abstracts.”

Registration for Thesis 790, Thesis Sustaining. All graduate students who have completed the thesis credits specified on their Plans of Study are required to register and pay tuition for Thesis 790, Thesis Sustaining, each semester (including Summer) until they complete their theses.

FINANCIAL AND OTHER INFORMATION

Fellowships and Assistantships

A number of fellowships, research and teaching assistantships are available to well-qualified graduate students. Recommendations for granting these are handled by the departments. Students interested in obtaining such financial assistance should write directly to the department in which they expect to do their major work.

Obligation Incurred in Accepting an Assistantship

The Graduate School of South Dakota State, as a member of the Council of Graduate Schools in the United States, subscribes and adheres to the following resolution regarding scholars, fellows, trainees, and graduate assistants: In every case in which a

*Subject to change by action of Board of Regents.
Graduate Assistants, Fellows and Trainees on contract with the University pay one-third the resident tuition per credit. Students who are 65 or older pay one-third tuition.
graduate scholarship, fellowship, traineeship or graduate assistantship for the next academic year is offered to an actual prospective graduate student, the student, if he (she) indicates his (her) acceptance before April 15, will have complete freedom through April 15 to submit in writing a resignation of his (her) appointment in order to accept another scholarship, fellowship, traineeship, or graduate assistantship. However, an acceptance given or left in force after April 15 commits him (her) not to accept another appointment without first obtaining formal release for the purpose.

**Housing for Graduate Students**
Prospective graduate students should inquire about rooms or apartments of the Director of Student Housing, well in advance of registration.

**Living Costs**
Living costs, including tuition and fees, for the single resident graduate student are estimated to be $3,000 to $4,000 per academic year. Travel costs are not included.

**Graduate Courses During Summer Sessions**
Many departments offer graduate courses during the summer. For information concerning the courses to be offered, write the Graduate Office and request a Summer Session Bulletin.

**Credit Restriction for Workshops**
While any number of credits may be earned in workshops, no more than two such credits may be applied toward an advanced degree.

**Credit Restriction for Problems Courses**
No more than four credits in problems courses may be counted toward the Master of Arts, Master of Science or Master of Education degree. No more than six credits of problems courses (beyond the Bachelor's degree) may be counted toward the Doctor of Philosophy degree.

**Correspondence Courses**
Correspondence courses are not given at the graduate level at this institution. Neither is transfer credit allowed for correspondence courses taken elsewhere.

**Grades for Thesis and Seminars**
Graduate students usually register for thesis credit during several semesters. However, thesis advisers may give only an incomplete grade (I) each term in which the student enrolls for thesis credit until satisfactory completion of the thesis and final oral examination. The thesis adviser, upon satisfactory completion of the thesis and final oral, will then give a satisfactory grade (E) for all thesis credit by notifying the Registrar. If not satisfactory a grade of unsatisfactory would be given. At the discretion of the instructor a letter grade or a grade of Satisfactory (E) or Unsatisfactory (F) may be given for Seminars.

**Filing a Graduation Card**
Not later than four weeks after registration for the term in which a student expects to receive the advanced degree, a graduation card must be filed with the Graduate Office. Failure to file this card will result in a delay in graduation.

**Scholastic Requirements**
No credit is given toward a graduate degree for any grade below "C" in 600 or 700 level courses, or "B" in 300 or 400 level courses. In addition, all work in the major must average "B" (3.0) and all work in the minor or in supporting courses must average "B" (3.0). Grades for transfer courses are not used in calculating these grade point averages.

A graduate student must attain a "B" average (3.0) in all 600-700 level courses taken and 300 and 400 level courses used in his graduate program taken from South Dakota State University.

**Cap, Gown, and Hood Rental**
Caps, gowns, and hoods for Commencement may be rented from the Student Association Bookstore in the Student Union.
Attendance at Commencement

All students are urged to participate in the Commencement exercises at which their degree is to be granted. Attendance is optional, however. Students must notify Student Services of their intent to attend or not on a card mailed to them shortly before Commencement.

Extension and Evening Students

Graduate students enrolling in Extension or evening classes will be admitted as non-degree students. Those students having less than a 2.4 junior-senior grade point average should not expect to earn a graduate degree, unless they demonstrate exceptional competence in their graduate work.

Furthermore, students cannot complete all requirements for a degree with Extension and evening classes. A minimum of one semester of full-time on-campus work will be required.

Outdating of Course Work

Courses taken more than six years prior to completion of the Master's degree are considered outdated. Credit for courses taken more than six years before completion may be applied to a Master's only if the course is repeated, or if an examination covering the material is certified as passed by appropriate faculty member.

The rules of the Graduate School in effect at the beginning of the seventh year following admission to work toward a Master's degree will apply if the degree has not been granted by then.

Transfer of Credits

Graduate credits earned at other institutions may be applied toward the Master's degree. Such credits must be approved for transfer by the student's adviser and by the Dean of the Graduate School. Usually this is done at the time a Plan of Study is approved. Such a transfer for a Master's degree is limited to 7 credits in the major and 3 credits in the minor or supporting course area.

Credits for transfer courses are allowed only if a grade of "B" or better was earned; the course is not outdated, and an official transcript is furnished. Courses with grades of "P" or equivalent cannot be transferred unless certification is received from the instructor that a grade of "B" or higher was earned.

Library Facilities

H. M. Briggs Library is located adjacent to the new University Student Union on the north side of the campus. Opened in 1977, it features open stacks for all books, journals, microform texts, pamphlets, and reference materials except rare books. The library provides seating for 1,000 readers, including thirty-six faculty and graduate studies, and 400 individual carrels. Holdings number 296,000 volumes in the general collection, 240,000 U. S. and state documents, 90,730 microtext items, plus several thousand pamphlets.

Degrees and Fields of Study

South Dakota State offers the Master of Science, the Master of Arts, the Master of Education, and the Doctor of Philosophy degree. The student who wishes to become a candidate for an advanced degree must not only fulfill these requirements but meet those of the major and minor department as well.

THE MASTER OF ARTS AND MASTER OF SCIENCE DEGREES

The Master of Science degree is offered with the following majors:

<table>
<thead>
<tr>
<th>Agricultural Engineering</th>
<th>Geography</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agronomy</td>
<td>Health, Physical Education</td>
</tr>
<tr>
<td>Animal Science</td>
<td>and Recreation</td>
</tr>
<tr>
<td>Biology *</td>
<td>Home Economics</td>
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<tr>
<td>Chemistry</td>
<td>Industrial Management</td>
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<tr>
<td>Dairy Science</td>
<td>Journalism</td>
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<tr>
<td>Economics</td>
<td>Mathematics</td>
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<tr>
<td>Engineering</td>
<td>Microbiology</td>
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<tr>
<td>Entomology</td>
<td>Plant Pathology</td>
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*See page 18 for description of multi-departmental program.
The major fields shown above may also be selected as minor fields. In addition, Botany, History, Political Science, Mechanized Agriculture (Agricultural Engineering Department) or Planning may be chosen as a minor.

The Master of Arts degree is offered with an English or Speech major. English or Speech also may be selected as a minor field.

The Advisers
Each student in the Master's degree program will choose a major adviser, who is a member of the graduate faculty, through consultation with the head of the department in which the major is being taken. A minor adviser is also chosen when a minor field is selected. The major adviser should be chosen prior to registration for the first semester of work, and the minor adviser as soon thereafter as possible. At the option of the department, the Graduate Faculty representative may be selected when a research topic is chosen.

Residence and Credit Requirements
A minimum of 30 graduate credits beyond the Bachelor's degree is required for the Master of Arts and the Master of Science degree. The minimum residence requirement for this degree is 20 graduate credits. In addition a minimum of one semester or two summer sessions of full-time graduate work (12 semester hours) must be spent on campus. Residence credit is given only for graduate credit earned in courses offered by South Dakota State.

Requirements for the Major
A minimum of 19 credits out of the 30 required for a Master's degree must be earned in the major. The thesis must account for 5 to 7 of these. Courses for the major must be taken in the major department or in related fields.

Requirements for the Minor or Supporting Courses
A minimum of 8 credits must be earned in the minor or supporting fields for a Master's degree. Supporting courses in two or more departments may be taken in lieu of a minor if approved by the major adviser.

Courses in the major department may be used as supporting courses, provided they are considered sufficiently diverse by the major department.

Plan of Study
A Master's degree student during the first term of study must work out a Plan of Study. The plan should be worked out with the adviser, approved by the adviser and head of the major department, and submitted on an appropriate form to the Graduate dean, prior to the end of the first semester of graduate work. The student's major adviser and others concerned will be notified of action taken by the Dean.

After approval, changes in the Plan of Study must be requested on a form furnished by the Graduate Office. Changes must be approved by the adviser, department head and Dean.

Admission to Candidacy
Admission to the Graduate School does not imply admission to candidacy. A student is submitted as a candidate only after 20 graduate credits have been earned (transfer credits may apply), provided: (1) the grade point average is "B" or better in the major and "B" or better in the minor or supporting courses, (2) reasonable progress has been made in the research for the thesis, (3) an approved program of study is on file at the Graduate Office, and (4) the major adviser recommends it.

A student must be admitted to candidacy before taking his oral examination.

The Thesis
Students completing a Master of Arts or Master of Science degree in areas requiring a thesis must submit a thesis meeting the requirements of the Department and the Graduate School. All theses, when appropriate, must include a list of non-standard abbreviations and symbols that are used in the thesis. Other requirements of the Grad-
The thesis should represent a scholarly contribution to knowledge by the candidate of research related to the major field. Although the thesis accounts for 5 to 7 credits in the major, the number of credits is not necessarily related to the amount of research completed. Thesis credits are given for both the research writing required for the thesis. Grades for thesis are turned in as Incomplete (I) until the oral examination. If the thesis is accepted by the examination committee, the major adviser and the Dean of the Graduate School, a grade of Satisfactory (E) is given for all thesis credits.

The original copy of the thesis must be filed with the Graduate Office for examination at least 10 days (excluding Sundays and holidays) before the oral examination. The student should distribute one copy to each member of his committee. The original and one copy, corrected in accordance with suggestions by the examination committee and the Graduate Office, must be returned to the Graduate Office with a receipt from the Library showing that $5 has been paid for the cost of binding. This should be completed five days prior to commencement.

Non-thesis Options

Students may complete a Master of Science degree in the Health, Physical Education and Recreation Department or the Mathematics Department without a thesis under options "B" or "C." Option "B" requires a minimum of 32 credits of course work, including two hours for a research paper and a comprehensive oral examination. Option "C" requires a minimum of 35 credits of course work and comprehensive written and oral examinations. Obtain further details from the department.

Students may complete a Master of Science degree in Agricultural Engineering, Biology, Economics, or Engineering without a thesis under option "B." Option "B" requires a minimum of 32 credits of course work, including two hours for a research or design paper and a comprehensive oral examination. Obtain further details from the department.

Students also may complete a Master of Arts degree in English without a thesis under Option "C." Option "C" requires a minimum of 35 credits of course work and comprehensive written and oral examinations. Obtain further details from the English Department.

Language Requirement

There is no general language requirement for the Master's degree. However, individual departments may require a speaking or reading knowledge of a foreign language.

Examination

Candidates for a Master's degree are required to pass an oral examination covering the research and courses included in the graduate program. This must be done 10 days (excluding Sundays and holidays) before Commencement.

The examining committee includes (1) the major adviser (chairman), (2) a member of the Graduate Faculty appointed by the Dean and representing the Graduate Faculty, (3) one additional representative from the major field, and (4) one representative from the minor or supporting course field. The major adviser selects the committee members (except for the representative of the Graduate Faculty), and submits their names to the Dean of the Graduate School for approval.

THE MASTER OF EDUCATION DEGREE

The Master of Education degree is offered under two options (see Residence and Credit Requirements below) and with the following majors: Agricultural Education, Education, and Guidance and Counseling.

The Advisers

Each student in the Master of Education degree program will choose a major adviser, who is a member of the graduate faculty, through consultation with the head of the department or the chairman of the committee concerned. A major adviser is chosen prior to registration for the first semester of work, and the minor adviser should be chosen as soon thereafter as possible.
Residence and Credit Requirements

Minimum residence requirement for the Master of Education degree is 22 graduate credits for Plan A and 25 graduate credits for Plan B, including a minimum of one semester or two summer sessions of full-time graduate work (12 semester hours) on campus.

The Master of Education degree is offered under two options. Option A requires no thesis but does require a research report. Option B requires no thesis nor research report. The credit requirements for the options are:

Option A: A minimum of 32 graduate credits beyond the Bachelor's degree. Two credits must be earned as a research problem in the major field.

Option B: A minimum of 35 graduate credits beyond the Bachelor's degree. No research problem is required, but a comprehensive written examination is required in addition to the final oral examination.

Requirements for the Major

Option A: Of the 32 graduate credits required 21 (including 2 for the research problem) must be earned in the major.

Option B: Of the 35 graduate credits required, 24 must be earned in the major.

Requirements for the Minor or Supporting Courses

At least 8 graduate credits must be earned in the minor or in supporting courses under either Option A or Option B. When supporting courses are taken in lieu of the minor, they are selected from two or more departments with the approval of the major adviser. Courses in the major department may be used as supporting courses, provided they are considered sufficiently diverse by the major department.

Plan of Study

During the first term of work, a graduate student should plan with his/her adviser(s) the Plan of Study for the Master of Education degree. This plan, approved by the adviser(s) and the head of the major department or the committee chairman concerned, is submitted on the appropriate form to the Dean of the Graduate School for approval. It must be submitted prior to the end of the first term of graduate work. The student, major adviser, and others concerned will be notified of action taken by the Dean.

Once the Plan of Study is approved, all changes must be requested on a form furnished by the Graduate Office. To be allowed, these changes must be approved by the adviser, the department head or committee chairman, and Dean of the Graduate School.

Admission to Candidacy

Admission to the Graduate School does not imply admission to candidacy. A student is admitted as a candidate only after 20 graduate credits have been earned (transfer credits may apply) provided: (1) the grade point average in the major and in the minor or supporting courses is "B" or better; (2) reasonable progress has been made in the research report in the case of Option A students, (3) an approved program of study is on file at the Graduate Office, and (4) the major adviser recommends it.

The Research Report (Option A)

The research report required under Option A is based on research in the major field. It is written in accordance with instructions outlined in, "Instructions for Theses and Research Reports," available in the Graduate Office.

The research problem must account for two credits in the major. The credits are included in the minimum of 21 required in the major. The research is not considered complete until its methods and findings have been recorded in a form acceptable to the major adviser, the examination committee, and the Dean of the Graduate School.

A copy of the research report must be filed at the Graduate Office 10 days (excluding Sundays and holidays) before the oral examination. Following the oral examination and approval of the research report, the original and first copy are delivered bound to the major department office. This must be done five days before Commencement.
Examinations

Option A: Candidates for the Master of Education degree under Option A must pass an oral examination covering the research and courses included in the graduate program. A written examination over the course work is required by the department. This must be done not less than 10 days (excluding Sundays and holidays) before Commencement. Before taking either examination, the student must be admitted to candidacy.

Option B: Candidates under Option B must pass a comprehensive written examination over the coursework in their program. A department, with the concurrence of the Graduate Faculty representative, may require or dispense with an oral examination. This Graduate Faculty representative will be appointed prior to the written examination by the Dean at the request of the department in order to participate in determining whether to exempt a student.

The examining committee under either option is composed of: (1) the major adviser (chairman), (2) a member appointed by the Dean and representing the Graduate Faculty, (3) one additional representative from the major field, and (4) one representative from the minor or supporting field. Except for the representative of the Graduate Faculty, the major adviser selects the committee members, subject to the approval of the Dean of the Graduate School.

Minor in Planning

The Minor in Planning is offered at the Master degree level in cooperation with the departments of Economics, Education, Engineering, Geography and Sociology. The primary purpose of the Minor in Planning is to prepare students majoring within appropriate academic departments for employment with organizations involved in planning in South Dakota. A secondary purpose is to provide courses which can be taken by students who desire to increase their knowledge of the planning process and methods.

The Minor in Planning (Master's degree level) and the teaching of the Planning courses are governed by a Coordinating Committee appointed by and responsible to the Vice President for Academic Affairs.

In addition to the requirements for a major, the following requirements apply to the Minor in Planning:
- Successful completion of courses PLAN 691 and PLAN 692.
- Successful completion of at least six credits in departmental courses selected from the list of specialized Planning or Planning-related courses approved by the Coordinating Committee and outside of the major department.

It is expected but not specifically required that a graduate student electing this minor will in addition to the above requirements include in his major program any specialized planning course(s) offered within his major department, and include some emphasis on Planning in special problem(s), internship or thesis.

THE DOCTOR OF PHILOSOPHY DEGREE

The Doctor of Philosophy Degree is offered with the following majors: Agronomy, Animal Science (offered in the Animal Science or Dairy Science Departments), and Sociology.

Admission Requirements

Applicants for the Doctor of Philosophy degree program usually must have a Master’s degree. Those not meeting this requirement will be required to complete a Master’s degree unless they have a grade point average of “B” (3.0) or better for the last two years of undergraduate study.

Residence and Credit Requirements

Three academic years of full-time work beyond the Bachelor’s degree (minimum 90 credits including transfer and thesis credits) are required for the Doctor of Philosophy degree. Credit earned for the Master’s degree may be applied. The minimum residence requirement is 50 credits at South Dakota State and one academic year of full-time work (or the equivalent in continuous half-time work) toward the Doctor of Phi-
losophy degree. Those on full-time faculty appointment and graduate assistants may satisfy the continuous residence requirement in one academic year.

The individual area or department in which the Doctor of Philosophy degree is granted, or the student's advisory committee, may require more credits and residence than the minimum indicated above if they feel it is in the best interest of the student (also, see Research Tool Requirement).

**Outdating of Program and Coursework**

If the Doctor of Philosophy degree is not completed within eight years from admission to work toward the degree, a reconsideration of the student's program will be necessary. In such cases, the rules of the Graduate School governing at the beginning of the ninth year will become effective for the student.

A course taken eight years previously cannot be applied toward the Doctor of Philosophy degree except by permission of the advisory committee and the Dean of the Graduate School. Certification of updating may be accomplished by completion of a form from the Graduate School by the Advisory Committee.

**The Advisory Committee**

During the student's first semester in residence the major adviser will recommend to the Dean members of an advisory committee as follows:

1. The major adviser who acts as chairman of the committee.
2. The head or representative of the major department or of a department in the area of the major.
3. An additional member of the major department or a related department.
4. The minor adviser or a representative from an area where the supporting courses will be taken.
5. In addition, the Dean will select a fifth member from a department representing an area not closely related to the major or minor department or area. This member represents the Graduate Faculty insuring that its rules and regulations are followed by the Committee. The above five members shall be members of the Graduate Faculty.

Additional members of the committee may be asked for by the student or the major adviser and assigned to the committee by the Dean.

**Plan of Study**

Within six weeks after appointment, the advisory committee will meet with the student to plan a complete Plan of Study and to consider a thesis topic. The Plan of Study must be forwarded to the Graduate Office within two weeks after the meeting. The Plan is subject to approval by the Dean, and until it is approved the student cannot take the preliminary examination.

Any changes in the Plan of Study, once it is approved, must be approved by the advisory committee and the Dean of the Graduate School.

Appropriate forms for the Plan of Study and changes are available at the Graduate Office.

**Transfer of Credits**

Graduate credits earned at other institutions may be applied toward the Doctor of Philosophy degree if they were earned in residence at the institution at a grade of at least "B," and if they are approved by the advisory committee and the Dean. Transfer credits cannot substitute for credits required for minimum residence (See Residence and Credit Requirements).

Requests for transfer credits must be supported by an official transcript filed with the Graduate Office.

**The Major**

At least 60 credits of the 90 required for the degree must be earned in the major. Thesis, transfer, and Master's degree credits may apply. Not all courses need to be in a single department or area, but all courses applying to the major should be closely related to it.

**The Minor or Supporting Courses**

At least 15 credits of the 90 required for the degree must be earned in a minor or in supporting courses (coursework chosen from two or more fields). Transfer credits and
credits from the Master's degree may apply. All courses applying in the minor or supporting fields must be taken outside the major department or area. Courses in the major department may be used as supporting courses, provided they are considered sufficiently diverse by the major department.

**Research Tool Requirements**

Each department with the approval of the Graduate Council shall determine the research tool requirements for their students. Research tools involving fields not closely related to the field of study and used in advanced research may include foreign languages, statistics, computer programming, or other areas. Credits earned in attaining proficiency in research tools may not be included in the degree program. Specific departments should be consulted for their requirements.

**Preliminary Examinations**

When coursework has been substantially completed and the research tool requirement has been met, preliminary examinations covering coursework are taken. The first is a comprehensive written examination which is followed on satisfactory completion by an oral examination.

The advisory committee arranges for examinations and conducts them at times approved by the Dean. Review of the examination is accomplished by all members of the advisory committee, the results are reported to the Dean of the Graduate School on the appropriate form and copies of the written examination are filed in the major department office.

The preliminary examinations must be completed satisfactorily six months before the final examination is taken.

**Admission to Candidacy**

Upon satisfactory completion of the preliminary written and oral examinations a Ph.D. student is admitted to candidacy. Thereupon a student must register continuously each semester during the academic year (fall, spring and summer) until the Ph.D. is awarded. Registration shall be for courses, including thesis, or by Thesis 890. Thesis Section II. Failure to do so will automatically terminate candidacy for the degree. Reinstatement requires retaking the preliminary examination.

**The Thesis**

The thesis should represent one academic year of full-time research. Of no specific length, it should advance or modify knowledge and demonstrate the candidate's mastery of the subject. The instructions in "Instructions for Thesis and Research Reports," copies of which are available at the Graduate Office, must be followed in preparation of the thesis. When submitted, it is accompanied by an abstract of 600 words or less.

After the manuscript is typed and approved by the major adviser, the original is delivered to the Graduate Office 10 days (excluding Sundays and holidays) prior to the final oral examination. After the thesis is found acceptable as to form by the Graduate Office, copies are delivered to the advisory committee for their examination.

After the final oral examination, all necessary corrections in the thesis are made and the first two copies are delivered to the Graduate Office five days prior to commencement. A $5 fee is paid at the library to cover the cost of binding the two library copies. The student must also go to the library and sign an agreement relating to the publication of the abstract and the microfilming of the thesis. At this time a fee of $25 covering the cost of microfilming must be paid. This must be done five days prior to commencement.

**The Final Examination**

The final oral examination is scheduled no sooner than six months following satisfactory completion of the preliminary examinations, and after the candidate's coursework and thesis have been completed. It is conducted by the advisory committee at a time and place announced by the Graduate Office.

While the advisory committee determines the character and length of the examination, sufficient time should be devoted to the thesis to test the ability of the candidate to defend the research. In addition, questions to test the candidate's general knowledge, judgment, and critical powers are usually asked.

The final oral examination must be completed 10 days prior to commencement.
Courses of Instruction

COURSE NUMBERING SYSTEM

300-499 series

Courses numbered 300 through 499 are advanced undergraduate courses. They are not listed in this bulletin, but are listed in the general catalog. They may be used in meeting part of the requirements for graduate degrees in accordance with the following:

1. Total credit for courses in this series, when applied to a graduate program, will be reduced by 20 percent discarding all fractions. After such conversion, these credits are defined as "converted credits," which are then considered as graduate credits in meeting the requirements for the various degrees, provided that a grade of at least "B" is attained in each course in this series. For example, if eight credits are earned in this series, they would be equivalent to six graduate credits.

2. For the Master of Arts, Master of Science or Master of Education degrees, no more than seven converted credits may be applied to the graduate program. They may be applied in the major, minor, or supporting course areas.

3. For the Doctor of Philosophy degree, no more than 10 converted credits may be applied to the graduate program. They may be applied in the major, minor, or supporting course areas.

4. Transfer credits may not be applied.

5. Converted credits may not be applied without the permission of the major adviser or advisory committee, the minor adviser (when applicable), and the Dean of the Graduate School.

NOTE: When credits in the 300-499 series are applied to a graduate program, they are entered on the transcript without notation. It is doubtful, therefore, that they could be transferred as graduate credit to another institution.

500-599 series

Courses numbered 500-599 are advanced undergraduate courses open to selected undergraduate students (Juniors and Seniors, only) having the necessary prerequisites. Such courses, except for fifth year pharmacy courses, may not be used as a requirement for the Bachelor’s degree, but may serve as electives in an undergraduate program.

600-699 series

Courses numbered 600-699 are graduate level courses but are open to senior students for graduate credit if they meet the following requirements:

1. Within 15 credits of completing Bachelor’s degree;
2. Have an overall grade point average of 2.5 or higher, or a Junior-Senior grade point average of 3.0 or higher;
3. Enroll for no more than 18 credits (9 credits during Summer School);

700-799 series

Courses numbered from 700 through 799 are graduate level and are open to graduate students only (except seniors by permission. See page 4).

800-899 series

Courses numbered 800 through 899 are doctoral and post doctoral level open only to doctoral students or those holding an earned doctoral degree.

900-999 series

Courses numbered 900 through 999 are post-baccalaureate and not for degree credit.

ABBREVIATIONS USED

Cr, Credit  P, Prerequisite  F, Fall semester  S, Spring semester  Su, Summer session  Other abbreviations explained in text.
Graduate major offered: Master of Science degree with major in Agricultural Engineering. The Agricultural Engineering courses listed below are also offered in support of the Master of Science in Engineering program (See College of Engineering).

Graduate minors offered: Agricultural Engineering, Mechanized Agriculture.

Prerequisites for graduate study:
For the graduate major a Bachelor of Science degree in engineering or its equivalent. For the graduate minor prerequisites to the graduate courses elected.

Two Options for Master of Science Degree:
Option A requires a minimum of 30 semester credits, including a thesis and a comprehensive oral examination.
Option B requires a minimum of 32 semester credits, including a two-credit design paper and a comprehensive oral examination.

Agricultural Engineering (AE)

603 Energy and Environment 3(3,0)
Advanced studies in energy transfer which pertain to agricultural crops, soils, climatology, fluids, machinery dynamics, and other materials. P, ME 411 PS 352 or equivalent courses. F 1978 or demand.

612 Advanced Agricultural Tractors and Machines 2(2,0) F 1978
Units of instruction will be selected from the following areas: Tractor chassis mechanics and transmissions, hydraulics, human factors considerations for agricultural machine operators, soil dynamics in tillage and machine-plant concepts. P, Math 321, and AE 464 or equivalent. Alternate years.

622 Bio-environmental Engineering 2(2,0) F
(Offered in F 1977)
Analysis of farm animals and their environment employing engineering principles combined with biological principles. Homeothermic mechanisms of animals and the influence of thermal environment upon growth and production. P, AE 324. Alternate years.

633 Advanced Irrigation Engineering 3(2,3) F 1977
Basic soil-water-crop relationships. Theory and design of pumping plants, surface irrigation systems, sprinkle irrigation systems and trickle irrigation systems. Design of pipe network distribution systems. P, 434 or consent of instructor. Odd years. S 1979

642 Engineering Phases of Crop Processing 2(2,0)
F 1978
Study of the physical properties of agricultural crops and engineering principles as they apply to cutting, shearing, collecting, packaging, transporting, drying, handling and storing of agricultural products. P, 444. Even years.

652 Theoretical Micro-Climatology 2(2,0) S 1978
Derivation and application of physical laws to air layer near the ground occupied by plants and animals. Instruments used to take measurements in layer near ground. P, Calculus, Physics, AE 353.

663 Instrumentation 3(2,3) F

695 Special Topics 1-3 Cr.

732 Advanced Hydrology in Agriculture 2(2,0) F 1978
Study of small watershed hydrologic principles. The components of the land phase of the hydrologic or water cycle are studied and a study of the synthesis and interaction of these components is introduced. Mathematical relationships which describe the hydrologic components are reviewed and used to simulate components of the hydrologic cycle on the digital computer. The principles of soil erosion from small watersheds are also studied and applied to field problems. P, 434. PS 352, FORTRAN or consent of instructor. Alternate years.

733 Ground Water Engineering in Agriculture 3(3,0) F 1977
Study of saturated ground water movement. Presentation of theory and procedures for the design of subsurface drainage systems and water supply systems. Introduction of legal aspects of ground water use and pollution. P, EM 331. Alternate years.

763 Programming Agricultural Systems 3(2,2)
(Offered in S 1978)

770 Special Problems in Agricultural Engineering 1-2
(On demand)
Graduate students who wish to pursue detailed studies in one or several areas of the Agricultural Engineering field including meteorology and climatology.
771 Graduate Seminar 1(1,0)  
Discussion and reports of current topics and investigations in Agricultural Engineering. (Limit of 2 credits.)

772 Similitude 2(1,2) S 1978  
A systematic approach to the principles and theory of dimensional analysis, problems of model design and tests. The use of true, distorted and dissimilar models as they pertain to engineering design and research.

790 Thesis 5-7

Mechanized Agriculture (MA)

600 Special Topics 1(4 day workshop, 6 hrs/day)  

612 Advanced Farm Machinery 2(1,3) Su  
(Offered in 1978)  
Operation, care, adjustment, new developments in farm machinery, with emphasis on field and farmstead machinery as related to needs of agricultural production. Alternate years.

622 Advanced Farm Structures 2(1,3) Su  
(Offered in 1979)  
Materials for farm construction; construction methods and techniques; new developments in farm building. Alternate years.

DEPARTMENT OF ANIMAL SCIENCE

Professor Harold Tuma, Head

Professors Briggs, Carlson, Dearborn, Dinkel, Embry, Kamstra, Kohlmeyer (Emeritus), Kohler, Luther, Morgan, Wahlstrom, Johnson (Emeritus); Associate Professors Bush, Gartner, Lewis, McCarty, McConne, Slyter; Assistant Professor Libal

Graduate majors offered: Master of Science degree with a major in Animal Science. Doctor of Philosophy degree with a major in Animal Science.

Graduate minors offered: Animal Science.

Research toward the graduate degrees in this department may be pursued in the areas of animal breeding, animal nutrition, animal physiology, meat technology, range management, or poultry nutrition.

Prerequisites for graduate study:

For the graduate major a Bachelor's degree including not less than 12 credits in Animal Science.

For the graduate minor a Bachelor's degree including prerequisites for the graduate courses elected.

Animal Science Courses (AS)

623 Population Genetics 3(3,0) S (Offered in 1977)  
Genetic structure of populations, and forces affecting this structure. Theories of biological variation, race and species formation. P, Bio 371 or equivalent. Stat 641 or equivalent highly recommended. Alternate years.

631 Animal Nutrition 3(3,0) S (Offered in 1977)  
Principles of nutrition in relation to growth, reproduction, lactation, fattening and work. P, Ch 260 and Z 325 or equivalent. Alternate years.

632 Animal Nutrition Laboratory 2(0,6) S  
(Offered in 1977)  
Laboratory methods course involving demonstration and practical work in techniques used in animal nutrition research. P, Ch 260. Alternate years.

634 Avian Nutrition 3(2,2) S (Offered in 1976)  
Nutritional requirements and deficiency signs, peculiarities of digestive physiology, formulation of diets and dietary effects upon quantity, quality and efficiency of production of chickens, turkeys, pheasants, ducks, geese. P, 223, desirable antecedent 366, 333. Alternate years.

653 Meat Technology 4(2,4) S (Offered in 1976)  
Basic physical, chemical, microbiological and historical characteristics of meat and effects of various processing methods on meat products and by-products. P, 241. Alternate years.

681 Wild Lands Seminar 1(1,0) S  
Guest lectures and review of current research and action programs in use of wild lands. P, 322 and senior standing. Limit 2 credits.
691 Research Problems 1-3 FSu
Investigation of problems in the following areas with results submitted as a technical paper:

692 Special Topics 1-3 FS
Advanced study of one or more selected topics such as nutrition, physiology, research methodology, or marketing.

711 Ruminology 3(3,0)
See Dairy Science 711 for description.

731 Experimental Procedure 2(2,0) S
Research methods and planning of experimental work, necessary records, interpretation of results and presentation of material. Introduction to research applications of linear programming. P, Stat 641 or equivalent.

732 Advanced Physiology of Reproduction
3(2,2) S (Offered in 1976)
Anatomical and physiological processes of reproduction in domestic animals with special emphasis on research techniques and the findings of recent research. P, 433.

733 Nutritional Interrelationships 3(3,0) F
Relationships between nutrients in metabolism. Substitution and sparing effects. Comparing metabolic significance of required nutrients for different animal species.

781 Graduate Seminar 1 (1,0) FS
Reports and discussion of current research in animal science. Maximum of two credits for M.S. and four credits for Ph.D.

782 Nutrition Seminar 1 (1,0) FS
Reports and discussion of current research in nutrition. Maximum of two credits.

790 Thesis, Master of Science 5-7 Cr.

890 Thesis, Ph.D.

DEPARTMENT OF BOTANY AND BIOLOGY

Professor G. A. Myers, Head
Professors Chen, Holden, Miller (Emeritus), Morgan, Taylor
Associate Professors Granholm, Haertel, Hutcheson, Whalen

Graduate majors offered: Master of Science degree with major in Biology, thesis or research paper options.

The M.S. degree in biology is a multidisciplinary program which allows the student breadth of coursework at the graduate level while specializing in the thesis or research paper area. The BS/MS program should include coursework in levels of biological organization from the molecule to the biome. The major area can be selected from course offerings in several departments and thus advising will be from staff of participating departments. More information concerning the MS in biology can be obtained from the Dean of Instruction, Room 135, Ag Hall, SDSU.

Graduate minors offered: Botany or Biology.

Prerequisites for graduate study:
For the graduate major a Bachelor’s degree, including 24 credits in biological sciences or consent.
For the graduate minor a Bachelor’s degree, including 16 credits in biological sciences, or consent.

Two Options for Master of Science Degree:
Option A requires a minimum of 30 semester credits, including a thesis and a comprehensive oral examination.
Option B requires a minimum of 32 semester credits, including two credits of Biology 793, “Biological Research Problems” and a comprehensive oral examination.

Black Hills Natural Sciences Field Station:
South Dakota State University has joined with other universities and colleges in the state of South Dakota to jointly sponsor the Black Hills Natural Science Field Station. The summer course offerings of the field station include courses in Biology, Geology and Anthropology. Courses are available each summer for both graduate and undergraduate credit. Special topics and independent studies are also available. For additional information, contact the Department of Botany-Biology, Sociology, or Entomology-Zoology.

Botany Courses (Bot)

615 Advanced Plant Ecology 4(2,3) Su 1977
Theoretical analysis of the trophic-dynamic or energy relationships of communities with emphasis on productivity. Literature readings. Laboratory work in techniques of community analysis. P, consent of instructor. Alternate years.
627 Advanced Plant Physiology 4(1,6) S  
(Offered in 1978)
Role of organic and inorganic compounds in plant nutrition. Emphasis on photosynthesis, respiration, metabolism, and other cellular processes. P, 424, Ch 120. Alternate years.

685 Growth and Development 4(1,6) S  
(Offered in 1977)
Relations of light, temperature, water, wind, growth regulators, nutrients and other factors to various stages of plant growth and development. P, 424, Ch 120. Alternate years.

607 Principles and Techniques in Electron Microscopy 3 FS
Techniques and instruments basic to the preparation, examination and interpretation of specimens with the electron microscope.

651 Biology of Algae 4(2,6) S (Offered in 1977)
Physiology, ecology, taxonomy and evolution of algae. Laboratory includes identification and field and laboratory techniques. P, two years of biological science and one year of chemistry. (To be designated)

697- Special Topics FS

790 Thesis in Botany 5-7 as arranged

Biology Courses (Bio)

697 Special Topics FS

790 Thesis in Biology 5-7

792 Graduate Seminar 1(1,0) FS

793 Biological Research Problems 2-4

DEPARTMENT OF CHEMISTRY

Professor Harry G. Hecht, Head

Professors Brandwein, Emerick, Gehke, Greb (Emeritus), Greichus, Halverson, Jensen, Johnson, Kenefick, Klug (Emeritus), Olson, E., Olson, O., Palmer, Washworth Webster (Emeritus), Worman, Whitehead; Associate Professors Grove, Hilderbrand, Rue; Assistant Professor Guss (courtesy)

Graduate majors offered: Master of Science degree with a major in Chemistry.

Graduate minors offered: Chemistry.

Prerequisites for graduate study:
For the graduate major a Bachelor's degree with a major in professional chemistry.
For the graduate minor a Bachelor's degree including prerequisites to the graduate courses elected.

Chemistry Courses (Ch)

634 Analytical Spectroscopy 3(3,0) S  
(Offered in 1978)
In-depth treatment of the quantitative applications and theory of modern spectroscopy techniques including atomic absorption, emission, and fluorescence; molecular absorption and fluorescence; and X-ray spectroscopy. P, 434. AY

636 Chromatography and Separations 3(3,0) S  
(Offered in 1977)
Theory and practice of solvent extraction and paper, thin layer, gas and liquid chromatographic techniques. P, 232. AY

642 Advanced Physical Chemistry 3(3,0) S
A review of the principles and applications of physical chemistry. Several topics such as thermochongy, quantum mechanics, spectroscopy, kinetics, and electrochemistry will be considered. P, 344.

644 Chemical Thermodynamics 3(3,0) F  
(Offered in 1978)
Discussion of the laws and theories of classical and statistical thermodynamics as related to macroscopic chemical systems. P, 344. AY
646 Atomic and Molecular Structure 3(3,0) F
   (Offered in 1977)
   Introduction to quantum mechanics and theoretical treatment of chemical structure and binding. P, 328, 344, or concurrent registration in 344. AY

652 Descriptive Inorganic Chemistry 3(2,3) F
   (Offered in 1977)
   Discussion centered on periodic relationships of the elements. The laboratory work includes preparation and purification of typical inorganic compounds. P, 120 (4 credits), 232, 354. AY

654 Advanced Inorganic Chemistry 3(3,0) S
   General discussion of inorganic systems including theoretical, representative group and transition metal topics. P, 452 or 344.

660 Radioisotope Techniques 4(3,3) S
   Theory and measurement of radioactivity. Techniques for the application of radioactive isotopes in chemical and biological experimentation. P, consent of instructor.

662 Principles of Biochemistry 3-5(3,0 or 3,6) F
   Chemistry of biological processes occurring in plants and animals. P, 260.

681 Bioinorganic Chemistry 3(3,0) F
   (Offered in 1978)
   A study of biological systems stressing the role of metal ions, primarily the transition metals. Model systems included in the discussion. P, 120 (4 credits), 354 or consent of instructor. AY

691 Special Problems *(0,*) FS

720 Special Topics in Organic Chemistry 1-6
   (Offered in 1978)
   One term advanced courses taught upon demand and covering such topics as stereochemistry, advanced synthetic organic chemistry, etc. P, consent of instructor.

Individualized studies in mass spectrometry, electroanalytical, trace analysis, or instrumentation and introduction, trace analysis, or instrumentation and electronics. P, consent of instructor.

740 Special Topics in Physical Chemistry 1-6
   One-term advanced courses taught upon demand covering such topics as electrochemistry, surface chemistry, kinetics, quantum chemistry, etc. P, consent of instructor.

750 Special Topics in Inorganic Chemistry 1-6
   One term advanced courses taught upon demand and covering such topics as coordination chemistry of transition elements, structural determinations, etc. P, consent of instructor.

760 Special Topics in Biochemistry 1-6
   Selected concepts covering the more advanced concepts in the biochemistry field, new research techniques, etc. P, consent of instructor.

764 Biochemistry I 3(3,0) S (Offered in 1977)
   Biological processes with special emphasis on the catabolism of carbohydrates, lipids, amino acids and generation of phosphate bond energy. P, 662. AY

766 Biochemistry II 3(3,0) S
   (Offered in 1978)
   Biological processes with special emphasis on the anabolism of carbohydrates, lipids, amino acids, and nucleic acids. The transfer of genetic information. P, 662. AY

772-773 Seminar 1(1,0) FS
   Required of all graduate majors in chemistry.

790 M.S. Thesis in Chemistry 1-7 credits
   The following Physics courses may be used in either the graduate major or minor program.

Phys 635 Reactor Physics 3(3,0) S
Phys 637 Science of Solids 3(3,0)
Phys 743 Statistical Mechanics 2(2,0)
Phys 775 Advanced Quantum Mechanics 3(3,0)
Phys 779 Group Theory in Quantum Mechanics 3(3,0)
DEPARTMENT OF CHILD DEVELOPMENT AND FAMILY RELATIONS
Professor Jay Richardson, Head

The following Child Development and Family Relations courses are offered to support the Master of Science in Home Economics program (see College of Home Economics) as well as other graduate programs in the University.

Child Development and Family Relations Courses (CDFR)

602 Seminar in Human Development and Family Relations 1-2 (1-2,0) (On sufficient demand)
Reports and discussions of current literature, including research methodology in areas of human development, personality, family relations, marriage and family counseling. Maximum of 4 credits may be applied on advanced degree. P, consent of instructor.

644 American Woman 2(2,0) S
(On sufficient demand)
Recent literature regarding changing role of woman, her development tasks, and unique contribution she has to make in dynamic 20th century America. P, 342, or equivalent.

DEPARTMENT OF CIVIL ENGINEERING
Professor E. E. Johnson, Head
Professors Dornbush Koepsell, Larson, Rollag, Shoukry

The following Civil Engineering courses are offered to support the Master of Science in Engineering program (see College of Engineering), as well as other graduate programs in the University.

Civil Engineering Courses (CE)

623 Environmental Engineering 3(3,0) F
The relationship of man's environment to his health and control of this environment from an engineering standpoint. P, consent of instructor.

624 Industrial Waste Treatment 2(2,0) S
Characteristics and composition of industrial wastes, sampling and methods of analysis of these wastes and remedial measures for treatment and disposal. P, 423 or equivalent.

625 Environmental Engineering Planning 3(3,0)
Analysis and review of basic concepts and procedures involved in environmental aspects of planning. Consideration is given to the local effects of projects as well as the effects on the area and the state or region. Graduate standing or consent.

626 Water Quality Analysis 3(1,6) F
The chemistry and interpretation of process control tests for the use and treatment of water and waste water. Application of test results to the design of water and waste water treatment works. P, 327.

627 Water Treatment Plant Design 3(1,6) F
Water supply sources, design of treatment plants, cost estimates of water supply systems. P, graduate standing.

628 Waste Water Treatment Plant Design 3(1,6) S
Design of waste collection and disposal facilities, waste treatment plants, cost estimates of waste disposal and treatment systems. P, graduate standing.

634 Fluvial Hydraulics 3(3,0) S
Erosion, transportation and deposition of sediments by flowing water, bed load and suspended load movement, river behavior, control. P, 433.

636 Foundation Engineering 3(3,0)
Bearing capacity, load induced pressures and settlements, soil exploration and sampling, lateral earth pressure, retaining walls, sheet pile structures, pile foundations and caissons. P, CE 446.

637 Hydraulic Design 3(3,0) F
Hydraulic design as applied to hydro-electric power development and turbine design, flood routing in reservoirs and natural channels, design of drainage structures, energy dissipators. P, 433.

638 Advanced Hydraulics 3(2,3) S
Introduction to topics related to water resources engineering including: dimensional analysis, similarity, mechanics of sediment transport, river engineering, coastal hydraulics and stream channel mechanics. P, 433.

646 Advanced Soils Engineering 3(2,3) S
Application of basic soil mechanics to engineering problems. Stability, compaction, embankments, seepage, draining, stabilization. P, 446.

651 Plastic Design 2(0,6) F
Modes of failure, plastic hinges, design rules and applications. P, graduate standing.

652 Prestressed Concrete 3(3,0) Su
657 Advanced Indeterminate Structural Analysis 3 (3,0) F
Analysis of structural members of non-uniform section. Arch analysis, multilevel frameworks, column analogy, movement distribution and energy methods. P, graduate standing.

659 Advanced Structural Mechanics 3 (2,3) S
Matrix methods, arches and rings, buckling, structural dynamics, computer solutions. P, 353, 455.

663 Pavement Design 3 (3,0) S
Stresses in and design of flexible and rigid pavements including subgrades, bases and sub-bases. P, 363.

690 Special Engineering Problems 1-3 FS
Elective course for special or detailed study or investigation. P, senior standing in Civil Engineering.

695 Special Topics 1-3
Special topics in the field of Civil Engineering. P, Graduate standing or consent.

723 Advanced Sanitary Engineering 3 (3,0) S
Advanced engineering topics related to sanitary engineering and public health, including housing, air conditioning and ventilation, air pollution, hospital and institutional sanitation, stream sanitation, waste disposal, radiological health and industrial hygiene.

733 Water Resources Engineering 3 (3,0) S
Advanced topics related to water resources engineering including: Multiple purpose river development, economic analysis of flood control measures, aspects of water law, advanced topics related to surface and ground water hydrology and administrative aspects of water resources planning. P, 433.

756 Advanced Structural Design 4 (2,6) S

763 Highway Administration and Economy 3 (3,0) Su
Highway administration, highway and transportation costs, road user benefits, cost benefit ratio.

764 Advanced Transportation Engineering 3 (2,3) F
Planning and designing of railroads, highways, water and air transportation facilities and coordination of transportation facilities.

790 Thesis FS Su
Independent investigation of special problem and written thesis.

DEPARTMENT OF DAIRY SCIENCE

Professor J. H. Martin, Head
Professors Baker, Dracy, Spurgeon, Voelker; Associate Professors Bartle (Emeritus), Parsons, Schingoethe

Graduate majors offered: Master of Science degree with a major in Dairy Science.
Doctor of Philosophy degree with a major in Animal Science.

Graduate minor offered: Dairy Science.

Prerequisites for graduate study:
For the graduate major a Bachelor’s degree with major work substantially equivalent to that required by this department.
For the graduate minor a Bachelor’s degree including prerequisites to the graduate courses selected.

Dairy Science Courses (DS)

612 Physiology of Lactation 3 (3,0) S
(Offered in 1979)

622 Advanced Dairy Microbiology 3 (2,3) S
(Offered in 1978)
Role of microorganisms in manufacture and spoilage of manufactured dairy products. P, 301. Alternate years.

631 Laboratory Techniques in Dairy Science 2 (0,6) F
(Offered in 1978)
Current research techniques in Dairy Science including photometry, electrophoresis; and column, thin-layer, and gas chromatography of milk and plant or animal tissues. P, Ch 260 or consent. Alternate years.

690 Dairy Science Problems 1-3 FS Su
Investigation of problems in dairy production or dairy manufacturing. Results submitted as a technical paper. P, consent of instructor.

702 Seminar 1 (1,0) S
Research report writing, oral reports and discussion of current research in dairy production, dairy manufacturing, and related sciences. Maximum of 2 credits will be allowed toward either the Master of Science or Doctor of Philosophy degree.

711 Ruminology 3 (3,0) F (Offered in 1979)
Biochemical, physiological, and microbiological activity occurring in the rumen and the relation of rumen function to animal response. P, AS 631 or consent. Alternate years.

782 Nutrition Seminar 1 (1,0) F (Offered fall only)
Reports and discussion of current research in nutrition. Limited to 2 credits.

790 M.S. Thesis in Dairy Science (as arranged)
890 Ph.D. Thesis (as arranged)
DEPARTMENT OF ECONOMICS

Graduate majors offered: Master of Science degree with a major in Economics.

Graduate minor offered: Economics.

Prerequisites for graduate study:
A Bachelor's degree is prerequisite. A background in the social sciences and statistics is helpful, but not essential, as the department will fit the program to individual needs. Additional background, which would be helpful to the student pursuing a graduate degree in economics, would include mathematics, history, philosophy and English. An early exposure to foreign languages may be important to those contemplating further graduate work.

Two Options for Master of Science Degree:
Option A requires a minimum of 30 semester credits, including a thesis (5 credits) and comprehensive written and/or oral examinations.
Option B requires a minimum of 32 semester credits, including a research paper (2 credits) and comprehensive written and/or oral examinations.

All students must complete the core requirements plus sufficient graduate hours in a specialty area, a minor in another department, or supportive courses.

Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Econ 624</td>
<td>Advanced Quantitative Economics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 701</td>
<td>Research Methods</td>
<td>2</td>
</tr>
<tr>
<td>Econ 703</td>
<td>Advanced Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Econ 704</td>
<td>Advanced Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>Stat 641</td>
<td>Statistical Methods II</td>
<td>3</td>
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</tbody>
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Specialty Areas

Agricultural Economics

Required:
- AgEc 670 Advanced Farm and Ranch Management 3
- Econ 672 Resource Economics 3
- AgEc 630 Agricultural Marketing and Prices 3
- Recommended: (select one)
- Econ 760 Market Power and Strategies 3
- AgEc 478 Agricultural Finance and Appraisal 3

AgEc 479 Agricultural Policy 3

Public Sector and Development

Required:
- Econ 730 Economics of the Public Sector 3

Agricultural Economics (AgEc)

630 Agricultural Marketing and Prices 3 (3,0) F
The marketing environment; market structure, performance and conduct; measurement and forecasting; pricing problems and policies; financing and risk; marketing alternatives; efficiency; market power; social, legal, and ethical issues; marketing and policy.

670 Advanced Farm and Ranch Management 3 (3,0)

690 Special Problems 1-3 (1-3,0) FS
Advanced work or special problems in agricultural cooperation, agricultural finance, farm management, land economics, marketing, public finance, statistics. Open to qualified seniors and graduate students by consent.
600 Economics for High School Teachers (Workshop) Su
Basic course for preparation of High School economics instructors. Purposes of economic analysis, goals of a high school economics course, adaptation of student’s prior knowledge to economic analysis, application of graphic and mathematical tools to micro and macro economic analysis, behavioral vs. quantitative approaches to analysis, and interpretation of economic phenomena.

604 History of Economic Thought 3 (3, 0) S
Survey of economic theory; various schools of economic thought and economic environments which produced them. P, 401 or consent.

610 Economics of National Development 3 (3, 0) S
Identification and analysis of economic factors, including physical, human, social forces involved in economic development. Special emphasis given to institutional arrangements and economic aspects of local, district, state, national economic planning development.

624 Advanced Quantitative Economics 3 (3, 0) S
Econometric and other quantitative methods applied to decision-making. Topics studied will normally involve market and income models, linear programming, queuing theory, inventory models, and simulation. P, 326.

640 Economics of the International Sector 3 (3, 0) F

660 Economics of Regional Development and Planning 3 (3, 0) S
Uses of economic theory and analysis in various public planning activities. Review of applicable economic growth theories, regional science methods, and principles of land and resource economics. Examination of how these concepts are applied in the planning process. P, 202 or consent.

672 Resource Economics 3 (3, 0) F

690 Special Problems 1-3 (1-3, 0) FS
Advanced work in special problems in finance, management, marketing, public finance, statistics. Open to qualified seniors and graduate students by consent.

701 Research Methods 2 (2, 0) F
Planning, conducting, analyzing, and reporting economic research. Formulation and testing of hypotheses. Methods of summary and analysis. Sources of data.

702 Seminar in Economics 1 (1, 0)

703 Advanced Macroeconomics 3 (3, 0) S
Modern, advanced macroeconomic models related to economic growth and maintenance of high level of income and employment.

704 Advanced Microeconomics 3 (3, 0) F
Selected branches of microeconomics, including welfare theory and partial and general equilibrium.

705 Applied Economic Theory FS
Practice in the application of micro- and macroeconomic theory to solutions of real and hypothetical problems. Selection, use of appropriate statistical techniques, research methods. Analytical methods suitable for complex problems.

730 Economics of the Public Sector 3 (3, 0) F
Governmental operations, policies, and revenues as related to employment, productivity, and economic welfare. Alternatives that would affect social services, education, commerce and trade, fiscal policies, and quality of life.

760 Market Power and Strategies 3 (3, 0) S

790 Thesis as arranged

DIVISION OF EDUCATION
Professor Duane Everett, Acting Dean
Professors Foreman, Gallda, Larsen, Schmieding, Scholten, Sundet (Emeritus), Associate Professors Betz, Edeburn, Hanson, Herold (Emeritus), Jensen, Lindstrom, Widvey

Graduate majors offered: Master of Education degree with a major in Education, Agricultural Education, or Guidance and Counseling.

Graduate minors offered: Agricultural Education, Education, Guidance and Counseling.

Prerequisites for graduate study:
For the graduate major in Education a Bachelor’s degree including completion of the curriculum at this institution (or its equivalent) for High School General Certificate for South Dakota.
For the graduate major in Agricultural Education a Bachelor’s degree including completion of the curriculum at this institution (or its equivalent) for approval as a
teacher of Vocational Agriculture in South Dakota, 9 credits in general education, and a course in elementary psychology.

For either of the above majors, 8 credits of sciences and mathematics are required, and at least one year of successful teaching experience in public schools is recommended.

The graduate program in guidance and counseling is designed to provide the professional preparation, supervision, and competencies expected of qualified student personnel and guidance staff members to serve in public and private schools and in higher education positions. Graduates are also prepared to hold jobs in numerous related occupations.

For the graduate major in guidance and counseling, both a Bachelor's degree and a teaching certificate are required for those preparing to be school counselors. An alternate method for counselor certification in South Dakota only is the completion of a 500 clock-hour internship beyond the Master's degree in Guidance and Counseling.

Mature students with a vocational commitment, or those with a goal other than public school employment, may enter the graduate degree program in guidance and counseling without meeting requirements for the High School General Certificate for South Dakota. Candidates with deficiencies may be required to take courses in guidance and psychology for undergraduate credit.

The Graduate Program in Education is designed to provide professional preparation above the Bachelor's Degree for teachers. The program includes the following options: (1) Education Administration Program, (2) Teacher Education Program, (3) a major in the teaching field and a minor in education. (See details under departmental areas.) For the graduate major in Educational Administration the Bachelor's Degree and a teaching certificate are required. Admission to the program does not require experience. However, it is recognized that those persons who complete the program should qualify for an Administrative Certificate. The state of South Dakota issues an Administrative Certificate on the basis of the Master's Degree and two years of successful teaching experience. Majors must also complete the data sheet for candidates and provide the department with two letters of recommendation from persons who have knowledge of their professional competencies. Applicants may be asked to meet with the Departmental Selection Committee prior to admission.

Note: Anyone who does not meet the above qualifications because of unusual circumstances may be approved for graduate study if he meets the approval of the Dean of the Education Division and the Dean of the Graduate School.

For the graduate minor a Bachelor's degree and prerequisites for the graduate courses elected.

The courses in the Education Division are divided into the following areas: Agricultural Education (AgEd), Adult Higher Education (AHEd), Counseling, Guidance and Personnel Services (CGPS), Driver's Education (DrEd), Educational Administration (EdAd), Education, Evaluation and Research (EdER), Educational Foundations (EdFn), Elementary Education (ElEd), Educational Psychology (EPsy), Secondary Education (SeEd), and Vocational Teacher Training Education (VTTE).

**Adult Higher Education Courses (AHEd)**

600 Special Problems in Extension 2-6 cr. FSSu

Individually assigned investigative problems in Extension. Individual conference with Laboratory and/or field work. Arrangements with Extension staff must be made prior to registration.

610 Adult Teaching and Learning 3 (3,0) Su

Emphasize teacher behavior in relation to adult learning. Social and cultural factors and their effects on learning process.

681 Workshop in Adult and Continuing Education 1-3 FSSu

Workshop sessions, in several areas of education: methods, curriculum, guidance, administration, supervision and others. Generally requires 45 hours of work per credit in workshop sessions, lectures, and outside assignments. Concentrated course. Credit at rate of one credit per week. P, experienced teachers, consent of instructor.

682 Seminar 1-3 FSSu

Review of scientific investigation of problems in education. Problems for investigation and research assigned to students. P, open to seniors and graduate students in education by permission of instructor.
South Dakota State University

689 Internship in Education 1-6 (0.6) FSSu
On-the-job participation under supervision of local leader and a staff member from University. P, consent of instructor.

691 Problems in Adult and Continuing Education 1-3 Cr.
Selected studies to meet needs of advanced students. P, consent of instructor.

711 Organization and Administration of Adult Education 3 Cr.
Organization, development of Adult Education programs. Particular emphasis on Adult Basic Education.

Agricultural Education Courses (AgEd)

605 Seminar in Agricultural Education 1-2 (1,0) or (2,0)
Specific problems dealing with instruction in vocational agriculture, project work, course of study, farm enterprise analysis, local survey. Reading and problem work. P, 434, 404, 475.

606 Problems in Agricultural Education 1-3
Selected studies to meet needs of advanced students. P, senior standing, for seniors and graduate students desiring to do individual studies. Limited to 3 credits in graduate program. Consent of instructor.

706 Adult Education in Agriculture 2 (2,0) Su
Young farmer and adult farmer work. Emphasizes needs and techniques in administering and conducting adult education programs in vocational agriculture; course planning, instructional procedures, follow-up and evaluation of adult classes. P, graduate student in Agricultural Education.

Counseling, Guidance and Personnel Services Courses (CGPS)

600 The Exceptional Child 3 (3,0) SSu
Critical consideration of physical, social, emotional, and intellectual qualities which characterize children who deviate from normal to such an extent as to require special educational consideration. Special attention given to study of desirable provisions in educational program of gifted children.

603 Elementary School Guidance 3 (3,0) FSSU
The principles of guidance and their application at the elementary level. Emphasis is on the function of the counselor in meeting children's need. The nature of guidance and of the guidance services in elementary education.

608 Human Approaches to Teacher Effectiveness 2 (2,0)
Skills in human relationships, developing potentials, resolving differences, active listening, avoiding roadblocks, developing congruency, using "no lose" method of resolving classroom conflicts. Developing learner responsibility, accepting others, communicating acceptance to others, "I Messages," changing the environment.

610 Foundations of Guidance and Personnel Services 2 Cr.
Developing basic human relations and helping skills; self-awareness and self-examination of the interpersonal communication process; emphasis on understanding self and understanding others.

630 Learning Disorders of Children 3 (3,0) Su
Overview of various learning deficits, remedial procedures, and consideration of psychological assessments.

661 Theories of Counseling 3 (3,0) FSSu
Theories, methods, and application of the counseling processes at all levels.

681 Guidance and Counseling Workshop 1-4 Cr. Su
Physical, intellectual, and social development of adolescents and their adjustment in home, school and community.

713 Administration and Operation of Guidance and Personnel Services 3 (3,0) SSu
Principles of guidance; organizing school guidance program, tests and testing; guidance library and materials; interviewing and counseling. For those seeking administrative certificate.

736 Appraisal of the Individual 2 (2,0) Su
Techniques for discovering characteristics of individual students. Students will develop competencies.
in the use of cumulative records, case study procedures, sociometric devices, and other non-standard test instruments. Recording, analyzing, compiling, and interpreting data as they relate to counseling. A synthesis of information about students.

742 Career Education and Occupational Information
Using, reviewing, and evaluating occupational information. Sources and types of materials and occupational filing plans. Theories of vocational development, integrating careers into curriculum.

766 Group Counseling 2(2,0) FSSu
Purpose and methods of group as applied to a sound guidance program. Concentration on group processes. Theoretical basis for group work in guidance, orientation activities, classroom instruction, educational and vocational planning, and group guidance. P, consent of instructor.

777 Employment Service Counseling Practicum
Specifically designed for employment service counselor working toward a major in Guidance and Counseling. Supervised practice for employment courses. Twenty-five clock hours of supervised counseling. P, advanced graduate majors in guidance and counseling and consent of instructor.

787 Counseling Laboratory and Supervised Practicum
Counseling interviews and activities under supervision of one or more members of university staff will be conducted in counseling laboratory and field. A minimum of 25 clock hours actual counseling time required and 30 counseling tapes. Limited to advanced graduate majors in guidance and counseling and consent of instructor.

788 Group Counseling Practicum 2-4 Cr.
Supervised practicum in conducting small group counseling sessions. P, CGPS 766, CGPS 787, consent of instructor.

789 Internship in Guidance and Counseling
Practical experience in a counseling and guidance setting. 1-6 Cr.

791 Special Problems in Guidance and Counseling
Directed reading and research in selected individual guidance and counseling problems. Designed to meet needs of graduate students in guidance and counseling.

792 Seminar in Current Trends and Issues in Counseling 1-2 Cr.
Major emphasis on research studies and evaluation of guidance counseling theory and practice. Students will investigate specific problems determined in part by needs, deficiency and interest of guidance.

796 Research Project 2 Cr.
Individual work. Problem selected, analyzed, data gathered and tested statistically. Reported in appropriate research form. Required of all graduate students in Guidance and Counseling qualifying for Master of Education degree under Option "A." P, Consent of instructor.

Driver's Education Courses (DrEd)

650 Safety Education 3(3,0) Su
Philosophy, content and methods requisite to teachers participation in accident prevention activities and school safety education program.

671 Driver Education Simulation 2(2,0) Su
Philosophy, organization and procedures in the use of simulators to teach Driver Education.

672 Alcohol and Drugs in Relation to the Driving Task 2(2,0) Su
The effects of alcohol and drugs in relation to the individual's ability to drive. Organization of course content and materials to be used in high school Driver Education.

Education, Evaluation and Research Courses (EdER)

611 Advanced Educational Measurements 3(3,0) FSSu
Study of theory and principles of construction and use of standardized measuring instruments used in educational and vocational evaluation. Practice in administration, scoring and interpretation of results. P, consent of instructor.

761 Introduction to Graduate Studies 3(3,0) FSSu
Main objectives are: (a) understanding standard and new research procedures in education (b) acquainting with up-to-date research on present-day educational problems (c) understanding and using evaluation standards for education research. Required of most graduate majors in education.

Edational Administration Courses (EdAd)

700 Public School Administration 3(3,0) FSSu
Organization and administration of school systems. Roles and responsibilities of the state education agency, professional organizations, local boards of education, and others influencing the administration of schools. Some attention given to school finance.

710 Organization and Administration of Elementary Education 2(2,0) SSu
Principles and modern practices of organizing and administering work of elementary schools. Required by State Department of Public Instruction of school superintendents and elementary school principals.

715 Elementary and Secondary School Supervision 3(3,0) FSSu
The nature of supervision, evaluation and instruction and teacher performance. Techniques, plans and procedures for improving the course of study and instruction in the public schools.
730 School Finance 2(2,0) SSu
Financing the operation of public schools; national, state, and local sources of support. Sources of revenue. Financing school building construction. Investment of surplus funds. Federal aid to education programs.

732 School Buildings and Grounds 2(2,0) SSu

735 School Law 3(3,0) FSu
Legal character of public schools; legal powers of school boards, administrators, and teachers; legal aspects of parent-child-school relationships; Emphasis will be placed on South Dakota school law. Alternates with EdAd 732.

782 Seminar 1-3 Cr.
Review of scientific investigations of problems of administration. Problems for investigation and research assigned. P, consent of instructor.

**Educational Foundations Courses (EdFn)**

620 Philosophy of Education 2(2,0) FSSu
Comparison of historic and current philosophies of education, major emphasis of each, their effects upon educational goals and practices today.

623 Adolescent Psychology 3(3,0) SSu
Physical, social, emotional, intellectual and vocational aspects of adolescent development. Emphasis is upon increasing understanding of adolescents and their problems.

651 Mental Health and Personality Development 3(3,0) FSu
Nature of personality; mental and emotional health and recognition of deviations in children and adults. Emphasis on mental health problems and positive program for personal mental health.

**Educational Psychology Courses (EPsy)**

673 Elementary School Curriculum 2(2,0) FSu

681 Workshop in Elementary Education 1-3 FSSu
Workshop sessions, in several areas of elementary education: Methods, curriculum, guidance, administration, supervision, reading, and others. Generally requires 45 hours of work per credit in workshop sessions, lectures, and outside assignments. Concentrated course. Credit at rate of one credit a week. P, consent of instructor.

**Secondary Education Courses (SeEd)**

640 Secondary School Curriculum 2(2,0) SSu

681 Workshop in Education 1-3 Su
Workshop sessions, in several areas of education: methods, curriculum, guidance, administration supervision and others. Generally requires 45 hours of work per credit in workshop sessions, lectures, and outside assignments. Concentrated course. Credit at rate of one credit per week. P, experienced teachers, consent of instructor.
Graduate Bulletin

682 Educational Seminar 1-3 (1-3,0)
Review of scientific investigations of problems of education. Problems for investigation and research assigned to students. P, open to seniors and graduate students in education by permission of instructor.

691 Problems in Education 1-3
Selected studies to meet needs of advanced students. P, senior standing, for seniors and graduate students desiring to do individual studies. Limited to 3 credits in graduate program. Consent of instructor.

752 Improvement of Reading 2 (2,0) SSu
Description of normal process of development in reading skills and techniques which may be used in remediating deviations which hinder readers in speed or comprehension. Recommended for graduate students in Language Skills and Communications programs.

753 Diagnosis and Remediation of Reading Problems 2 (3,0) Su
General nature of causes of reading disability: principles of diagnosis and use of instruments; basic principles of individual remediation; case studies.

754 Clinical Practice in Reading 2 (1,4) Su
Supervised experience in utilizing best techniques and materials to effect desirable solution to reading difficulties; practical experience in writing case studies, in diagnosing reading disability, proposing effective remediation, keeping records and in evaluating progress of student. P, 753 or concurrent.

759 Internship in Education 1-6 (0,1-6) F-Su
On-the-job participation in teaching in the public schools under the supervision of a local school instructor and a staff member from the Department of Education.

792 Research Problem in Education 2 Cr.
Individual work. Problem selected, analyzed, data gathered and tested statistically. Reported in appropriate research form. Required of all graduate students in Education qualifying for Master of Education degree under Option "A." P, consent of instructor.

Vocational Teacher Training Education Courses (VTTE)

625 Development of Vocational Education Thought and Practice 3 (3,0) FSSu
Emphasis on philosophy, origins, and development of vocational, technical and practical arts education programs at adult, post-secondary, secondary and pre-vocational levels. Current and emerging principles, practices and issues are stressed. P, senior in Education.

731 Administration and Supervision of Vocational Education 3 Cr. Su
Organization, administration of vocational-technical education and the practical arts at all levels. State-federal relationships in administration and supervision. State plan development, reimbursement plans and procedures, projected activities and program standards. Principles of effective supervision and evaluation applicable to vocational-technical education. Consent of instructor.

COLLEGE OF ENGINEERING

J. O. Storry, Dean

Two programs are offered in engineering:

Master of Science in Engineering
Option A requires a minimum of 30 semester credits including a thesis and a comprehensive oral examination.
Option B requires a minimum of 32 semester credits including a 2-credit design paper (of thesis quality and style) and a comprehensive oral examination.

Master of Science in Industrial Management
This degree requires a minimum of 30 semester credits including a thesis and a comprehensive oral examination.

Master of Science in Engineering
The purpose of the Graduate Program in engineering is to provide an interdisciplinary education for engineers who will become leaders and experts in fields related to:
I. The development and control of land, water and energy resources.
II. The development and promotion of industrial development.
III. The application of engineering principles to biological and ecological problems.
IV. The control of pollution and preservation of the environment.

The degree granted is the Master of Science in Engineering. This degree gives the student an opportunity to acquire a broad interdisciplinary and technological education. Students will take course work not only from the engineering departments of Agricultural, Civil, Electrical and Mechanical Engineering, Mathematics and Engineering Physics, but from departments throughout the University which are related with the individual student's evaluation of progress of the disabled reader; adaptation of techniques to classroom. P, EPsy 302.
research area, such as Zoology, Microbiology, Plant Science, Rural Sociology, Horticulture, Economics, etc.

Research organizations which exist on campus for the purpose of assistance and direction in research include the following: Engineering Extension, Remote Sensing Institute, Water Resources Institute, Institute of Irrigation Technology, the Institute of Social Sciences for Rural-Urban Research and Planning, Agricultural Extension Service, and the Center for Power System Studies. These and other problem-oriented organizations as well as all departments on campus offer the graduate student a wealth of assistance and course offerings to help him in his graduate work.

The formal course offerings for Master of Science in Engineering are divided into four groups, a core, secondary core, supporting courses and the thesis, or design paper.

The core consists of the following courses:
- Statistics 641—Statistical Methods II
- Mechanical Eng. 661—Introduction to Operations Research
- Agricultural Eng. 663—Instrumentation
- General Eng. 600-601—Seminar

Seven to ten credits of these courses are required and will give the student a basic background in research methods.

The secondary core consists of the following courses:
- AgE 772—Similitude
- CE 624—Industrial Waste Treatment
- CE 623—Environmental Engineering
- CE 646—Advanced Soils Engineering
- CE 626—Water Quality Analysis
- ECom 620—Communications Systems
- ECom 625/CSCI 625—Digital Systems Hardware Design
- ECom 626—Digital Logic
- EPow 631—Computer Analysis of Power Systems
- EBio 671—Biomedical Systems Analysis
- Math 671—Numerical Analysis
- Math 623—Advanced Calculus
- ME 612—Thermo-Fluid Energy Systems
- ME 621—Modeling and Simulation of Dynamic Systems
- ME 622—Applied Stress Analysis in Mechanical Design
- ME 751—Computer-Aided Design
- Phy 635—Reactor Physics
- Phy 737—Theory of the Solid State

The student is required to take at least three courses from this list. The choices are expected to broaden the students interdisciplinary background and aid him in his particular research area.

The supporting courses taken can be chosen from a number of departments and colleges at South Dakota State University to allow the student further specialization within his primary professional area in engineering or further developments of interdisciplinary interests such as biology, plant science, etc.

A thesis will provide a research experience and a degree of specialization. This experience will help the student apply information learned in course work to the solution of practical problems which are of importance to South Dakota and the world.

A design paper will provide experience in searching the literature, applying theory to practice, considering economic factors, and considering the consequences of alternate solutions.

Course descriptions are listed under individual departments.

**Master of Science in Industrial Management**

The Master of Science in Industrial Management is offered jointly with the School of
Business of the University of South Dakota. About one half of the course work will be taken at each school; the thesis may be written at either school.

This program is designed to give a student graduate work in engineering and principles of business administration and management to prepare the graduate for management roles in business and industry.

Ordinarily, a B.S. degree in a field of engineering will be required for entry into the program.

DEPARTMENT OF ELECTRICAL ENGINEERING

Professor V. G. Ellerbruch, Head

Professors Gamble (Emeritus), Higgins, Knabach, Manning (Emeritus), Sander, Storry; Associate Professor Nelson

The following Electrical Engineering courses are offered to support the Master of Science in Engineering program (see College of Engineering) as well as other graduate programs in the University. Electrical Engineering (EE), Bioengineering (EBio), Communication Engineering (ECom), Electronics (Elec), Power Systems (EPow) Courses

Bioengineering Courses (EBio)

670 Biomedical Electronics 2(2,0)
Design and operation of basic biomedical electronic instrumentation. Measurement and continuous monitoring of physiological variables: EKG, body temperature, blood pressure, etc. Data acquisition, telemetry data and reduction techniques. P, EBio 300 or Elec 320 or consent of instructor.

671 Biomedical Systems Analysis 3(3,0)
Engineering concepts applied to the study of biological systems. Modeling of representative biological systems and analysis using techniques developed in engineering disciplines. P, EE 316 or equivalent.

672 Biomedical Instrumentation and Safety
Health Facilities 3(3,0)
Methods for designing instrumentation for measurement and safety, analysis of instrument dynamics, interpretation of electrical codes and facility safety. The course provides background material for engineers working with architects, consultants, and contractors. P, EPow 430, Elec 321.

Communication Engineering Courses (ECom)

620 Communication Systems 3(3,0) S
Information transmission, modulation, sampling theory, noise sources, introduction to statistical theory of communication. P, ECom 420 or consent of instructor.

625 Digital Systems Hardware Design 3(3,0)
Design and organization of digital systems with strong emphasis on systems hardware and its function in a digital computer. Translation of high level computer instruction into hardware designs for digital computers. P, EE 445 or consent.

673 Communication System Theory 3(3,0)
Design, analysis, and implementation of communication systems. Interpretation of data transmission over a variety of media. P, ECom 420 or consent.

Electrical Engineering Courses (EE)

615 Linear Network Theory 3(3,0)
Laplace transform theory, matrix analysis and complex variable theory as applied to problems in circuit analysis. Topology, network theorems and network functions. P, consent of instructor.

616 Nonlinear Analysis 2(2,0)
Numerical, graphical and analytical methods of analysis. Singularities; systems with varying coefficients, stability of nonlinear systems, describing function methods. P, consent of instructor. Alternate years.

620 Integrated Circuit Engineering 3(3,0)
Analysis and design of transistor circuits with and without feedback. Gain sensitivity studies, field-effect transistor circuits. P, Elec 320 or equivalent.

657 Special Topics in Electrical Engineering 1-3
Special topics in the field of Electrical Engineering are included. P, consent of department head.

685 Microwave Theory 3(3,0)

690 Special Electrical Problems 1-3
(On sufficient demand)
-Special problem assigned in the field of electrical engineering. P, consent of department head.

790 Thesis in Electrical Engineering 5-7 as arranged

Electronics Courses (Elec)

620 Integrated Circuit Engineering 3(3,0)
Analysis and design of transistor circuits with and without feedback. Gain sensitivity studies, field-effect transistor circuits. P, Elec 320 or equivalent.

720 Advanced Electronics 3(3,0)
Molecular and plasma electronics, masers and lasers, electronics systems engineering, communication theory.
South Dakota State University

Power Systems Courses (EPow)

630 Power System Stability 3 (3,0)
Inertia constant, swing-curves, equal area criterion, as applied to transient stability studies. P, EPow 430; EPow 432 or consent of instructor.

631 Computer Analysis of Power Systems 3 (3,0)
Concept used in formulating load flow and fault study problems for computer solution. P, EPow 430; EPow 432 or consent of instructor.

632 Symmetrical Components 2 (2,0)
Application of symmetrical components to simple three phase circuit, unloaded systems, loaded systems. Symmetrical component impedances. Use of network analyzer in analysis of symmetrical components. P, EPow 430; EPow 432 or consent of instructor.

633 Alternate Energy Conversion 2 (2,0)
Basic principles and design equations of thermoelectric and thermionic devices, magnetohydrodynamic converters, solar cells, and fuel cells. P, EPow 430; ME 313. Alternate years.

ENGINEERING MECHANICS (EM)

Courses in Engineering Mechanics are taught by staff from the Civil Engineering Department and Mechanical Engineering Department.

The following courses are provided in support of the Master of Science in Engineering program.

Engineering Mechanics Courses (EM)

621 Introduction to Mechanics of a Continuous Medium 3 (3,0) (On sufficient demand)
The general theory of a continuous medium. Kinematics of deformation and flow; stress tensors; conservation of mass, momentum and energy; invariance requirements; constitutive equations for solids and fluids; applications for special problems. P, Math 331; EM 331.

622 Theory of Elasticity 3 (3,0)
Analysis of stress and strain; equilibrium and compatibility equations; Hooke's law; fundamental problems in the theory of elasticity; plane-stress and plane-strain problems of the narrow beam, rotating discs and a plate with a circular hole. P, EM 321, Math 331 or equivalent.

623 Theory of Plasticity 3 (3,0)
Analysis of stress and strain; plastic behavior of materials; basic laws of plastic flow; applications to bending of beams, torsion of bars and thick-walled cylinders; slip line theory and its applications to extrusion problems; limit analysis theorems and their applications to structural problems. P, EM 622, consent of instructor.

624 Theory of Plates and Shell 3 (3,0)

631 Advanced Fluid Mechanics 3 (3,0)
Fundamental notions of continuum, stress at a point, velocity field and vorticity. General principles of kinematics and dynamics of a fluid. Potential flow and vortex motion. P, EM 331, Math 331 or equivalent.

DEPARTMENT OF ENGLISH

Professor J. W. Yarbrough, Chairman

Professors Alexander, Giddings (Emeritus), Marken, Walz (Emeritus), Witherington;
Associate Professors Brown, Nagle (Emeritus)

Graduate majors offered: Master of Arts degree with a major in English.
Graduate minor offered: English.

Prerequisites for graduate study:
For the graduate major a minimum of 24 semester hours of undergraduate credit in English or consent of Department Chairman. For the graduate minor a minimum of 16 semester hours of undergraduate credit in English or consent of the department chairman.

Degree requirement:
Much of the student's work is concentrated in the major area of study. In addition to this work in the major field, a minor concentration of 8 hours must be included in a field related to the major or in two or more fields supporting the major. The candidate must have a reading knowledge of at least one modern foreign language, preferably French or German, or must have at least two years of undergraduate credit in a foreign language on the transcript. Unless English 690 or a similar course has been taken
previously, it is required for the M.A. and should be taken in the first or second semester of graduate study. Course offerings in the Department of English are so arranged that a full-time student may complete the degree requirements in one academic year. Graduate assistants should be able to complete the requirements in two academic years. Two degree options are available:

**Option A:**
The candidate is required to present a minimum of 30 hours of graduate work including 5 hours of thesis (English 790). At least 20 hours must be taken in residence. The candidate will present a thesis which reports the results of research directed by a member of the Graduate Faculty in English. The candidate will be required in an oral examination to defend the thesis and to demonstrate knowledge of English and American literature, both generally and in particular in those areas in which graduate courses have been taken.

**Option C:**
The candidate is required to present a minimum of 35 hours of graduate level credit, at least 20 of which must be taken in residence. A written examination based on a departmental reading list and graduate course work is required. An oral examination which in addition to concentrating on areas examined in the written examination may include an analysis of a particular literary work presented to the candidate approximately a week before the oral examination.

**Note:**
Before registering for graduate work the graduate student should choose a major adviser after consultation with the Chairman of the English Department.

**English Courses (Engl)**

**NOTE:** Before registering for graduate work the graduate student should choose a major adviser after consultation with the Chairman of the English Department.

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606 Workshop in English and Speech 2 Su
Workshop sessions in various areas of English: linguistics, composition, or literature. This is a concentrated course; it may not be taken concurrently with any other course. P, teaching experience or consent.

619 Comparative Novel 3(3,0) F
Selected European novels from Fielding to Camus.

620 Advanced Studies in Early English Literature 2-3(2-3,0) S
Intensive study of a phase of English literature of the era before 1550.

623 Advanced Studies in Neo-Classical Literature 2-3(2-3,0)
Intensive study of an important writer or group of writers or of a significant aspect of English neoclassical literature.

624 Victorian Literature 2-3(2-3,0) S
Intensive study of the chief writers of British poetry and prose from 1840 to 1900 with emphasis on social and intellectual developments.

626 Advanced Studies in Seventh-Century Literature 2-3(2-3,0)
Intensive study of the literature of an important writer or group of writers with consideration of the relationships between the literature and the historical and social events between 1600 and 1700.

627 Advanced Studies in Elizabethan Literature 2-3(3-2,0) F
Intensive study of an area of Elizabethan literature chosen to meet the needs and interests of the students. Alternate years.

630 The English Romantic Movement 3(3,0) F
The chief writers of English Romantic poetry and prose from 1789 to 1832, with emphasis on intellectual trends.

634 Advanced Shakespeare 3(3,0) S
Intensive study of selected plays of Shakespeare and significant Shakespearean criticism.

635 Chaucer 2-3(2-3,0) F
A study of the works of Chaucer, with some attention to his sources and his language. Alternate years.

647 Pre-Civil War American Writers 3(3,0) F
A selection of writers from American transcendentalism and Romanticism.

648 The American Realists and Naturalists 3(3,0)
An examination of Post Civil War realistic and naturalistic writers.

650 Modern American Novel 3(3,0) F
Intensive study of selected American novelists after 1920 and through the post World War II novel, particularly emphasizing twentieth century themes and forms in the novel.
South Dakota State University

665 Contemporary Drama 2-3 (2-3, 0) F
A study of representative British and American plays from the time of Shaw to the present; some attention may be given to significant Continental plays of this era.

684 Literature Criticism 2 (2, 0) S
The tradition of literary criticism from Plato to the present.

690 Research Tools in the Humanities 2 (2, 0) F
Survey of reference and research materials of special value and interest to students of the Humanities. REQUIRED OF ALL CANDIDATES FOR THE M.A. DEGREE IN ENGLISH.

692 Seminar in American Indian Literature 2-3 (2-3, 0)
Intensive study of the American Indian literature of the past or present with concentration on the plains Indians.

693 Seminar in English Literature 2-3 (2-3, 0)
Intensive study of a selected type, author, or period of English literature.

694 Seminar in American Literature 3 (3, 0)
Intensive study of a selected type, author, or period of American Literature.

697 Special Studies in Composition and Literature 1-3 (1-3, 0) FSSu
Special Studies in various areas of writing, grammar, and literature. May be repeated to total 4 credits. Given only with the permission of the Chairman of the Department of English.

705 Problems in Teaching Composition and Literature 3 (3, 0) SsU
Analysis of problems encountered in teaching composition and literature, and examination of teaching techniques.

758 Modern American Thought 2 (2, 0) FSSu
Analysis of selected economic, social and philosophical ideas of the late 19th and 20th centuries, their relationship to selected segments of American life, and their reflection in American literature.

790 Thesis 5 Cr.
P, 690.

Linguistics Courses (Ling)

520 The New English 2 (2, 0) FSSu

643 Development of the English Language 2 (2, 0) S
Historical survey of the phonology, grammar, syntax, and lexicology of English leading to an understanding of the present state of the language and future developments.

DEPARTMENT OF ENTOMOLOGY-ZOOLOGY

Professor Robert Walstrom, Head
Professors Hartwig (Emeritus), Greichus, Huggins, Kartack, Kirk (USDA), McDaniel, Roller, Stoner (SDA), Swanson: Associate Professors Kieckhefer (USDA), Krysan (USDA), Sutter (USDA), Thibodeau, Walgenbach

Graduate majors offered: Master of Science degree with major in Entomology.
Master of Science degree with major in Zoology.

Prerequisites for graduate study:
For the graduate major in Entomology a Bachelor’s degree with at least 14 credits in entomology.
For the graduate major in Zoology a Bachelor’s degree with at least 14 credits in zoology.
For the graduate minor in Entomology a Bachelor’s degree with at least 6 credits in entomology and prerequisites to the graduate courses to be taken.
For the graduate minor in Zoology a Bachelor’s degree with at least 6 credits of zoology and prerequisites to the graduate courses to be taken.

Note: Deficiencies in the prerequisites for graduate study may be made up during the first year of graduate study, without graduate credit.

Entomology Courses (Ent)

611 Insect Ecology 3 (2,2) S (Offered in 1979)
Comprehensive study of insects in relation to their environment. Effects of microclimate and macroclimate on predators, parasites, disease, reproduction, development and feeding habits of insects. Techniques for determining various factors important to survival and reproduction in the insect’s environment. P, Biol 211. Alternate years.

613 Insectary Methods 2 (1,2) F (Offered in 1977)
Methods of rearing insects under laboratory, greenhouse, and screenhouse or caged conditions; includes techniques of mass production of insects for use in biological control of insect pests. Alternate years.
Graduate Bulletin

621 Insect Anatomy 3(2,2) F (Offered in 1978)
Detailed anatomy of insects; integument, appendages, sense organs, and organ systems of representative larval, nymphal and adult forms. Consideration given to structural variation, embryology, and evolutionary relationships. Alternate years

623 Insect Physiology 3(2,2) S (Offered in 1979)
Fundamental physiological processes in insects. Normal and abnormal functioning of adult and immature stages, developmental physiology, physiology of behavior. P, Ch 120 and permission of instructor. Alternate years

671 Insect Toxicology 3(2,2) S (Offered in 1979)
Comprehensive study of insecticides and chemicals, their effects, antidotes, detection, and uses. The techniques of determining insecticide resistance in an insect population, insecticide residues, and radio-active tracers in laboratory and field populations. P, Ch 120. Alternate years

621 Mammalian Anatomy 4(2,6) F
Detailed dissection of cat as representative mammal. Comparisons with human body (skeleton, models, charts) given special attention. All systems are dissected and studied. For those students who need more comprehensive and detailed course in anatomy than is available in Z 221. P, Bio 151, 153.

623 Advanced Systemic Physiology 4(3,3) F
Various systems of the animal body; coordination and inter-relationships of systems; circulation, temperature regulation, muscle, and respiration. P, Z 325 and consent of instructor.

625 Advanced Systemic Physiology 4(3,3) S
Physiology of digestion, rumination, urine formation, reproduction, nervous system, endocrine glands, and special senses. P, 623 or consent of instructor.

627 Endocrinology 4(3,3) F (Offered in 1978)
A study of the effects of the secretions of the various glands of the body on the growth, development, metabolism, and reproduction of domestic animals. P, 325. Alternate years.

691 Special Topics in Entomology 2-6 Cr. FSSu
Qualified students may investigate special topics of entomological study under supervision of department staff in the following and other selected areas:
Entomological Research Problems
Medical Entomology
Beekeeping
Acarology

761 Taxonomy of Insect Groups 2-6 Cr. FS
Taxonomic study of groups of insects. Student prepares report in which he gives technical description, and other information, of groups under study. P, Ent 301.

790 Thesis in Entomology 5-7 credits
792 Graduate Seminar in Entomology 1(1,0) FS
Reports and discussions of topics of entomological interest. Maximum of 3 credits accepted for M.S. degree. P, graduate status. (Major students urged to attend all seminar sessions.)

Zoology Courses (Zool)

621 Mammalian Anatomy 4(2,6) F
Detailed dissection of cat as representative mammal. Comparisons with human body (skeleton, models, charts) given special attention. All systems are dissected and studied. For those students who need more comprehensive and detailed course in anatomy than is available in Z 221. P, Bio 151, 153.

623 Advanced Systemic Physiology 4(3,3) F
Various systems of the animal body; coordination and inter-relationships of systems; circulation, temperature regulation, muscle, and respiration. P, Z 325 and consent of instructor.

625 Advanced Systemic Physiology 4(3,3) S
Physiology of digestion, rumination, urine formation, reproduction, nervous system, endocrine glands, and special senses. P, 623 or consent of instructor.

627 Endocrinology 4(3,3) F (Offered in 1978)
A study of the effects of the secretions of the various glands of the body on the growth, development, metabolism, and reproduction of domestic animals. P, 325. Alternate years.

697 Special Topics in Zoology 2-6 Cr. FSSu
Qualified students may investigate special topics of zoological study under supervision of department staff in the following and other selected areas:

790 Thesis in Zoology 5-7 credits as arranged FSSu
792 Graduate Seminar in Zoology 1(1,0) FS
Reports and discussions of topics of zoological interest. Maximum of 3 credits accepted. P, graduate status. Major students are urged to attend all seminars.

DEPARTMENT OF GENERAL ENGINEERING (GE)
Professor L. G. Skubic, Coordinator
Administrative Committee: Dean of Engineering J. O. Story; Professors Ellerbruch, Johnson, Moe, Sandfort, Skubic

The following General Engineering courses are offered to support the Master of Science in Engineering program (see College of Engineering) as well as other graduate programs in the University.

600 Seminar 0(1,0) FS
601 Seminar 1(1,0) FS

DEPARTMENT OF GEOGRAPHY
Professor Edward P. Hogan, Head
Professor Reeves (USDI)

Graduate major offered: Master of Science degree with a major in Geography.
Graduate minor offered: Geography.
Prerequisites for graduate study: A Bachelor's degree with 24 credits in social science of which 12 credits must be in Geography.
South Dakota State University

Geography Courses (Geo)

603 Evolution of Geographic Thought 2 (2,0) F
The history and development of geography and its theories, schools of thought and current ideas.

606 Seminar in Systematic Geography (Topical) 1-4 FS
Selected topics in systematic geography. The seminars will deal with one or more aspects of human geography, economic geography, political geography, population geography, historical geography. This course may be repeated for credit. The specific topic to be studied will change each semester.

620 Advanced Regional Studies in Geography (Topical) 1-4 FS
Selected topics in the regional geography of continents, nations, or states. This course may be repeated for credit. The specific topic to be studied will change each semester.

660 Social Demography 2 (2,0) S 1976
(See Sociology 660). Alternate years.

700 Seminar in Geography 1-4
Studies in selected geography fields.

765 Advanced Studies in Land Utilization (Topical) 1-4 FS
The physical and cultural factors affecting the nature and pattern of land utilization. Local and/or regional utilization, planning, and problems will be studied in detail in relation to the topic. This course may be repeated for credit. The specific topic to be studied will change each semester.

788 Advanced Geographic Technique (Topical) 1-4 (1,4,0) FS
Selected geographic techniques such as cartography, aerial photograph interpretation, remote sensing, information systems and map interpretation. This course may be repeated for credit. The specific topic to be studied will change each semester.

790 Thesis in Geography MS 1-6 (as arranged)

791 Seminars in Anthropology 1-4
(See Anthropology 791)

792 Special Problems in Geography (Topical) 1-4
Selected studies in geography to meet the needs of advanced students.

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION AND RECREATION
Professor Stanley Marshall, Head
Professors Blazey, Forsyth; Hattlestad, Williamson; Associate Professors Boetel, Booher, Huether

Graduate majors offered: Master of Science degree with a major in Health, Physical Education, and Recreation.

Graduate minor offered: Health, Physical Education and Recreation.

Prerequisites for graduate study:
For the graduate major a Bachelor's degree with a major in Health, Physical Education and Recreation or its equivalent, and prerequisites to the courses to be pursued. For the graduate minor a Bachelor's degree with an undergraduate minor, or equivalent in Health, Physical Education and Recreation, and prerequisites to the courses to be pursued.

Thesis Option:
Option A requires a minimum of 30 semester credits, including a thesis. The thesis may be completed in an area of specialization of Health, Physical Education and/or Recreation.

Non-thesis Options:
Option B requires a minimum of 32 semester credits, including HPER 792 (Individual Research), and a comprehensive oral examination.
Option C requires a minimum of 35 semester credits and comprehensive written and oral examinations.
Obtain further details from the Health, Physical Education and Recreation Department.

Health Education Courses (Hlth)

760 Advanced Administration of School Health Programs 2 (2,0) FSu
Methods of health instruction; problems of health service: problems in supervision of health environment; recent trends and problems in safety education. P, graduate standing, permission of staff.

Health, Physical Education and Recreation Courses (HPER)

681 Workshop in Health, Physical Education, and Recreation 1-3 Cr.
Workshop in specific areas. Lectures, conferences, committee work and outside assignments to increase understanding of a specific area. P, permission of department head.

682 Seminar in Health, Physical Education and Recreation 2 (2,0) Su
Courses designed to offer current information on subjects of interest in field.
Graduate Bulletin

741 Philosophy of Physical Education 3(3.0) SSu
Discussion and analysis of major philosophic contributions to physical education. Formation and evaluation of one's belief concerning physical education. P. graduate standing, permission of staff.

742 Psycho-Social Aspects of Sport 2(2.0) SSu
Psychological principles, theories and laws applied to physical education and athletic situations. Interpretation of behavior in sports. P. graduate standing, permission of staff.

743 Basic Issues in Health, Physical Education and Recreation 2(2.0) SSu
Directed reading in recent literature in field; discussion of current problems; critical analysis of recent research. P. graduate standing, permission of staff.

760 Motor Learning and Development 3(2.2) SSu
Analysis of various teaching methods. Survey of research in motor learning. Demonstrations and study of methods applied to various activities. P. graduate standing, permission of staff.

783 Research Methods in Health, Physical Education and Recreation 3(3.0) FSu
Methods and techniques of research in field, critical analysis of masters and doctoral thesis, practice of research techniques. P. graduate standing, permission of staff.

792 Individual Research and Study in Health Education, Physical Education and Recreation 3 credits FSu
Special problems by individuals. Results of study presented in special reports and term papers. P. major in this field.

790 Thesis in Physical Education 5-7 as arranged

Physical Education (PE)

660 Methods and Materials for Elementary Physical Education 2(2.0) Su
Analysis of activities, materials, techniques, and methods used in conduct of physical education for elementary grades. Progression in curriculum planning in areas of rhythm, games, self-testing, and tumbling. P. permission of department head.

744 Supervision of Health and Physical Education 2(2.0) Su
Techniques, principles, organization and philosophy of supervision in this field. P. graduate standing, permission of staff.

750 Scientific Basis of Physical Education 2(2.0) Su
Investigation of the latest developments in the sciences which relate to the field of physical education. P. graduate standing and permission of instructor.

Recreation Courses (Recr)

740 Advanced Administration of Community Recreation Programs 2(2.0) SSu
Problems related to equipment; establishing programs; budget and finance; selecting and supervising staff; public relations activities. P. graduate standing, permission of staff.

DEPARTMENT OF HISTORY

Associate Professor Rodney Bell, Head
Professor Volstorff (Emeritus): Associate Professor Sweeney

Graduate major offered: None.
Graduate minor offered: History.
Prerequisites for graduate study.
For the graduate minor a Bachelor's degree with major or minor in History.

History Courses (Hist)

637-638 European Intellectual History 3(3.0)
A history of leading cultural and ideological movements of Western man from the Renaissance to the present. History 637 stresses the 16th, 17th and 18th centuries while History 638 deals with the main currents of European thought in the 19th and 20th centuries.

640 Medieval England 3(3.0)
A detailed study of England from the Anglo-Saxon invasion of the 5th Century to the Battle of Bosworth Field, 1485. The development of the English constitution and the emergence of England as a European power.

641 Europe in the 19th Century 3(3.0)
Europe in the period 1815-1914. This course will concentrate on the emerging power struggle in 19th century Europe, the race for world empire, forces leading up the outbreak of World War I as well as
the scientific, cultural and artistic achievements of the age.

671-672 Cultural History of the United States 3 (3,0)
Major social and intellectual trends and movements in the United States, 1607-1877, 1877-present.

691 Conflicting Interpretations of American History 3 (3,0)
A detailed analysis of questions of historical interpretations in the field of U.S. history which are currently being debated by scholars. Students will be encouraged to come to tentative conclusions of their own on selected historical issues.

692 Special Problems in History 1-3 Cr.
Selected studies for advanced students.

793 Seminar in History 1-3 Cr.
Studies in selected history, arranged according to demand.

COLLEGE OF HOME ECONOMICS
Ardyce Gilbert, Dean

The purpose of the Graduate Program in Home Economics is to provide an interdisciplinary education for home economists who will become leaders in fields related to the four home economics departments. These are:

- Child Development and Family Relations
- Home Economics Education
- Nutrition and Food Science
- Textiles, Clothing, and Interior Design.

The degree granted is the Master of Science in Home Economics. This degree gives the student an opportunity to acquire a broad education with a measure of specialization within the field. Students will take course work not only from the home economics departments but from departments throughout the University which are related to the student’s research area, such as Psychology, Rural Sociology, Education, Microbiology, Chemistry, Economics, Guidance and Counseling, etc.

The formal course offerings for the Master of Science in Home Economics are divided into three groups: research requirements, subject-matter specialization and supporting courses.

The research requirements involve 9-10 credits and consist of the following courses:
- Statistics 341—Statistical Methods
- Home Economics 701—Seminar in Home Economics
- Home Economics 790—Thesis in Home Economics
- Home Economics 791—Research Methods in Home Economics

At least three courses in the area of specialization are required. These are listed under the four departments in the college of Home Economics.

The supporting courses may be selected from any of the other colleges and departments at South Dakota State University. Courses related to the student’s primary professional area in Home Economics are recommended.

701 Seminar in Home Economics .5-1 Cr.
(On sufficient demand)
Reports and discussion of research in various areas of home economics. Required of graduate majors.

790 Thesis in Home Economics 5-7 Cr.

791 Research Methods in Home Economics 3

792 Problems in Home Economics 1-4
(On sufficient demand)
Investigation of problems selected from Home Economics fields. P, consent of instructor.

DEPARTMENT OF HOME ECONOMICS EDUCATION
Associate Professor D. Kluckman, Head
Professors Gilbert, Johnson, McArthur (Emeritus)

The following Home Economics Education courses are offered to support the Master of Science in Home Economics program (see College of Home Economics) as well as other graduate programs in the University.
Graduate Bulletin

Home Economics Education Courses (HEd)

701 Trends in Home Economics Education 2(2,0)  
(On sufficient demand)  
Trends in family life education, with emphasis on their effect on teaching in high school classes or youth groups, such as 4-H clubs. P, 412 and CD 342 or equivalent.

702 Seminar in Home Economics Education 1-2  
Review and discussion of current literature in home economics education.

741 Supervision in Home Economics Education 2(2,0)  
(On sufficient demand)  
Programs in home economics studies with special emphasis on supervised student teaching: Roles of state supervisor, city supervisor, student teaching supervisor, and student teachers analyzed. Opportunity to work on individual problems. P, teaching experience and consent of staff.

751 Curriculum in Home Economics Education 2(2,0)  
(On sufficient demand)  
Curriculum in secondary schools of South Dakota and other states. New ideas developed. P, 412 or equivalent.

761 Evaluation in Home Economics Education 2(2,0)  
(On sufficient demand)  
Methods and techniques used in evaluating programs in homemaking. Evaluation instruments developed. P, 412 or equivalent.

DEPARTMENT OF JOURNALISM AND MASS COMMUNICATION

Associate Professor Ruth Laird, Acting Chairman  
Professor Hoogstraat; Associate Professor Wentzy

Graduate major offered: Master of Science degree with a major in Journalism.  
The Graduate major in journalism is intended to meet the needs of (1) professional journalists who wish to broaden their education in communications and social sciences; (2) those who teach communications courses in high school, who have school public relations responsibilities, or who supervise school publications; and (3) individuals with undergraduate degrees in non-journalism specialties who wish to improve their mass communication skills. Courses outside the department of journalism are accepted toward the degree with consent of the department head and adviser.

Because journalism is largely an interdisciplinary subject, most courses are open to students with non-journalism undergraduate specialties.

Graduate minor offered: Journalism.

Prerequisites for Graduate Study:

For the graduate major in Journalism, a bachelor's degree; a minimum of 16 credits in undergraduate journalism courses or the equivalent (advanced English composition and advanced Speech courses in broadcasting are examples of equivalent); one year of practical experience in journalism or a related field (teaching of journalism or public information work will be accepted); plus demonstration of ability to write. Candidates not meeting the prerequisites may be accepted on condition, required to complete specified courses to meet deficiencies, and final exam may be postponed until all prerequisites are met to the satisfaction of the staff.

General Communication (GCom)

605 Theories of Communication 3(3,0) S  
Examination of major theories of communication including the mass media and interpersonal communication.

610 Seminar in Mass Communication 2(2,0) F  
The opportunity for extensive work in selected areas of journalism and mass communication including special investigation, reports and discussion.

615 Editorial Writing and Policy 2(2,0) F  
The opinion function of periodicals; the great editors and editorial writers; writing of editorials; shaping editorial policy.

617 Media Administration and Management 3(3,0) F  
Study of the business, economics, legal and management aspects of commercial print and broadcast media operations.

624 Persuasion 2(2,0) S  
See SpCm 624 under Department of Speech.

637 Educational Radio and Television 3(3,0) Su  
Educational broadcasting with practical work in the preparation and presentation of educational and instructional materials for radio, television and film and their use in the classroom.

Mass Communication (MCom)

606 Public Opinion and Propaganda 3(3,0) F  
Formation and measurement of public opinion; the role of the mass media; propaganda techniques, agencies, theories. P, senior standing, consent.
### South Dakota State University

#### Department of Mathematics

**Professor J. E. Richards, Head**

Professors Bergum, Engebretson, Kranzler, Walder (Emeritus), Wente (Emeritus); Associate Professors Bennett, Lacher, Yocom

**Graduate majors offered:** Master of Science with a major in Mathematics.

**Graduate minor offered:** Mathematics.

**Prerequisites for graduate study:**

- For the graduate major a Bachelor’s degree with a major in mathematics or the equivalent.
- For the graduate minor a Bachelor’s degree with prerequisites to the subjects elected for graduate study.

**Three options for Master of Science degree:**

- **Option A** requires a minimum of 30 semester credits, including a thesis and a comprehensive oral examination.
- **Option B** requires a minimum of 32 semester credits, including a research paper and a comprehensive oral examination.
- **Option C** requires a minimum of 35 semester credits and comprehensive written and oral examinations.

Obtain further details from the Mathematics Department.

### Mathematics Courses (Math)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>621</td>
<td>Complex Variables</td>
<td>4 (4,0)</td>
<td>F</td>
</tr>
<tr>
<td>623-624</td>
<td>Advanced Calculus</td>
<td>3 (3,0)</td>
<td>FS</td>
</tr>
<tr>
<td>627</td>
<td>Vector Analysis</td>
<td>3 (3,0)</td>
<td>(On demand)</td>
</tr>
<tr>
<td>631</td>
<td>Partial Differential Equations</td>
<td>3 (3,0)</td>
<td>S</td>
</tr>
<tr>
<td>666</td>
<td>Projective Geometry</td>
<td>3 (3,0)</td>
<td>S</td>
</tr>
<tr>
<td>671</td>
<td>Numerical Analysis</td>
<td>3 (3,0)</td>
<td>S</td>
</tr>
<tr>
<td>683</td>
<td>Theory of Probability</td>
<td>3 (3,0)</td>
<td>F</td>
</tr>
<tr>
<td>790</td>
<td>Thesis in Mathematics</td>
<td>5-7</td>
<td>as arranged</td>
</tr>
<tr>
<td>793-794</td>
<td>Advanced Topics in Mathematics</td>
<td>1-3</td>
<td>(1-3,0) FS</td>
</tr>
</tbody>
</table>
Mechanical Engineering Courses (ME)

611 Statistical Thermodynamics 3(3,0)

612 Thermo-Fluid Energy Systems 3(3,0)
Review of viscous fluid flow, basic modes of heat transfer and thermo-dynamic energy conversion. Discussion of energy sources, uses, conversion, transmission and economics. Analysis of conventional energy generation, storage and transmission systems. Criteria for design and analysis of exotic energy systems such as nuclear, wind, solar, geothermal, etc. P, 312, 415; Math 331 or equivalent.

621 Modeling and Simulation of Dynamic Systems 3(2,3)

622 Applied Stress Analysis in Mechanical Design 3(3,0)

631 Gas Dynamics I 3(3,0) (On sufficient demand)

632 Viscous Flow Theory I 3(3,0)
A study of the fundamental laws and equations of motion for a viscous fluid; exact and approximate solutions for the laminar boundary layer; creeping flow; flow in internal passages; secondary flow; compressible boundary layers; thermal boundary layers in lamination motion. P, EM 631.

641 Advanced Metallurgy 3(3,0) (On sufficient demand)

651 Advanced Analytical Methods 3(3,0)

661 Introduction to Operations Research 3(3,0) F
History and organization of operations research, mathematical and statistical models in industrial decisions. The evaluation of alternatives by means of linear programming, queuing theory, deterministic and stochastic inventory models, game theory and simulation. P, 362, Math 381 or consent of instructor.

662 Quality Control and Reliability 3(3,0)
Application of statistical techniques to the control of quality and the development of economical inspection methods. Collection, analysis, and interpretation of operations data; control charts and sampling procedure. P, 362, Math 381, or consent of instructor.

663 Topics in Reliability Engineering 3(3,0) (On sufficient demand)
Probability concepts and typical models involved in the statistical prediction of reliability. Methods for estimating the required parameters from experimental data. Applicability of reliability and maintainability techniques in practice and a survey of recent developments in the field. P, 662 or consent of instructor.

694 Special Problems 1-5 (On sufficient demand)
Provides an opportunity for study or investigation of special problem or project at graduate level. P, graduate standing or consent of instructor.

695 Special Topics 1-3

711 Advanced Heat Transfer I 3(3,0)
Derivation of the heat conduction equation and basic relations. Advanced analytical methods of solutions of boundary value problems of steady and unsteady heat conduction and multidimensional heat conduction in several orthogonal coordinate systems. Non-linear problems including heat flow in anisotropic solids. P, 351, 415 or equivalent.
728 Topics in Advanced Machine Design 3(3,0)  
(On sufficient demand)  

731 Gas Dynamics II 3(3,0)  

751 Computer-Aided Design 3(3,0)  
The use of digital computer as a design tool. Techniques and algorithms which increase the rationality of the design process. Design principles and optimization theory. General approach to constrained optimization. Probabilistic approaches to design. Computer-aided design to reliability specification. Application of computer graphics to engineering design. The emphasis is on extending the designer's potential and not on automating his activities. P, competence in FORTRAN programming and consent of instructor.

761 Decision Theory 3(3,0) (On sufficient demand)  

762 Systems Analysis 3(3,0) S  
Analysis of industrial problems as systems of servicing stations with deterministic and stochastic inputs and service times using queuing theory as a principal approach. Development of theoretical models. Digital computer simulation of complex systems. P, 661 or consent of instructor.

790 Thesis 5-7 as arranged  
794 Special Problems 1-3 Cr.

DEPARTMENT OF MICROBIOLOGY  
Professor T. Ross Wilkinson, Head  
Professors Baker, Middaugh, Pengra, Semeniuk (Emeritus), Sword; Associate Professors Ellis, Westby

Graduate majors offered: Master of Science degree with a major in Microbiology.  
Graduate minor offered: Microbiology

Prerequisites for graduate study:  
For the graduate major, a Bachelor's degree with at least a minor in Microbiology with supportive courses including two semesters of Organic Chemistry.  
For the graduate minor, a Bachelor's degree including prerequisites for the graduate courses elected.

**Microbiology Courses (Micr)**

DS 622 Advanced Dairy Microbiology 4(2,4) S  
(See description in Dairy Science)

624 Virology 3(2,3) S  
Viral and rickettsial diseases of animals, biochemical and biophysical properties of viral agents. viral replication in tissue culture, immune mechanism against virus diseases. The role of viral vaccines, antiviral drugs. P, 422 and consent of instructor.

636 Molecular and Microbial Genetics 4(4,0) F  
Designed to serve as a basic course in molecular genetics. Examples to illustrate genetic principles are drawn from all forms of life. Open to all students. P, Bio 371. A general microbiology course recommended.

637 Systematic Bacteriology 4(2,4) F  
Bacterial techniques for rapid isolation, identification and preservation of cultures. Bacterial taxonomy and nomenclature. P, 332.

713 Industrial Microbiology 4(2,4) S  
(Offered in 1979)  

738 Microbial Metabolism 4(2,4) S  
(Offered in 1978)  
Cellular architecture, environment and metabolism, permeability, catabolism, anabolism, regulation and differentiation. Laboratory study includes effect of environmental factors upon metabolism, active transport, isolation of microbial anabolic and catabolic enzymes, isolation of auxotrophs and analytical techniques employed in microbial metabolism. P, 231 and Chem 260, or 762 or consent of instructor. Alternate years.

742 Graduate Seminar 1(1,0) FSSu  
P, graduate standing. Two credits maximum.

790 Thesis in Microbiology 5-7 FSSu

DEPARTMENT OF MUSIC  
Professor Warren Hatfield, Head

Graduate major offered: None  
Graduate minor offered: Music
Prerequisites for graduate study:
For the graduate minor, a Bachelor's degree with a major or minor in Music.

Music Courses (Mus)

690 Independent Studies 1-3
691 Directed Studies 1-3

DEPARTMENT OF NUTRITION AND FOOD SCIENCE

Associate Professor Wayne Johnson, Head
Associate Professor Wills (Emeritus)

The following Nutrition and Food Science courses are offered to support the Master of Science in Home Economics program (see College of Home Economics) as well as other graduate programs in the University.

Nutrition and Food Science Courses (NFS)

603 Seminar in Food and Nutrition 1-2
   (On sufficient demand)
   Reports and discussion of current literature in various areas of food and nutrition. P, consent of instructor.

661 Special Problems 1-3 Cr. as arranged
   Special study in food and nutrition. P, consent of instructor.

724 Recent Developments and New Approaches in Human Nutrition 3 (3, 0)
   (On sufficient demand)
   Emphasis on new concepts in nutrition and resultant impact of changing dietary patterns on health and behavior. Insights essential for recognition of dietary needs and practical educational techniques to evoke favorable changes in food consumption patterns.

734 Techniques in Nutrition Research 3 (1, 6)
   (On sufficient demand)
   Laboratory experience using methods, measurements and instruments for obtaining nutritional data. P, Chem 260 or consent of instructor.

743 Current Topics in Foods 3 Cr.
   (On sufficient demand)
   Continuing changes in food processing and preparation techniques, modes of food distribution and food consumption patterns. Recent legislation regulating food labeling and food additives. Changes in food marketing practices resulting from increasing consumer demands for convenience packaging and prepared foods.

DEPARTMENT OF PHYSICS

Professor H. G. Graetzer, Chairman
Professors Duffey, Miller, Williams; Associate Professor Tunheim; Assistant Professor Sippel

The following Physics courses are offered to support the Master of Science in Engineering program (see College of Engineering) as well as other graduate programs in the University.

Physics Courses (Phys)

625 Plasma Physics 3 (3, 0) S
   Elementary processes in a plasma, trajectories of charged particles, collective effects, creation of plasma, plasma instabilities, applications. P, 421.

635 Reactor Physics 3 (3, 0) S
   Fission process; moderation and diffusion of neutrons; critical equation for homogenous and heterogeneous reactors; reactor control and reactivity changes. P, 433 or 331, Math 321 and consent.

637 Science of Solids 3 (3, 0) on demand
   Topics covered will be chosen to satisfy student interests and will be chosen from areas such as magnetism, semi-conductors, superconductors, ferroelectrics, and devices based on these aspects of solids. The role of defects in solids and strength of materials may also be included. P, Phys 439 or consent of instructor.

675 Tensors and General Relativity 3 (3, 0)
   Covariance in physics, basic tensor algebra and calculus, affine connections, the Riemann tensor, field equations, linear approximations. The Schwarzschild solution. P, 351.

725 Electrodynamics 3 (3, 0) S
   Complex quantities, circuits, Maxwell's equations, waves in general, planar, cylindrical, and spherical waves, approximation methods, plasmas. P, 421.

735 Theoretical Nuclear Physics 3 (3, 0)
   Quantitative treatment of the intrinsic properties of nucleons and the nucleon-nucleon interaction; consideration of current nuclear models and interpretation of scattering of nucleons in terms of these models. P, 433.
743 Statistical Mechanics 2(2,0)

751 Theoretical Mechanics 3(3,0) F
Further development of Lagrangian and Hamiltonian methods, canonical transformations, rigid body motion, relativistic mechanics. P, 351.

775 Advanced Quantum Mechanics 3(3,0) F
Hermitian operators, matrix methods, perturbation theory, Dirac wave equation, four-fermion interactions. P, 351, 371.

779 Group Theory in Quantum Mechanics 3(3,0) S
Symmetry transformations, continuous groups, finite groups, applications to valence theory, Lorentz group, fundamental particles. P, 371.

790 Thesis 5-7 as arranged. FS

PLANNING
Professor M. Myers, Chairman and Coordinator
Coordinating Committee: Professors Carl, Gilbert, Hogan, M. Myers; Associate Professors Betts, Burns, Daves, Nordstrom, Wagner

Graduate Minor offered with Master’s degree and major in: Economics, Education, Engineering, Geography and Sociology (other colleges or departments by special arrangement).

Planning is an essential part of most private and public activities. Planning is a process which can be learned and applied to increase effectiveness of decision making and operations.

The teaching of planning is governed by an administrative committee appointed by and responsible to the Vice President for Academic Affairs. The Planning faculty is appointed by the Vice President for Academic Affairs.

Planning Courses (Plan)

691 Principles of State, Regional and Community Planning 3 Cr. F
Purpose, structure, and dynamics of the planning process. Identification of different types of planning, interdependencies among persons who contribute to the planning process and are trained in separate academic disciplines. Introduction to basic techniques employed within different phases of the planning process. P, Enrollment within a minor in planning at the Master’s level or consent of the instructor.

692 Techniques of State, Regional and Community Planning 3 Cr. S
Brief review of basic approaches, procedures and methods employed within different phases of the planning process. Coordination required among persons trained in separate academic disciplines in order to carry out these basic techniques. Exercises in the practical application of selected techniques, and review of their application in ongoing or completed planning efforts. P, Plan 691.

(See also specialized courses in planning within departmental listings in Economics, Education, Engineering, Geography, Horticulture-Forestry, Political Science and Sociology.)

DEPARTMENT OF PLANT SCIENCE
Professor Charles R. Krueger, Head
Professors Brage, Carson, Derscheid, Dybing (USDA), Fine, Gardner, Gerloff (USDA), Horton, Keneck, Kinch (Emeritus), Mankin, Moore, Nigel (Emeritus), Penny (USDA), Price (USDA), Ross, Semeniuk (Emeritus), Shank, Shubeck, Wells, Westin, White, Wood; Associate Professors Arnold, Buchenau, Jensen, (USDA), Kohl, Lundeen, Otta, Reeves

Graduate majors offered: Master of Science degree with a major in Agronomy or Plant Pathology.
Doctor of Philosophy degree with a major in Agronomy.

Prerequisites for graduate study:
A Bachelor’s degree including prerequisites for the graduate courses elected.

Plant Science Courses (PS)

604 Virus and Bacterial Diseases of Plants 4(2,4) F
(Offered in 1978)
Plant diseases caused by viruses, bacteria, and mycoplasma-like organisms—including identification, development, symptoms, and control. Advanced laboratory research methods used in isolation, transmission, culture, purification, microscopy, serology, and investigation of the nature and properties of important plant pathogens. P, consent of instructor. Alternate years.

613 Host-Plant Pathogen Interactions 3(2,2) S
(Offered in 1979)
Physiology and genetics of host-parasite interactions. Disease resistance. P, consent of instructor. Alternate years.
643 Physical Properties of Soils 3(3,0) F
(Offered in 1978)

The exchange of energy and water at soil surfaces, infiltration and redistribution of water, and soil physical properties related to plant growth. Emphasis on applications in development and utilization of soil and water resources in a manner consistent with preservation of environmental quality. P, consent of instructor. Alternate years.

654 Chemical Properties of Soils 4(4,0) F
(Offere in 1979)

Chemical considerations of the dynamic interactions of the soil solid-water-gas phases as affected by climate, soil age, kinds of minerals or organic matter, added fertilizer elements, and plants. P, consent of instructor. Alternate years.

663 Environmental and Physiological Aspects of Crop Production 3(3,0) F (Offered in 1978)

Systems analysis of factors which limit or increase crop production and the potential for qualitative and quantitative adjustments. P, Bot 427 and consent of instructor. Alternate years.

673 Advanced Genetics and Cytogenetics 3(2,3) S (Offered in 1978)

Procedures in genetic studies and the nature and behavior of chromosomes in relation to heredity. P, consent of instructor. Alternate years.

700 Special Topics 1-6(1,3 per credit) FSSu


780 Advanced Special Problems 1 or 2 FSSu

Advanced study and research in crops, plant pathology, and soils. P, consent of instructor.

781 Plant Science Seminar I (1,0) FS

Reports and discussions of current investigations in crops, plant pathology, and soils. (2 Cr. required for M.S.; 3 Cr. for Ph.D.).

790 Thesis—M.S. 5-7

890 Thesis—Ph.D. var.

DEPARTMENT OF POLITICAL SCIENCE

Professor J. P. Hendrickson, Head

Graduate major offered: None.
Graduate minor offered: Political Science.

Prerequisites for graduate study:
For the graduate minor a Bachelor’s degree with major or minor in Political Science.

Political Science Courses (PolS)

692 Special Problems in Political Science 1-2-3(1-2-3,0) FSSu

Individual guided research culminating in formal research paper. Consent required for those students not minoring in Political Science.

DEPARTMENT OF RURAL SOCIOLOGY

Professor James L. Satterlee, Head
Professors Chittick (Emeritus); Dimit, Riley, Sauer (Emeritus); Associate Professor Wagner

Graduate Majors offered:
1. Master of Science Degree (2 options) (see department for details)
   A. Professional Option: designed for students seeking a career in secondary and college level teaching and public and private research (thesis required).
   B. Planning Option: designed for the student seeking a career in planning and community development (no thesis required). (Internship required)
2. Doctor of Philosophy degree with major in Sociology.

Prerequisites for graduate study:
For the graduate major a Bachelor's degree with 24 credits in the social sciences or consent of the department.
For the graduate minor a Bachelor's degree, including prerequisites for the graduate courses elected, or consent of the department.

Anthropology Courses (Anth)

690 Special Problems in Anthropology 1-3(1-3)

Advanced work or special problems in such areas as physical anthropology, cultural anthropology, archaeology. P, open to students with sufficient background and consent of instructor.

791 Seminars in Anthropology 1-4 Cr. On demand FSSu

Physical Anthropology
Cultural Anthropology
North American Ethnology
Archaeology
615 Social Thought 2(2,0) Su (Offered in 1978)
Brief survey of history and development of world's most important social theories and schools of social thought, evaluated in light of present knowledge. P, consent of instructor.

620 Social Organization 3(3,0) S (Offered in 1977)
Elements of social organization. Analysis of social groups and complex social organizations. Examination of conditions and factors related to the integration and disintegration of social organizations. P, consent of instructor.

621 Social Stratification 3(3,0) F (Offered in 1977)
A consideration of theories of social stratification. Examination of the relationship between social class and education, occupational choice, political preference, religious affiliation. Relationship between social class and social mobility. P, Open to students with sufficient background, consent of instructor. Alternate years.

630 Social Change 3(3,0) S (Offered in 1978)
Theories concerning factors and processes in social-cultural change. Consideration of various interpretations of social-cultural change in terms of stages, cycles, and trends. P, consent of instructor. Alternate years.

633 Leadership and Group Organization 3(3,0) F (Offered in 1977)
Emergency and types of leadership in group situations; analysis of leader-follower roles, functions and relationships in groups and organizations. P, consent of instructor. Open to Juniors and Seniors.

660 Social Demography 2(2,0) Su (Offered in 1977)
An exploration of population theory and methods focusing upon contemporary literature and the basic population processes of fertility, mortality, and migration. P, consent of instructor.

710 Research Methods in Sociology 3(3,0) S
(Offered in 1978)
Major emphasis will be given to research design, problems of measurement, methods of data collection, and analysis and interpretation of data. An integral part of the course will be the development of a research project dealing with some current sociological problem. P, consent of instructor.

712 Sociological Theory I 3(3,0) F
(Offered in 1977)
Critical examination of the main schools of sociological theory beginning with the system of Auguste Comte and ending with World War II. P, 301. or consent.

713 Sociological Theory II 3(3,0) S
(Offered in 1978)
Sociological theories and issues from World War II to present. P, 301 or consent.

780 Special Problems in Sociology 1-3(1-3) FSSu
Advanced work or special problems in such areas as population, marriage and family, rural sociology, criminology, social organization or urban sociology. P, open to graduate students with sufficient background and consent of instructor.

781 Internship in Planning 1-6 FSSu
P, Major and Planning option.

791 Seminars in Sociology 1-4 Cr. On demand FSSu
Theory Construction
Social Psychology
Sociology of Knowledge
Sociology of Religion
Sociology of Leisure
Social Planning
Sociology of Medicine
Advanced Research Methods

790 Thesis—M.S.
890 Thesis—Ph.D.

DEPARTMENT OF SPEECH
Professor Wayne Hoogestraat, Head
Professors Denton, Meyer, Stine; Associate Professors Johnson, Widvey, Zivanovic

Graduate majors offered: The Master of Arts degree with a major in Speech.

Graduate minor offered: Speech.

Prerequisites for graduate study:
For the Master of Arts degree with a major in Speech: a minimum of 20 semester hours of undergraduate credit in Speech, Theatre, Journalism, or Communication.
For the graduate minor in Speech: a minimum of 12 semester hours of undergraduate credit in Speech, Theatre, Journalism, or Communication; or the consent of the department head.
Those students who do not meet the above prerequisites may consult the Head of the Department of Speech concerning arrangements for removal of deficiencies. Before registering for graduate work leading toward a master's degree with a major in speech, the student must consult the Head of the Department of Speech who will assign an advisor.

Degree requirements: The required curriculum for the Master of Arts degree with a major in Speech consist of: (1) A minimum of 22 semester hours in Speech including 5-7 hours in SpCm 790, and electives approved by the advisor to bring the combined
total to not less than 30 semester hours; and (2) Completion and approval of a thesis based on appropriate research.

**General Communication (GCom)**

605 Theories of Communication 3 (3,0)
See GCom 605, Theories of Communication under Department of Journalism and Mass Communication.

**Mass Communication (MCom)**

637 Educational Radio and Television 3 (3,0)
Educational broadcasting with practical work in the preparation and presentation of educational and instructional materials for radio, television, and film and their use in the classroom.

660 Special Problems in Radio, Television and Film 1-2 Cr.

664 Film Studies 3 (3,0)
Film art forms, artists, and critics. Viewing and making films.

791 Research Methods in Communications 3 (3,0)
See MCom 791, Research Methods in Communication under Department of Journalism and Mass Communication.

**Speech Communication Courses (SpCm)**

616 History and Criticism of American Public Address 3 (3,0)
Critical evaluation of American speakers from Colonial to contemporary period. P, consent of instructor.

624 Persuasion 2 (2,0)

652 General Semantics 3 (3,0)
Relations between symbols; human behavior in reaction to symbols including unconscious attitudes, linguistic assumptions; and the objective systematization of language.

666 Rhetorical Theory 3 (3,0)
Historical development of rhetorical theory from classical to modern times.

676 Directing Speech Activities 3 (3,0) SSu
Organizing and directing declamation, dramatic, and forensic programs.

692 Special Problems in Oral Interpretation 1 or 2 Cr.
Directed research. May be repeated to a total of 4 credits in problems courses. P, consent of department head.

694 Special Problems in Public Address 1 or 2 Cr.
Directed research. May be repeated to a total of 4 credits in problems courses. P, consent of department head.

696 Special Problems in Speech Education 1 or 2 Cr.
Directed research. May be repeated to a total of 4 credits in problems courses. P, consent of department head.

790 Thesis 5-7 credits

**Theatre Courses (Thea)**

610 Dramatic Literature 3 (3,0)
Intensive readings of plays.

660 History of Theatre 3 (3,0)
Periods, theatres, and representative dramatic literature from primitives to present day.

690 Special Problems in Theatre 1 or 2 Cr.
Directed research. May be repeated to a total of 4 credits in problems courses. P, consent of department head.

**STATISTICS (Stat)**

Professor W. Lee Tucker, Coordinator of Instruction
Administrative Committee: Professors Dimit, Hsia, Rumbaugh, Storry, Tucker; Associate Professors Edeburn, Evenson, Kim, Lacher

Statistics is concerned with the development and application of the most effective methods of collecting, tabulating, and interpreting quantitative data in such a manner that the validity of conclusions and estimates may be assessed by means of inductive reasoning based on the mathematics of probability.

The teaching of statistics is governed by an administrative committee appointed by and responsible to the Vice President for Academic Affairs. The statistics faculty is appointed by the Vice President for Academic Affairs from the departments involved in this area.
641 Statistical Methods II 3(3,0) S
Analysis of variance, various types of regression, and other statistical techniques and distributions. Sections will be offered in the areas of Biological Science, Physical Science, and Social Science. P, 341 or Math 381.

791 Special Topics in Statistics 1-3, 6 max/student
Advanced study of one or more selected topics as student need justifies; as for example, sampling, statistical genetics, multivariate statistics. P, Stat 641.

DEPARTMENT OF TEXTILES, CLOTHING AND INTERIOR DESIGN
Professor Merlene H. Lyman, Head
Professors Lund (Emeritus), Lyle, Hsia, Rosenberger (Emeritus), Stoflet

The following Textiles, Clothing and Interior Design courses are offered to support the Master of Science in Home Economics degree program.

Textiles, Clothing and Interior Design Courses (TCID)

644 Textile Chemistry 3(2,2)
Chemistry of textiles including laboratory study of physical and chemical properties of textile fibers and fabrics.

673 Fashion, Art and Textiles Tour 3(3,0) Su
Development of intellectual understanding of the interrelationship of fashion, art and textiles of a specific area of the world. Study of the arts from an historical and contemporary approach.

692 Special Problems in Textiles and Clothing 1-4 credits
Problems for advanced study selected according to student's specific interests, needs, or current research with which student is familiar. Credit arranged by professor in charge.

744 New Developments in Textiles 3(3,0) Su
Recent developments in fibers and textile products. Chemical and physical properties of fibers, yarns, fabric structure and finishes. P, consent of instructor. Alternate years.

770 Seminar in Textiles and Clothing 1-2 Cr.
Reports and discussion of current literature in various areas of textiles and clothing.

773 Costumes and Textiles Through the Ages 3(3,0) (On sufficient demand)
A survey of the evolution of apparel arts from ancient to modern times emphasizing aesthetic, social, political, and economic factors affecting dress and mores expressed through dress in each culture. P, 372.

VETERINARY SCIENCE (Vet)
Associate Professors Ellis, Reed, Ruth

No major or minor is offered in this area. The following course may be used in the major or minor as a supporting course in the graduate program.

690 Problems in Veterinary Science 1-3 Cr. FS
P, Vet 403, consent of staff.

DEPARTMENT OF WILDLIFE AND FISHERIES SCIENCE
Associate Professor Charles G. Scalet, Head
Professors Hales (USDI), Linder (USDI), Simon (USDI); Associate Professors Applegate (USDI) Flake, Schitoskey (USDI)

Graduate major offered: Master of Science degrees with majors in Wildlife and Fisheries Sciences (Wildlife) and Wildlife and Fisheries Sciences (Fisheries).

Graduate minor offered: Wildlife Biology.

Prerequisites for graduate study:
For the graduate major in Wildlife and Fisheries Science a Bachelor's degree with at least 14 credits in the area of wildlife conservation and closely allied biological fields. For the graduate minor in Wildlife Biology a Bachelor's degree with at least 6 credits in the wildlife area and prerequisites to the graduate courses to be taken. Deficiencies in the prerequisites for graduate study may be made up during the first year of graduate study, but may not apply to the graduate program.
Wildlife and Fisheries Science Courses (WL)

*611 Limnology 4(2,6) S
Physical, chemical, and biological characteristics of lakes, ponds, and streams. Analysis of factors and processes that operate in fresh-water systems. Methods of measuring and evaluating these factors and processes. P, Ch 114; Phys 113; Biol 211; or permission of instructor.

*613 Fisheries Science 3(2,3) F (Offered in 1978)
Topics encompassed by the course include: various phases of fish propagation, population manipulation, production and population estimates, behavior, parasite and disease treatment, and others. Field work is of an applied nature. P, WL 367, 412; or permission of instructor. Alternate years.

*615 Upland Game Management 3(2,3) S
(Offered in 1977)
Upland game birds and mammals as components of ecosystems. Effects of farming, industry, social change, technology, and federal, state and private programs on game and nongame species. Techniques for management of individual species. P, WL 411 and permission of instructor. Alternate years.

*617 Big Game Management 3(2,3) S
(Offered in 1978)
Life histories and field techniques for research and management of big game animals. Recreational, economic, and aesthetic importance of big game. Interaction between big game species and domestic livestock. P, WL 411 and permission of instructor. Alternate years.

*619 Waterfowl Management 3(2,3) F
(Offered in 1977)

690 Special Topics in Wildlife and Fisheries 1-3 Cr. as arranged FSSu
(Limit of 2 credits for B.S. degree; limit of 5 credits for M.S. degree)

Graduate and senior undergraduate students may secure on demand individualized and small-group instruction in a variety of topics such as technical writing, wildlife pathology, advanced theory of population regulation, predation, animal behavior, ecology of aquatic invertebrates, water chemistry, and others. P, graduate or senior undergraduate standing and consent of instructor.

691 Wildlife Research Problems 1-3 Cr. as arranged FSSu
(Limit of 2 credits for B.S. degree; limit of 2 credits for M.S. degree)
Qualified students may investigate special wildlife problems under supervision of department staff. Arrangements must be made with supervising staff member prior to registration. P, cumulative grade point average of at least 2.75 and permission of supervisor.

*711 Aquatic Ecology 4(2,6) F (Offered in 1977)
Qualitative and quantitative measurements of aquatic populations including primary production and biomass. Interrelationship of biotic and abiotic components of aquatic ecosystems. Productivity and factors affecting rates of transfer of energy and matter within aquatic communities will be stressed. P, Zool 357 or WL 611 and permission of instructor. Alternate years.

*713 Animal Population Dynamics 3(2,3) F
(Offered in 1978)
Methods of analysis and interpretation of vital statistics of animal populations. Current theories on natural regulation of animal populations. Particular emphasis on vertebrate species of economic and/or recreational importance. Comparison of environmental controls on population in various animal groups. P, permission of instructor. Alternate years.

790 Thesis in Wildlife 5-7 credits as arranged FSSu

792 Graduate Seminar 1(1,0) FS
Reports and discussions of current topics in wildlife research and management. Not more than 2 credits may be applied toward the graduate degree.

*Field trips required in these courses may result in pro-rata charges to defray transportation costs.
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COURSE CHANGES

AE 603 Energy and Environment 3(3,0) · Analysis of world energy resources and their relation to land and water environments. Energy technology in fossil fuels and investigation of research and technologies of non-fossil fuels. Analysis of energy requirements for selected tasks and energy conversion techniques.

MA 600 - Special Topics (4-day workshops, 6 hrs per day) · A. Small Power Units, 1978. B. Agricultural Power Units, 1979. (see page 17 for other topics and dates)

Bio 697 Special Topics FS · Teratological Development, Radiation Biology, Evolution, Biophotography

Chem 730 Special Topics in Analytical Chemistry 1-6 credits · Individualized studies in mass spectrometry, electroanalytical, trace analysis, or instrumentation and electronics. P, consent.

CDFR 644 American Woman - Roles and Relationships 2(2,0) S · Recent literature regarding changing role of woman, her development tasks, and unique contribution she has to make in dynamic 20th century America. P, 342, or equivalent.

CE 635 Water Resources Engineering 3(3,0) S · (See page 22 for course description)

Economics - add before Core Requirements · No graduate credit on a converted basis from 300-499 advanced undergraduate courses will be granted for the following courses: Econ 326 Quantitative Economics; Econ 401 Intermediate Macroeconomics; Econ 402 Intermediate Microeconomics; Econ 423 Statistics II.

delete - Specialty areas: Agricultural Economics, Public Sector and Development, and Planning

AgEco 670 Advanced Farm and Ranch Management 3(3,0) S · Leasing arrangements, capital investment, computerized accounting and budgeting. Use of linear programming as a tool for planning and organizing the farm business. P, 202 and 271 or consent.

Econ 791 Graduate Special Topics 1-4 · Organized by an instructor in consultation with his or her department head and a group of students. The course will provide a medium through which a specific topic can be pursued. The course will normally be experimental and may be a "one shot deal" for a particular semester and the unique group of students. Maximum: 4 hours credit per semester, 7 hours credit per degree.


Elec 620 - Integrated Circuit Engineering 3(3,0) · Analysis and design of modern integrated circuits. New devices and design concepts.

Elec 720 Advanced Electronics 3(3,0) · Electronics systems engineering, communication theory.

Hist 638 European Intellectual History 3(3,0) · Leading cultural and ideological movements of Western man from Renaissance to present.

Hist 640 Medieval England 3(3,0) delete

HE 600 Practicum in Home Economics Related Occupations, 2-6 · This course is designed for the Home Economics teacher with a program related to careers or instruction in home economics related occupations. Students will become acquainted with industry terminology, equipment and jobs. Students will be placed in a variety of work situations in the Brookings area. Some assistance in development of teaching units will be provided.

Math 683 Theory of Probability 3(3,0) F · Topics in probability including an introduction to the axiomatic development of probability, random variables and distributions with emphasis on the binomial and Poisson distributions. Applications to discrete stochastic processes such as Markov chains and queuing theory are covered in some detail. P 381, or consent.

Micro 713 Industrial Microbiology 4(2,4) S · (Offered in 1979)

Econ 791 Graduate Special Topics 1-4 · Organized by an instructor in consultation with his or her department head and a group of students. The course will provide a medium through which a specific topic can be pursued. The course will normally be experimental and may be a "one shot deal" for a particular semester and the unique group of students. Maximum: 4 hours credit per semester, 7 hours credit per degree.

Engineering - changes in secondary core add:

Elec 620 - Integrated Circuit Engineering
EBio 672 - Biomedical Instrumentation and Safety for Health Facilities change:
Math 623, 624-Advanced Calculus
Phy 637 - Science of Solids
ECom 620 - Communication Systems 3(3,0) S

Statistical methods, random signals and noise, physical sources of noise, statistical communication theory and digital communications.

Elec 620 - Integrated Circuit Engineering 3(3,0)

Analysis and design of modern integrated circuits. New devices and design concepts.

Elec 720 Advanced Electronics 3(3,0)

Electronics systems engineering, communication theory.

Hist 638 European Intellectual History 3(3,0)

Leading cultural and ideological movements of Western man from Renaissance to present.

Hist 640 Medieval England 3(3,0) delete

HE 600 Practicum in Home Economics Related Occupations, 2-6

This course is designed for the Home Economics teacher with a program related to careers or instruction in home economics related occupations. Students will become acquainted with industry terminology, equipment and jobs. Students will be placed in a variety of work situations in the Brookings area. Some assistance in development of teaching units will be provided.

Math 683 Theory of Probability 3(3,0) F

Topics in probability including an introduction to the axiomatic development of probability, random variables and distributions with emphasis on the binomial and Poisson distributions. Applications to discrete stochastic processes such as Markov chains and queuing theory are covered in some detail. P 381, or consent.

Micro 713 Industrial Microbiology 4(2,4) S (Offered in 1979)

Applied microbiology for production of cells, enzymes, biochemicals, methane, pharmaceutical drugs such as antibiotics, steroids, and preparation and purification of both antigens and immunochromic acids. P, 231 and consent.
Phy 635 Reactor Physics 3(3,0) S

Fission process: Moderation and diffusion of neutrons; critical equation; reactor control; environmental effects; nuclear fusion. P, 331.

Phy 695 Special Topics 1-3

Individualized special projects either from a theoretical or experimental approach. P, consent

Phy 735 Theoretical Nuclear Physics 3(3,0) delete

COLLEGE OF NURSING

Carol J. Peterson, dean
Professors Blazey, Johnson

The general purpose of graduate education in nursing is to prepare professional nursing leaders. These are the clinicians, teachers, supervisors, and administrators whose special knowledge and skills are needed to meet the nation's nursing needs. The aim of the program at SDSU is to prepare nurses to function at an advanced level in clinical nursing and in the functional roles of teacher, clinician/practitioner, or patient care manager. Achievement of this aim includes study in related fields and application of research methods in the examination of nursing problems.

The degree granted is the Master of Science in Nursing. This degree gives the student an opportunity to acquire a broad graduate education focusing on people's health needs in both primary and secondary care settings. It, therefore, prepares a clinical generalist rather than a clinical specialist.

Specific objectives of the program are as follows: (1) acquire theory and skills in advanced nursing practice; (2) develop competencies in at least one of these role areas: teaching of nursing, advanced clinical practice, management/supervision of patient care; (3) develop an understanding of basic research principles and methodology and their application to study problems in nursing practice, nursing education or nursing administration; (4) contribute to advancement of the nursing profession through articulating and implementing a philosophy of nursing practice; (5) advance knowledge in nursing through development and testing of theories and systematic study of nursing problems; (6) identify and implement a nursing leadership role within the health care delivery system; (7) engage in a collaborative role with others interested in health care.

Prerequisites for Graduate Study:

Basic requirement for entry into the Master of Science in Nursing program is graduation with a major in nursing from an NLN accredited baccalaureate degree nursing program. Undergraduate preparation must include community health experience and introduction to health assessment. Candidates not meeting these basic prerequisites may be given special consideration if it appears that deficiencies can be corrected.

Course Offerings and Requirements

Formal course offerings for the Master of Science in Nursing can be divided into three groups: core offerings, role option, and supporting courses. A minimum of 36 semester hours is required for the degree. Three to four semesters of full-time study are required. Part-time study is an option available.

Core Courses
Nurs 610, 630, 650, 690, 700, 720, 792

Role Options
1. Teaching Option
   AHEd 751 Principles of College Teaching
   Nurs 710 Curriculum Development in Nursing
   AHEd 689 Internship in Education
2. Clinical Specialty Option (clinician or patient care manager)  
Nurs 640 Clinical Nursing Specialization

Supporting Courses  
Zool 623 Advanced Systemic Physiology  
Stat 641 Statistical Methods II  
Electives from other colleges and departments which support either the student’s clinical interest or role focus.

Two Options for Master of Science Degree:  
Option A requires a thesis and comprehensive written and/or oral examinations.  
Option B requires a research paper and comprehensive written and/or oral examinations.

Nursing Courses (Nurs)  
610 Concepts and Issues in Nursing 3(3,0)  
A systematic study and interpretation of nursing phenomena by critical examination of theoretic concepts and models. Consideration of the influence on nursing of federal, state and local legislation, and demographic and emerging social forces.

630 Nursing Science 2(0,6)  
Experience in systematic assessment of clients/patients in the identification of nursing diagnoses with emphasis on evaluation of nursing intervention.

640 Clinical Nursing Specialization 3(0,9)  
Extension and refinement of professional expertise in a clinical field of the student’s choice. May be repeated for a total of six credits.

650 Advanced Concepts in Nursing I 5(3,6)  
The development of nursing practice by application of scientific principles, generalization and concepts to complex nursing problems. Particular attention directed toward management of client relationship with the changed environment determined by his or her health status.

690 Seminar: Guided Study in Nursing 1-4 (0,2)  
Investigation of a selected problem in nursing theory or practice. May be repeated for two semesters for variable credit.

700 Advance Concepts in Nursing II 5(3,6)  
(continuation of Nurs 650) See Nurs 650 for course description

710 Curriculum Development in Nursing 2(2,0)  
Principles of curriculum development and their application to the nursing school curriculum. Selection, organization and evaluation of learning experiences.

720 Seminar: Leadership 1(0,2)  
Opportunity for analysis and critical review of current issues regarding the nurse’s role in delivery of health care services.

792 Problems in Nursing Research 3(3,0)  
A study of the components of the nursing research process with particular emphasis on problems of inquiry in the evolving health care system.

Note: The graduate program is still under development by the College of Nursing. Persons interested in the program should consult the Dean of Nursing to determine the status of the program’s development, requirements and the availability of offerings.