South Dakota State University Graduate Catalog 1989-1991

South Dakota State University

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SOUTH DAKOTA STATE UNIVERSITY BULLETIN
(USPS 474-180)

Graduate School edition
Volume 80, Number 1, May 1989

Published quarterly by South Dakota State University
Second Class Postage paid at Brookings, SD 57007

Due to conditions which may arise beyond the control of South Dakota State University, statements in this catalog may be changed during the 1985-86 and 1986-87 school years 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 conditions.

The contents of this catalog are believed to be accurate as of its date of publication. They cannot, however, be considered to be contractually binding and are presented for background information only.

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 Equal Opportunity/Affirmative Action Employer (Male/Female).
1989 Summer Session
June 5, Monday .......................................................... Registration
June 6, Tuesday ............................................................ Instruction begins
June 29, Thursday .......................................................... Graduation cards due
July 3, Monday ............................................................. Registration, second four-week session begins
July 4, Tuesday .............................................................. Holiday
July 18, Friday ............................................................. Session ends
August 2, Wednesday ...................................................... Grades due in Registrar’s Office

1989 Fall Semester
(1 day Registration, 72 Class Days, 5 Exam Days)
(Tentative)
August 28, Monday .......................................................... Registration
August 29, Tuesday ......................................................... Labor Day Holiday
September 4, Monday ..................................................... Last day to add or drop a course and adjust final fees
September 12, Tuesday ...................................................... Last day to submit a graduation card for Fall 1989
September 22, Friday ....................................................... South Dakota State Centennial-Holidays.
October 7, Saturday .......................................................... Hobo Day
October 9, Monday ........................................................... Pioneer Day Holiday
October 10, Tuesday .......................................................... Monday Classes
October 19, Thursday ......................................................... First half Fall semester ends
October 25, Wednesday ...................................................... Deficiency reports due in Registrar’s Office, 5:00 pm
November 2-3, Thursday-Friday ......................................... South Dakota State Centennial-Holidays.
November 8, Wednesday .................................................... Last day to drop a course
November 10, Friday .......................................................... Veterans’ Day—Holiday
November 23-26, Thursday-Sunday .................................... Thanksgiving Recess
December 15, Friday .......................................................... Last day of classes, F ’89
December 16, Saturday ..................................................... Graduation, 10:00 a.m.
December 18-22, Monday-Friday ........................................ Final Examinations
December 28, Thursday ...................................................... Grades due in Registrar’s Office not later than 5:00 p.m.

1990 Spring Semester
(1 day Registration, 73 Class Days, 5 Exam Days)
January 10, Wednesday .................................................... Registration
January 11, Thursday ........................................................ Instruction begins
January 24, Wednesday ...................................................... Last day to add or drop a course and adjust final fees
February 19, Monday ........................................................ Presidents Day Holiday
February 22, Thursday ....................................................... Monday Classes
February 22, Thursday ...................................................... Last day to submit a graduation card for Spring 1990
March 2, Friday ............................................................... First half Spring Semester ends
March 5, Thursday ............................................................ Deficiency reports due in Registrar’s Office, 5:00 p.m.
March 12-16, Monday-Friday ............................................. Spring Break
March 22, Thursday .......................................................... Last day to drop a course
April 13-16, Monday-Monday ............................................. Easter Recess
May 3, Thursday ............................................................. Last day of classes, Spring ’90
May 4, Friday ................................................................. Assessment/Reading Day
May 5, Saturday ............................................................. 104th Annual Commencement, 10:00 a.m.
May 7-11, Monday-Friday ................................................ Final Examinations
May 18, Friday ............................................................... Grades due in Registrar’s Office not later than 5:00 pm
**BOARD OF REGENTS**

<table>
<thead>
<tr>
<th>Honorable Regent</th>
<th>City</th>
</tr>
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<tbody>
<tr>
<td>HONORABLE KAY JORGENSEN</td>
<td>Spearfish</td>
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<tr>
<td>HONORABLE JOHN SUTTON</td>
<td>Pierre</td>
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<tr>
<td>HONORABLE MAX GREENWALD</td>
<td>Milbank</td>
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<tr>
<td>HONORABLE GEORGE E. MAAS</td>
<td>Watertown</td>
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<tr>
<td>HONORABLE E. STEEVES SMITH</td>
<td>Mitchell</td>
</tr>
<tr>
<td>HONORABLE MICHELLE TAFKEN</td>
<td>Yankton</td>
</tr>
<tr>
<td>HONORABLE ROGER PRUNTY</td>
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<tr>
<td>HONORABLE CATHY HALL</td>
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<tr>
<td>HONORABLE PAT LEBRUN</td>
<td>Rapid City</td>
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<tr>
<td>FRITZ A. BEHRING</td>
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</tr>
<tr>
<td>HONORABLE ERNEST L. BUCKLEY</td>
<td>Brookings</td>
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**GRADUATE COUNCIL**

<table>
<thead>
<tr>
<th>Name (Position)</th>
<th>City</th>
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<tbody>
<tr>
<td>CHRISTOPHER P. SWORD, Dean of the Graduate School</td>
<td></td>
</tr>
<tr>
<td>GARY LEMME, Associate Professor of Plant Science, (Biological Sciences)</td>
<td></td>
</tr>
<tr>
<td>ARDELLE LUNDEEN, Professor and Head of Economics, (Social Sciences and Humanities)</td>
<td></td>
</tr>
<tr>
<td>MARGARET DUGGAN, Professor of English, (Social Sciences and Humanities)</td>
<td></td>
</tr>
<tr>
<td>GEBALD BERGM, Head of Computer Science, Professor of Mathematics, (Physical Sciences)</td>
<td></td>
</tr>
<tr>
<td>JOHN EWING, Associate Professor of HPER, (Education)</td>
<td></td>
</tr>
<tr>
<td>GARY LARSON, Associate Professor of Biology, (Biological Sciences)</td>
<td></td>
</tr>
<tr>
<td>IVAN PALMER, Professor of Chemistry (Physical Sciences)</td>
<td></td>
</tr>
</tbody>
</table>

**OFFICERS OF ADMINISTRATION**

<table>
<thead>
<tr>
<th>Name (Position)</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROBERT T. WAGNER, President, Professor of Rural Sociology</td>
<td></td>
</tr>
<tr>
<td>CAROL J. PETERSON, Vice President for Academic Affairs, Professor of Nursing</td>
<td></td>
</tr>
<tr>
<td>RICHARD W. POWERS, Vice President for Administration, Ph.D., Indiana University</td>
<td></td>
</tr>
<tr>
<td>CHRISTOPHER P. SWORD, Dean of the Graduate School, Director of Research, Professor of Microbiology</td>
<td></td>
</tr>
<tr>
<td>REX C. MYERS, Dean of the College of Arts and Science, Ph.D., Western State College</td>
<td></td>
</tr>
<tr>
<td>DAVID A. BRYANT, Dean of the College of Agriculture and Biological Sciences, Professor of Animal and Range Sciences</td>
<td></td>
</tr>
<tr>
<td>DARRELL JENSEN, Dean, Division of Education, Professor of Education</td>
<td></td>
</tr>
<tr>
<td>DUANE E. SANDER, Acting Dean, College of Engineering, Professor of Electrical Engineering, Ph.D., Iowa State University</td>
<td></td>
</tr>
<tr>
<td>EDNA PACE ANDERSON, Dean, College of Home Economics, Professor of Home Economics Education</td>
<td></td>
</tr>
<tr>
<td>CARMEN WESTWICK, Dean of the College of Nursing, Professor of Nursing, Ph.D., University of Denver</td>
<td></td>
</tr>
<tr>
<td>BERNARD E. HUEBRINK, Dean of the College of Pharmacy, Professor of Pharmaceutical Sciences</td>
<td></td>
</tr>
</tbody>
</table>

**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 members are authorized to serve as adviser to graduate students or on their examining committees 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 Director of Summer School.

**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 College of Nursing is accredited by the National League for Nursing.

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.
I. The Graduate School

A. Degrees and Fields of Study

1. Master’s Degrees

Master of Science, Master of Arts, Master of Science Teaching and Master of Education degrees are offered. For a listing of majors within each degree, and for thesis and non-thesis options with requirements and procedures, see section on Master’s degrees on p. 7.

2. Doctor of Philosophy Degree

The Doctor of Philosophy Degree is offered with majors in Agronomy, Animal Science, Chemistry and Sociology. The Doctor of Philosophy in Agricultural Engineering is available through a cooperative program with Iowa State University.

B. Admission to the Graduate School

1. General Procedure

Students must be admitted to the Graduate School before enrolling in any graduate course, whether or not they are pursuing an advanced degree. A completed application must be filed with the Graduate School at least 15 days before the beginning of the first term of graduate work. Students taking only Lifelong Learning and Outreach classes or applying only for Special Student (non degree) status are exempt from the prior admission requirement, but must complete an application and be admitted to Graduate School. The application procedure includes the following:

a. A completed form supplied by the Graduate School must be submitted and accompanied by a non-refundable application fee of $15. Former students who have attended a state institution in South Dakota are exempt from the fee.

b. Official transcripts of all undergraduate and graduate course work must be sent to the Graduate School as a part of the application, except for South Dakota State University graduates who do not intend to pursue an advanced degree and non-degree students who are graduates of other institutions and intending to enroll for 10 credits or less (transient students). If application is made before the Bachelor’s degree is completed, an incomplete transcript must be filed, followed by a completed transcript during the first term of graduate work. International students who cannot provide original transcripts may submit notarized or certified copies at the time of application, followed by completed transcripts and certification of degree awarded, as soon as the bachelor’s degree is completed.

c. Two letters of recommendation, written on forms supplied by the Graduate School, from persons acquainted with the academic ability and professional competency of the applicant should be sent directly to the Graduate School. This requirement may be waived by the Dean of the Graduate School on recommendation of the department.

d. Students from foreign countries should submit their applications at least four months before registration. The application must include:
1.) The results of the Test of English as a Foreign Language (TOEFL). A score of 500 or above is required.
2.) Evidence of available financial support for at least the first year of academic work.
3.) A statement concerning whether any financial assistance from this institution will be necessary to pursue the degree.

2. Requirements for Admission

a. Baccalaureate Degree

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

b. Graduate Record Examination

Submission of the results of a Graduate Record Examination is not a requirement for admission to the Graduate School, the following programs require that scores be submitted: Health, Physical Education and Recreation, Microbiology, and Nursing. Departments should be consulted for specific requirements. The Graduate Record Examination is strongly recommended for students applying for admission to Sociology and Wildlife and Fisheries programs.

c. Departmental Requirements

Individual departments may have additional admission requirements. Applicants should inquire about such requirements from the department of interest.

3. Admission Status

a. Unconditional Admission

An applicant may be admitted without condition if a Bachelor’s degree has been earned, all undergraduate prerequisites for major and minor fields of study satisfactorily completed, and the applicant 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. Applicants with less than 3.0 but 2.75 or above grade point average may also be considered for unconditional admission if other aspects of their academic and/or professional record indicate superior performance and potential.

Admission to all degree programs is competitive and limited by the availability of personnel, facilities and funding necessary to provide quality graduate education within each program.

b. Conditional Admission

Conditional admission may be granted if:
1.) The applicant meets the requirements for unconditional admission for the last three semesters but has not completed the last semester of undergraduate study. Admission is conditional until the Bachelor’s degree is granted, or
2.) The applicant lacks prerequisite undergraduate courses specified by the major department. Admission is conditional until these courses have been completed to the satisfaction of the department.
3.) The applicant has a grade point average, between 2.5 and 3.0 for the junior and senior years.

4.) Completed physical health evaluation form.

After an application for admission and supporting documents are received by the Graduate School, they are reviewed by the department concerned. Using the recommendations from the department, the Dean of the Graduate School acts on the application and notifies the applicant, the department and/or committee concerned. A physical evaluation report, filed with the Health Service, is required of all students, except those enrolled as undergraduates at South Dakota State University during the previous year.

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4.) Completed physical health evaluation form.

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A student admitted conditionally must satisfy any conditions within the first year after admission. Departments will assign advisors to such students. Failure of a student to fulfill the above conditions or to do satisfactory graduate work at any point in his/her program is sufficient grounds for dismissal or recategorization as a Special Student (nondegree student).

Students with a junior-senior grade point average above 2.75 and who have pass-fail (or equivalent) grades shall have instructors for such courses furnish letter grades or shall furnish satisfactory Graduate Record Examination scores.

c. Special Student (nondegree)
Students not meeting the above admission requirements, those initially enrolled only in evening, Lifelong Learning and Outreach, or Adult Education classes, those not working toward a degree, or transient students may be granted admission and take courses as Special Students. Special Students may not receive Graduate Assistantships or enroll for thesis credits. The Graduate Dean will act as advisor for these students unless they are assigned to a department advisor. No more than ten credits under Special Student status may be applied toward a degree.

4. Change of Admission Status
Students with Special Student status may request and be granted a change in status to work toward a degree, provided ten credits of graduate work have been completed with grades of "B" or better. The request must include complete official transcripts and application fee if these have not been supplied previously. This request should be submitted to the Graduate School, after which it will be submitted to the appropriate department for a recommendation and processed as other applications.

5. Readmission
Students formerly enrolled as graduate students at South Dakota State University (who interrupt continuous registration for more than one semester or one semester and one summer session) should apply for readmission at least one month prior to registration. Forms for this purpose can be obtained from the Graduate School. Official transcripts for graduate work taken at other institutions since enrollment at South Dakota State University must be furnished.

A personal interview with the head of the major department should be arranged prior to registration.

6. Postdoctoral Study
Postdoctoral 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 approval of the Head of the Department, Dean and/or Director concerned.

C. Registration
Admitted graduate students should report at the place and time indicated in the semester schedule to receive registration materials and instructions.

1. Normal and Maximum Credit Loads
Minimum credit loads for the full-time student, including workshops, are 9 credits per semester during the academic year for master's students and 7 credits for doctoral students, 3 credits during the four-week and 6 credits during eight-week summer session. The maximum credit load for graduate assistants is as follows:

<table>
<thead>
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<th>Academic Year</th>
<th>Session</th>
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<tr>
<td>One-fourth time assistant</td>
<td>30</td>
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<tr>
<td>One-half time assistant</td>
<td>22</td>
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<tr>
<td>Three-fourths time assistant</td>
<td>15</td>
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</table>

In calculating credit loads, audit courses and undergraduate courses, are included at full value for Graduate School, but are not allowable for loan deferral, full and part time certification, or financial aid disbursement.

2. Converted Credits
Courses numbered 300-499 are considered to be advanced undergraduate credits and may be used in graduate programs with the following provisions:

a. Total credit for courses in this series, when applied to a graduate program, will be valued at 80 percent discarding all fractions. After such conversion, these credits are defined as "converted credits," which may be used as graduate credit in meeting the requirements for the various degrees, provided a grade of at least "B" is obtained in each course in this series. For example, if eight credits are earned in this series, they would be equivalent to six graduate credits.

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. The converted credit rule also applies to 500-series courses.

b. 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. Converted credits are usually not permitted in The Master of Science Teaching degree.

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

d. Transfer credits may not be converted.

e. Converted credits may be applied to a graduate program only with the permission of the major advisor or Advisory Committee, and Dean of the Graduate School.

3. Thesis or Dissertation Sustaining
All graduate students who have completed the thesis or dissertation credits specified on their Plans of Study are required to register and pay for one credit of Thesis Sustaining 790 or Dissertation Sustaining 890 each semester during the academic year and Summer Session until the degree is awarded. Registration is the student's responsibility and must be completed and payment made prior to the 10th day of the semester.

4. Summer Sessions
Many departments offer graduate courses during the summer. For information concerning the courses to be offered, write the Director of Lifelong Learning and Outreach and request a Summer Session Bulletin.

D. Course Restrictions
1. Workshops
While any number of credits may be earned in workshops, no more than two such credits may be applied toward an advanced degree. Workshop notation on transcripts will be used for application of this limitation.
2. 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.

3. Correspondence Courses

Correspondence courses are not given at the graduate level at this institution and are not permitted on a student’s Plan of Study. Generally courses delivered by television are considered to be correspondence courses.

4. Lifelong Learning and Outreach and Evening Students

Graduate students enrolling in Lifelong Learning and Outreach or evening classes will ordinarily be admitted as Special Students. Students must possess a bachelor’s degree to enroll and receive credit for graduate courses.

5. Transfer of Credits

Graduate credits earned while in residence at other institutions may be applied toward an advanced degree if they were awarded a grade of at least “B”, and if they are approved by the Advisor or Advisory Committee and the Dean. Transfer credits cannot substitute for credits required for minimum residence (See Residence and Credit Requirements). Requests for transfer of credits are usually made at the time a Plan of Study is approved and must be supported by an official transcript filed with the Graduate School. For the Master’s degree transfer credits are limited to 7 credits in the major and 3 credits in the minor or supporting area.

Transfer credit is not permitted for courses taken by correspondence. Independent Study, Readings’ courses, Continuing Education, or Extension courses may be approved for transfer if they are regularly listed in the graduate bulletin of an accredited institution and were taught by members of the Graduate Faculty of such institution. Subtitles or explanatory information will be required for approval of Independent Study and Readings’ Courses. Transfer credit is generally not permitted for work from foreign institutions.

6. Graduate Credit for Seniors

Seniors within 15 credits of completing a Bachelor’s degree at South Dakota State University may request permission from the Dean to take up to 6 credits of 600 or 700 level courses for graduate credit. Permission requires the student to have a grade point average of at least 2.5, or a junior-senior grade point average of 3.0 or higher and to enroll for not more than 18 credits (9 credits during summer school). Forms for requesting permission to take courses for graduate credit may be obtained from the Graduate School. The student must be admitted as a special student and must register for the course at the graduate level.

7. Graduate Study by University Staff

Staff members with the rank of Assistant Professor or above may not work toward an advanced degree at this institution, but all staff members may take graduate courses for credit with permission from the Department Head, Dean and/or other required authorization. A transient Graduate application should be completed. A “Permission to Take Classes” form, which may be obtained from the Personnel Office, should be completed and returned to the Personnel Office before registration.

Staff members below the rank of Assistant Professor who intend to work toward a degree at this institution must follow the regular process for admission to the Graduate School (Section 1 B 1).

Full-time members of the research, instructional, or extension staffs may enroll for a maximum of 12 credits during the calendar year, with a maximum of seven in any one semester and two during the Summer Session. Staff must pay the application fee.

E. Grades

The student must maintain a “B” average (3.0) in all courses in the graduate program. No credit is given toward a graduate degree for any grade below “C” in 600 or 700 level courses, or below “B” in 300, 400, or 500 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.

Graduate students usually register for thesis or dissertation credit during several semesters. An incomplete grade (I) is given until satisfactory completion of the thesis and final oral examination. The advisor, upon satisfactory completion of the thesis or dissertation and final oral, will then assign a satisfactory grade (S) for all thesis or dissertation credit by notifying the Registrar. If not satisfactory, a grade of unsatisfactory (F) is given. This grading procedure also applies to Research and Design Papers.

For Seminars, a letter grade or a grade of Satisfactory (P) or Unsatisfactory (F) may be assigned at the discretion of the instructor.

When a graduate student is given an Incomplete grade (I) for any other course in the student’s graduate program the instructor may indicate in writing to the student what additional work must be completed and may establish a date at which such work must be completed. A copy of this information must be filed with the Graduate School. If the work is not completed in either the manner or time prescribed, the instructor may change the Incomplete grade to whatever grade is justified as an evaluation of the student’s work or may allow the grade to remain Incomplete. Incomplete grades given without this procedure will remain as Incomplete on the student’s record unless changed because of completion of the remaining work in the course.

F. Tuition and Fees*

1. Academic Year

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<td>Tuition per credit hour, graduate resident</td>
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<td>Tuition per credit hour, graduate, non-resident</td>
<td>104.00</td>
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<td>General University fee (waived for faculty and staff completing proper forms from Personnel Department, but not for Graduate Assistants), per credit</td>
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<tr>
<td>General Instruction Administrative Fee, per credit</td>
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<tr>
<td>General University Deposit fee (refundable)</td>
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<tr>
<td>Engineering Education Fee, per credit</td>
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<tr>
<td>Engineering/Science Lab fees (per course)</td>
<td>12.50</td>
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<tr>
<td>International Student fee (new international students only)</td>
<td>75.00</td>
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*Subject to change by action of The 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-fourth tuition.

2. Fees for Auditing Courses

Regular tuition per credit will be charged for auditing a course. Faculty, fellows, graduate assistants, research and teaching assistants will not be charged tuition to audit a course (State Support Courses Only) but will be assessed general university/activity and instructional fees, and course related fees. Registration as an auditor is by add slip after registration day. Grades will be designated by the instructor as AUP or AUF. Please check the SDSU Semester Schedules for more information.
3. **General Deposit**

All students enrolled in 9 or more credits or living in a residence hall must pay a $60.00 deposit to defray charges for damage of laboratory equipment or supplies, or housing facilities. Library and vehicle fines or special service fees may be assessed against this deposit. The balance at the beginning of any semester must be $60.00 and appropriate charges will be assessed at final fee payment to reinstate the balance. Any remaining balance is refundable.

4. **Thesis and Dissertation Fees**

Master's students must pay a fee to the Library to cover the cost of binding four thesis copies. This must be done before the Graduate School will accept the manuscript in final form.

Doctor of Philosophy students must pay for binding four copies of the dissertation, microfilming and publishing the abstract in “Dissertation Abstracts.” This does not include Registration of Copyright, reprint costs or other incidental fees. The fee must be paid to the Graduate School when submitting the final copies of the dissertation.

5. **Summer Sessions**

See Summer Session catalog for tuition and fees.

G. **Student Responsibility**

Before a degree is granted, the student must meet all of the requirements of the Advisory Committee, the Major Department and the Graduate School. Students are responsible for conforming to all published academic policies and degree requirements. They are likewise responsible for the regulations concerning the degree they plan to obtain and any special requirements within the department or academic unit. In addition, it is the student's responsibility to conform to the University's policies regarding the standard of work necessary to maintain enrollment in the Graduate School.

H. **Other Information**

1. **Fellowships and Assistantships**

A number of fellowships and research and teaching assistantships are available to 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.

2. **Obligation Incurred in Accepting an Assistantship**

The Graduate School of South Dakota State University 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 graduate scholarship, fellowship, traineeship or graduate assistantship for the next academic year is offered to an actual prospective graduate student, the student, having indicated acceptance before April 15, will have complete freedom through April 15 to submit in writing a resignation of the appointment in order to accept another scholarship, fellowship, traineeship or graduate assistantship. However, an acceptance given or left in force after April 15 commits the student not to accept another appointment without first obtaining formal release for the purpose. Students working on degree programs, including those on assistantships, are considered to have assumed an obligation to complete their graduate program before transferring to any other post baccalaureate or professional degree program.

3. **Housing for Graduate Students**

Prospective graduate students should inquire about rooms or apartments from the Director of Residential Life, well in advance of registration.

4. **Living Costs**

Living costs, including tuition and fees, for the single resident graduate student are estimated to be approximately $7,000 per academic year. Travel costs are not included.

5. **Filing a Graduation Application**

The student must file a graduation application with the Graduate School by the date specified in the university calendar for the term in which completion of the advanced degree is expected. Failure to file this application will result in a delay in graduation.

6. **Attendance at Commencement**

All students are urged to participate in the Commencement exercises at which their degree is to be granted. However, attendance is optional. Students must notify the Registrar of their intent to attend or not to attend on a card mailed to them shortly before Commencement. Diplomas will be mailed approximately three months after Commencement.

7. **Cap, Gown and Hood Rental**

Caps, gowns and hoods for Commencement may be rented from the Student Association Bookstore.
II. Degrees and Fields of Study

A. Master’s Degrees

1. Degrees and Options

The Master of Arts, Master of Science, Master of Education, and Master of Science teaching degrees are offered with the majors shown below. Some majors offer thesis option A only, others have non-thesis options B or C as well. Master of Education degrees are offered only with non-thesis options B or C. Requirements for each option are given in Section II A 5.

### Major: Degree Options

- **Agricultural Education**: M.Ed., B, C
- **Agricultural Engineering**: M.S., A, B
- **Agronomy**: M.S., A, B
- **Animal Science**: M.S., A
- **Agricultural Education**: M.Ed., B, C
- **Chemistry**: M.S., A
- **Curriculum & Counseling**: M.S., A, B
- **Development**: M.S., A, B, C
- **Dairy Science**: M.S., A
- **Economics**: M.S., A, B
- **Economics, J.D./M.S.**: M.S., A, B
- **Educational Administration**: M.Ed., B, C
- **Engineering**: M.S., A, B
- **English**: M.A.
- **Entomology**: M.S., A
- **Geography**: M.S., A, B
- **Health, Physical Education and Recreation**: M.S., A, B, C
- **Home Economics**: M.S., A, C
- **Industrial Management**: M.S.
- **Journalism**: M.S.
- **Mathematics**: M.S., MST**, A, B, C
- **Microbiology**: M.S.
- **Nursing**: M.S., A, B
- **Plant Pathology**: M.S.
- **Physics**: MST**, C
- **Rural Sociology**: M.S., A, B
- **Speech**: M.A.
- **Wildlife and Fisheries Sciences**: M.S.
  - **Wildlife Option**: M.S., A
  - **Fisheries Option**: M.S., A

**A** (Agricultural emphasis) See page 18.

**MST**: Degree has majors in chemistry, mathematics, and physics.

**NOTE**: Previous editions of this bulletin include the M.Ed. degrees as a separate section. This edition integrates them with other master's degrees.

The major fields shown with the exception of Nursing, may be selected as minor fields. In addition, Botany, History, Political Science, Mechanized Agriculture (Agricultural Engineering Department) or Planning, page 36 may be chosen as a minor.

2. Admission

Applicants must meet the requirements for admission to the Graduate School as listed in section I B.

3. Advisory Committee

As a minimum, the Advisory Committee will be composed of the major advisor (Graduate Faculty member), the minor advisor (Graduate Faculty member), an additional member of the major department, and a Graduate Faculty representative (appointed by the Graduate Dean and representing the Graduate Faculty). The major advisor should be chosen or assigned by the head of the major department. Following selection by the student and recommendation of the major advisor, the Advisory Committee should be appointed by the Dean of the Graduate School as soon as practical after starting work on the graduate program.

The Advisory Committee is responsible for assisting the student in developing a suitable graduate program, providing continuing guidance and counsel and certifying the completion of the degree requirements to the Dean of the Graduate School. The Advisory Committee approves the Plan of Study and any revisions of it, approves the thesis proposal (in options requiring one of these), conducts the examinations appropriate to each option, supervises the validation of courses and ensures that professional standards have been met in completing the degree requirements.

4. Plan of Study

During the first semester of graduate work and no later than the end of the first year, the Plan of Study should be prepared on the appropriate form and approved by the Advisory Committee. After approval by the Advisory Committee, the Plan of Study will be submitted to the Dean of the Graduate School for approval. Courses for the major must be taken in the major department or in related fields. At least 50% of the credits on a Plan of Study must be in courses open only to graduate students (700-series or above). Failure to submit a Plan of Study may result in disapproval of courses taken prior to approval. After approval, changes in the Plan of Study must be requested on a form furnished by the Graduate School, approved by the Advisory Committee and the Dean of the Graduate School.

5. Requirements by Option, semester hours

<table>
<thead>
<tr>
<th>Option</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum total</td>
<td>30</td>
<td>32</td>
<td>35</td>
</tr>
<tr>
<td>Minimum major, including thesis or research problem†</td>
<td>19</td>
<td>19**</td>
<td>19**</td>
</tr>
<tr>
<td>Thesis</td>
<td>5-7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Research Problem</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Minimum minor, or supporting courses from two or more disciplines††</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

†Consult CHRD department for requirements.

**M.Ed. degree requires 21 credits for Option B, and 24 credits for Option C in the major.

††Courses in the major department may be used as supporting courses, providing they are considered sufficient diverse by the major department.

**NOTE**: See separate listing for Master of Science Teaching requirements.

6. Minimum Residence Requirements

The minimum residence requirement is 22 semester hours, including at least one semester or two summer sessions of full time graduate work spent on campus. Residence credit is given only for graduate credit earned in courses offered by South Dakota State University. Appeal procedures are available from the Dean of the Graduate School for persons seeking exemption from this policy.
7. 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:

a. The grade point average is "B" or better in the major and "C" or better in the minor or supporting courses, and
b. Reasonable progress has been made in the research for the thesis, research report or design paper as applicable, and
c. An approved program of study is on file at the Graduate School, and
d. The major adviser recommends it.

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

8. Thesis

A thesis meeting the requirements of the major department and the Graduate School must be submitted by each student completing a Master's degree in those options requiring a thesis. The thesis must represent a scholarly contribution to research knowledge in the major field.

A research area for the thesis topic should be chosen after consultation with the major advisor as early in the student's program as possible. A written research plan must be approved by the Advisory Committee not later than the end of the second semester of graduate work. The thesis accounts for 5 to 7 semester hours in the major. The thesis may be prepared with a view to publication and conform to the style of one of the journals in the major field as required by the major department and must be prepared in the format required by the Graduate School as shown in "Instructions for Thesis and Research Reports" available from the Graduate School. The thesis should be a single document rather than a compilation of individual manuscripts.

Grades for thesis are submitted as Incomplete (I) until the oral examination. If the thesis is accepted by the examination committee, the major advisor and the Dean of the Graduate School, a grade of Satisfactory (P) is given for all thesis credits.

A copy of the thesis must be filed with the Graduate School for review at least ten working days (excluding Sundays and holidays) before the oral examination. The student should distribute one copy to each member of the advisory committee (including the Graduate Faculty Representative). Two copies (one on at least 50 percent rag content paper), corrected in accordance with suggestions by the advisory committee and the Graduate School, must be returned to the Graduate School with a receipt from the Library showing that the fee for binding for four copies of the thesis has been paid. This should be completed at least five days prior to commencement.


Students following Option B must complete at least two credits for a Research Problem (or Design Paper in Engineering) in the major field presented as a written report. The content, style and format of the report must meet the requirements of the major department. The Research Report (or Design Paper) must be approved by the Advisory Committee, and filed in the major department. A copy of the written report should be provided to each committee member and be available at the final oral examination. Grades of satisfactory (P) are given.

10. 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.

11. Examinations

a. Comprehensive

In those departments and options (academic programs) requiring a comprehensive written examination, the examination will be given by the Advisory Committee at least two weeks prior to the final oral examination, filed in the major department for review, and be present at the final oral examination. A comprehensive written examination is required of students on non-thesis Option C programs.

b. Final

An oral examination will be administered by the Advisory Committee covering the student's program. This examination should be comprehensive, testing the student's ability to analyze, integrate and apply knowledge from the discipline. This examination should occur at least ten working days (excluding Sundays and holidays) before commencement. An exemption from the oral examination may be given within the Division of Education on Option C programs by the student's advisory committee with the concurrence of the Graduate Faculty representative.

12. Time Limitation

a. Obsolete program

If the requirements for the Master's degree are not completed within six years from the time of admission to work toward the degree, a reconsideration of the student's program will be required and the rules of the Graduate School in effect at the beginning of the seventh year will apply.

b. Obsolete Coursework

Courses completed more than six years prior to completion of the requirements of the Master's degree and not part of a previous degree are regarded as obsolete coursework. Such courses may be used in the Master's degree program if validated. Validation is allowed at the discretion of the Advisory Committee and the department involved and can be accomplished by passing a written validation examination in the subject matter area.

Validation of obsolete coursework cannot exceed six graduate credits and must be certified by the Advisory Committee on a form prescribed by the Graduate School.
13. Checklist for Master's Degree

Requirements | When Due
---|---
1. Application for Admission to Graduate School | One month before initial registration
2. Designation of Major Advisor | Prior to registration for first semester or as soon as practical after starting program.
3. Designation of Advisory Committee | During first semester or as soon as practical after starting program.
4. Approval of Plan of Study by Advisory Committee | During first semester
5. Approval of Thesis Proposal (Option A) or Research Problem Plan (Option B) | During second semester
6. Admission to Candidacy | After 20 graduate credits have been earned
7. Comprehensive Written Examination | During last semester of course work, at least two weeks before final oral examination where required

8. Filing of Graduation Application | Within the first four weeks of the last semester
9. Thesis (Option A) or Research Problem (Option B) submitted to Advisory Committee | At least ten days (not including Sundays & Holidays) before final oral examination
10. Thesis submitted to Graduate School (Option A) | At least ten days before final oral examination
11. Request for Scheduling Oral Examination | At least ten days before final oral examination
12. Final Oral Examination | At least five days before commencement
13. Corrected copies of Thesis submitted to Graduate School and Library (Option A) or Research Paper filed in major department (Option B) | At least five days before commencement

The Advisory Committee is responsible for assisting the student in developing a suitable graduate program, providing continuing guidance and counsel, evaluating student progress and certifying the completion of the degree requirements to the Dean of the Graduate School. The Advisory Committee approves the Plan of Study and any revision(s) of it, approves the Dissertation Proposal, reviews the Dissertation, evaluates the student’s progress, determines the student’s proficiency with the research tools, conducts the comprehensive examinations and the final examination, supervises the validation of courses and ensures that professional standards have been met in completing the degree requirements.

4. Plan of Study

Within six weeks after appointment, the Advisory Committee will meet with the student to approve a Plan of Study and to consider a research area for the dissertation. The Plan of Study must be prepared on the appropriate form and approved by the Advisory Committee and the Dean of the Graduate School. Delay in submitting a Plan of Study may result in disapproval of courses taken prior to approval. The student cannot take the comprehensive written examination prior to approval of the Plan of Study. Changes in the approved Plan of Study must be requested on a form furnished by the Graduate School, and must be approved by the Advisory Committee and the Dean of the Graduate School.

5. Residence and Credit Requirements

a. Total

A minimum of three academic years of full time work beyond the Bachelor's degree (minimum 90 semester credits) or a minimum of two academic years of full time work beyond the Master's degree (minimum of 60 semester credits) are required for the Doctor of Philosophy degree. Where consideration is given to a master’s degree it must be in the area of the major, minor or a related area, be an academic program from a regionally accredited institution, and be declared at the time the Plan of Study is submitted. The Advisory Committee may require more credits than the minimum listed above if it believes the extra requirements are in the best interest of the student. The Research Tool requirements are in addition to this total.

B. The Doctor of Philosophy Degree

1. Majors

The Doctor of Philosophy degree is offered with majors in Agronomy, Animal Science (offered in the Department of Animal and Range Sciences and in the Department of Dairy Science), Chemistry and Sociology. The Doctor of Philosophy degree in Agricultural Engineering is offered through a cooperative program with Iowa State University.

2. Admission Requirements

Applicants for the Doctor of Philosophy degree will usually have a Master’s degree. In those cases where applicants do not have a Master’s degree, departmental requirements will apply, either requiring completion of a Master’s degree or permitting an individual to move directly into a doctoral program.

3. The Advisory Committee

After consultation with the student, the head of the major department will designate a major advisor prior to first registration where practical. During the student’s first semester in residence (or before the completion of 12 credits part-time) the major advisor will recommend to the Dean of the Graduate School members of an Advisory Committee as follows:

a. The major advisor who acts as chairperson of the committee;
b. The head or representative of the major department or of a department in the area of the major;
c. An additional member of the major department or a related department, and
d. The minor advisor or a representative from an area where the supporting courses will be taken.
e. In addition, the Graduate School Dean will select a fifth member from a department representing an area not closely related to the major or minor department or supporting area. This member represents the Graduate Faculty, ensuring 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 requested by the student or the major advisor and assigned to the committee by the Graduate School Dean.
10

6. Research Tool Requirements

The Plan of Study must include development of proficiency with at least one research tool. Research tools are skills which are useful in advanced research in the major field, but which are not an integral part of the major or the minor fields (or supporting courses). Since relevant skills are involved, the number of credit hours cannot be specified, but generally will be equivalent to 8 to 10 credits of coursework. Each department, with the approval of the Advisory Committee, shall specify the research tool requirement for students in its program. The Advisory Committee will determine that proficiency has been obtained and will certify completion of the Research Tool requirement on a form supplied by the Graduate School. Research tools that have been required frequently include foreign languages, statistics and computer programming. Credits earned in attaining proficiency with research tools may not be included in the degree program.

7. The Dissertation

a. Proposal
The student in consultation with the major advisor or dissertation adviser shall prepare a written dissertation proposal for approval by the Advisory Committee.

b. Requirements
The dissertation should represent at least one academic year of full time research (18-30 credits). Of no specific length, it should advance or modify knowledge in the major discipline and demonstrate the candidate's mastery of the subject. The dissertation should be prepared in the style of one of the journals in the major discipline as required by the Major Department and in the format required by the Graduate School as specified in "Instructions for Thesis and Research Reports". When submitted, it is accompanied by an abstract of no more than 350 words.

While the dissertation should be an integrated document providing opportunity for philosophic inquiry, the student is encouraged to develop one or more journal articles from it. Some departments may require that the journal articles be a part of the dissertation.

After the dissertation is approved by the major advisor or dissertation advisor, a copy is delivered to the Graduate School. After the dissertation is found acceptable in form by the Graduate School it is returned to the student who must distribute copies to the members of the Advisory Committee ten days (excluding Sundays and holidays) prior to the final oral examination.

After the final oral examination, all necessary corrections in the dissertation are made and four copies are delivered to the Graduate School (two copies for the Library, one for the department and one for the dissertation adviser). The cost for binding these copies is the responsibility of the student. The student must agree to the publication of the abstract and payment for publication of the abstract and microfilming of the dissertation.

8. Examinations

a. Interim Evaluation
Upon completion of approximately half of the coursework on the Plan of Study the Advisory Committee will meet to evaluate the progress of the student, provide advice and counsel, and recommend continuance or termination of the program. Since the Doctor of Philosophy is a terminal academic degree, evaluation of student performance includes an evaluation of progress in the program as well as academic performance. The Advisory Committee may recommend to the Dean of the Graduate School termination of the student in the program.

b. Comprehensive Written and Oral Examinations
When coursework has been substantially completed and the research tool requirement has been met, examinations covering the coursework are taken. These examinations are open for all members of the Graduate Faculty to listen, but not participate in the questioning. The first is a comprehensive written examination which is followed on satisfactory completion by an oral examination. These examinations are to test the student's knowledge and ability to integrate this knowledge in both the major and minor (or supporting courses) areas.

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. The comprehensive examinations must be completed at least two months before the final examination is taken. Upon satisfactory completion of the comprehensive examinations a student is formally admitted to candidacy for the Ph.D. degree.

c. The Final Examination
This examination is conducted by the Advisory Committee at a time and place announced by the Graduate School. While the Advisory Committee determines the character and length of the examination, sufficient time should be devoted to the dissertation, including journal articles to test the ability of the student to defend the research. In addition, questions to test the student's general knowledge, judgement and critical powers are usually asked. The final oral examination cannot be taken earlier than two months following successful completion of the comprehensive examinations and must be completed ten days prior to commencement.
9. Dissertation Sustaining
After satisfactory completion of the dissertation requirements in the Plan of Study, a student must register continuously each semester during the academic year for Dissertation 890, Section II, until the degree is awarded. Failure to do so will automatically terminate the degree program. Reinstatement requires retaking the Comprehensive Written Examination with performance approved by the Advisory Committee. Registration is the student's responsibility and must be completed, and payment made, prior to the 10th class day of the semester.

10. Time Limitation

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

b. Obsolete Coursework
Courses completed more than eight years before completion of the doctorate and not part of a previous degree are regarded as obsolete coursework. Such courses, may be used in the doctoral degree program if validated. Validation is allowed at the discretion of the Advisory Committee and department involved and can be accomplished by passing a written validation examination in the subject matter area. Validation of obsolete coursework cannot exceed six graduate credits and must be certified by the Advisory Committee on a form prescribed by the Graduate School. However, credits earned as a part of a Master's degree which is applied toward the doctoral program remain valid and require no validation.

11. Checklist for Doctor of Philosophy Degree

<table>
<thead>
<tr>
<th>Requirements</th>
<th>When Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Application for Admission to Graduate School</td>
<td>One month before first registration</td>
</tr>
<tr>
<td>2. Designation of Major Adviser</td>
<td>Prior to registration for first semester where practical</td>
</tr>
<tr>
<td>3. Designation of Advisory Committee</td>
<td>Within first semester of graduate work or prior to 12 semester hours of graduate work</td>
</tr>
<tr>
<td>4. Approval of Plan of Study by Advisory Committee</td>
<td>Within first semester of graduate work</td>
</tr>
<tr>
<td>5. Approval of Dissertation Proposal by Advisory Committee</td>
<td>Before beginning research</td>
</tr>
<tr>
<td>6. Interim Evaluation by the Advisory Committee</td>
<td>Not later than halfway through the coursework in the Plan of Study</td>
</tr>
<tr>
<td>7. Language Examination/Completion of Research Tools</td>
<td>Prior to comprehensive examination</td>
</tr>
<tr>
<td>8. Comprehensive Examinations, Candidacy for Ph.D. degree</td>
<td>Near completion of coursework and at least 2 months prior to final oral examinations</td>
</tr>
<tr>
<td>9. Filing of Graduation Application</td>
<td>Within the first four weeks of the last semester</td>
</tr>
<tr>
<td>10. Dissertation Due at Graduate School and to Advisory Committee with request for scheduling Final Oral Examination</td>
<td>Not later than ten days (not including Sundays &amp; holidays) prior to final oral examinations</td>
</tr>
<tr>
<td>11. Final Oral Examination</td>
<td>No later than ten days prior to commencement</td>
</tr>
<tr>
<td>12. Corrected Copies of Dissertation Due at Graduate School</td>
<td>Not later than five days prior to commencement</td>
</tr>
<tr>
<td>13. Arrangements for microfilming and binding of Dissertation</td>
<td>Not later than five days prior to commencement</td>
</tr>
</tbody>
</table>

Courses of Instruction

**COURSE NUMBERING SYSTEM**

**300-499 series**
Courses numbered 300-499 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 policy on converted credits (see C. 2, Page 4)

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 SDSU 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 700-799 are graduate level and are open to graduate students only (except seniors by permission. See page 5).

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

**900-999 series**
Courses numbered 900-999 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.
DEPARTMENT OF AGRICULTURAL ENGINEERING

Professor Mylo A. Hellickson, Head
Professors Chu, De Boer,
Moe (Emeritus), Wiersma (Emeritus);
Associate Professor Froehlich
Associate Professor Alcock

Graduate major offered:
Ph.D. in Agricultural Engineering — Cooperatively with Iowa State University.
Master of Science degree with major in Agricultural Engineering. Master of Science in 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 majors 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)  S 1990, F 1991
Analysis of world energy resources, and their relation to land and water environments. Energy technology in fossil fuels and investigations of research and technologies of non-fossil fuels. Analysis of energy requirements for selected tasks and energy conversion techniques.

612 Advanced Agricultural Tractors and Machines 2(2,0) S 1990, F 1991
Units of instruction will be selected from the following areas: Tractor chassis mechanics and dynamics, 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.

Mechanized Agriculture (MA)

500-600 Special Topics
(4-day workshops, 6 hrs. per day)
(On sufficient demand)
A. Agricultural Machinery, B. Soil and Water Mechanics, C. Small Power Units, D. Agricultural Power Units, E. Electric Motors and Electrical Controls, F. Agricultural Structures and Environment, G. Welding. Primarily designed for in-service teaching activities for Vocational Agriculture teachers. Workshops held at several points in state.

*612 Advanced Farm Machinery 2(1,3) Su 1990
Operation, care, adjustments, 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 1990
Materials for farm construction; construction methods and techniques; new developments in farm building. Alternate years.

*642 Advanced Rural Electrification 2(1,3) Su 1989
Operation, selection, care, adjustment, and new developments in rural electric equipment; motors, fans, controls, wiring, pumps, grain handling equipment, and home and classroom lighting. Alternate years.

*652 Advanced Irrigation, Mechanics and Practices 2(1,3) Su 1989
Sprinkler, surface and trickle irrigation systems and equipment. Irrigation scheduling, management, and economics. Water laws and irrigation program financing. Water quality and environmental impact of irrigation. Alternate years.

*652 Advanced Farm Engines 2(1,3) Su 1989
Operation, selection, care, adjustment, and new development of internal combustion engines as applied to farm power units. Alternate years.

*All courses would be subject to a laboratory fee.
DEPARTMENT OF ANIMAL AND RANGE SCIENCES

Graduate majors offered:
Master of Science degree with a major in Animal Science. Doctor of Philosophy degree with a major in Animal Science.
Research toward the graduate degrees in this department may be pursued in the areas of animal breeding, animal production, ruminant nutrition, swine nutrition and muscle biology, reproductive physiology, meat science and range management.

Graduate minors offered:
Animal Science.

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 (AS)
691 Research Problems 1-3 FSSu
Investigation of problems in the following areas with results submitted as a technical paper:
Animal Breeding: Nutrition; Meats; Livestock Production; Range Management; Reproductive Physiology; Wool Technology; Poultry

692 Special Topics 1-3 FS
Advanced study of one or more selected topics: breeding, management, product technology, physiology, nutrition, research methods or marketing.

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

712 Ruminant Nutrition 3(3,0) S
Principles of nutrition for ruminants in relation to growth, reproduction and lactation. P. 223, 333, Ch 361, Vet 323 or Zool 325.

723 Population Genetics 3(3,0) S Odd Years
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.

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

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

733 Vitamins and minerals 3(3,0) S Odd years
Relationships between nutrients in metabolism. Substitution and sparing effects with emphasis on minerals and vitamins. Comparing metabolic significance of required nutrients for different animal species and as applied to human nutrition. P. 223, 333, Ch 361, Vet 323 or Zool 325.

734 Protein and Energy Nutrition 3(3,0) F Even years
Principles of protein and energy metabolism and the partitioning of these nutrients for maintenance, growth and production in domestic farm animals. P. 223, 333, Ch 361, Vet 223 or Zool 325.

736 Monogastric Nutrition 3(3,0) F
Nutrition principles for nonruminants related to reproduction, lactation and growth. P. 223, 333, Ch 361, Vet 323 or Zool 325.

753 Meat Science 3(2,3) S
Even years
Basic physical, chemical, microbiological and histological characteristics of meat and effects of various processing methods on meat products and by-products. P. 241.

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.

790 Thesis, Master of Science 5-7

791 Thesis Sustaining 1

890 Dissertation Ph.D. 1

891 Dissertation Sustaining 1

Range Science (Rang)
681 Range Science Seminar 1(1,0) (On sufficient demand)
Review of current literature, research programs, and action programs in the management and the use of rangelands. Rang 300 or equivalent highly recommended. Limit 2 credits.

691 Research Problems in Range Science 1-3 FSSu
Investigation of problems in range science with results submitted as a technical paper.

692 Special Topics 1-3 FSSu
Advanced study of one or more selected topics in range science.

DEPARTMENT OF BIOLOGY

Biological Sciences

Professor C.R. McMullen, Head
Professors Chen, Granholm, L. Haertel, Hartwig (Emeritus), Huggins (Emeritus), Hutcheson, Morgan (Emeritus), Myers, Peterson, Taylor (Emeritus), Whalen
Associate Professor Larson

Graduate major offered:
Master of Science degree in Biology with options in Biology, Botany and Zoology.

Graduate minors offered:
Biology, Botany or Zoology. These require a minimum of 8 semester credits.

Prerequisites for graduate study:
For the graduate major in Biology a Bachelor's degree, with at least 24 credits in biological sciences or consent.
For the graduate minor in Biology, Botany or Zoology a Bachelor's degree with at least 6 credits in the appropriate field.
Deficiencies in the prerequisites for graduate study may be made up during the first year of graduate study, without graduate credit.

Thesis Option:
This program requires a minimum of 30 semester credits including a thesis and comprehensive oral exams. The student may either select breadth in coursework or specialize in certain areas such as botany, ecology, genetics, physiology, etc. Supporting courses are available from other biological science departments on campus.

Non-Thesis Option:
This program requires a minimum of 32 semester credits including 2 credits of Biology 793 "Biological Research Problems." The student may select breadth in coursework from all levels of biological organization.

Biology (Bio)

625 Biology of Aging 2(2,0) S
Primarily human aging studied at the molecular, cellular, tissue, organ, and whole animal levels. Physical, sensory and physiological changes with age. Diseases of aging including arteriosclerosis, cancer and Alzheimer's disease. Altered metabolism and dosage of drugs, aging as part of the entire life cycle. P. Zool 325 or Ch 260.

653 Advanced Genetics 3(3,0) F
Even years
Procedures in genetic studies as they relate to molecular and classical genetic applications. (Cross-listed PS 653.)

695 Strategies in Science Teaching 3(3,0) F
Training in identifying and teaching certain processes deemed fundamental to science and scientific behavior.

697 Special Topics* 1-3 FSSu
Field Ecology, Human Ecology, Mammalian Developmental Genetics.
Botany (Bot)

612 Morphology of Non-Vascular Plants
1-3 F Odd years
Morphology has been defined as philosophical anatomy. This course will address comparable features of different plant forms in light of biological descent and consequent relationships. Nonvascular morphology (Bot 512/612) surveys diversities in the bacteria, algae, fungi, mosses and liverworts. To gain insight into unity from homeostasis and diversity through evolution. May be taken for variable credit depending upon groups surveyed.

613 Morphology of Vascular Plants 3(2,3)S
Morphology has been defined as philosophical anatomy. This course address comparative structure & evolutionary patterns existing in the diverse vascular plant groups including club mosses, ferns, gymnosperms and angiosperms. The student will gain insight into unity from homeostasis and diversity through evolution of this group of plants.

705 Aquatic Plants 3(1,4) F
A systematic survey of vascular plants that grow in wetland habitats, and a study of their adaptations to life in the water. Field and laboratory practice in identification and recognition of common aquatic plants. P, Bot 301, or consent of instructor.

715 Advanced Plant Ecology 4(2,3) S
Analysis of the energy relationships of communities with emphasis on productivity. Literature readings. Laboratory work in techniques of community analysis. P, Consent.

727 Advanced Plant Physiology 4(2,4) S
Role of organic and inorganic compounds in plant nutrition. Emphasis on photosynthesis, respiration, metabolism, and other cellular processes. P, 427, Ch 120.
of organic chemistry. Synthesis of biological
catalysis. P, Ch 224, Ch 662.

724 Physical Organic Chemistry 3(F, 3.0) S 1990
Physical organic, reaction mechanisms,
M.O. calculations, orbital symmetry, and
E.S.R. spectroscopy. P, 328 and 344. Alternate
years.

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

752 Analytical Chemistry 4
The principles of analytical chemistry as
applied to agricultural environmental
chemistry will be presented in the lecture
portion of the course and the performance of
those procedures will be presented in the laboratory
section of the course. P, Ch 434.

753 Analytical Spectroscopy 3(F, 3.0) S 1990
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

756 Chromatography and Separations
3(F, 3.0) S 1989
Theory and practice of solvent extraction
and paper, thin layer, gas and liquid
chromatographic techniques. P, 322. Alternate
years.

758 Electroanalytical Chemistry 3
The principles of electrochemistry as ap-
plied to analytical methods will be presented in
this course. Topics covered will include
polarography, potentiometry, conductance,
coulometry, and related topics. P, Ch 434.

740 Special Topics in Physical Chemistry
1-6
One-term advanced courses taught upon
request covering such topics as elec-
trochemistry, surfacte chemistry, kinetics,
quantum chemistry, etc. P, consent.

741 Quantum Chemistry I 3
The application of wave mechanics to simple
atomic and molecular systems, properties of
wave functions, and approximate
methods. P, Ch 642, Math 321. Triennial
years.

742 Quantum Chemistry II 3
Continuation of 741. P, 741. Triennial

744 Chemical Thermodynamics
3(F, 3.0) S 1990
Discussion of the laws and theories of
classical and statistical thermodynamics as
related to macroscopic chemical systems. P,
344. Alternate years.

745 Statistical Thermodynamics 3
Fundamental principles of statistical ther-
modynamics with applications to chemical
systems. P, Ch 642, 644. Triennial Years.

746 Atomic and Molecular Structure
3(F, 3.0) F 1990
Introduction to quantum mechanics and
theoretical treatment of chemical structure
and binding. P, 328, 344, or concurrent
registration in 344. Alternate years.

748 Chemical Kinetics 3
Experimental methods and theoretical
approaches to the study of reaction rates. P, Ch
328, 344. Triennial years.

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

753 Organometallic Chemistry 3
The study of metal compounds containing
organic moieties and related inorganic com-
ounds. Major emphasis will be focused on
transition metal-carbon compounds such as
the carbonyls, aromatic hydrocarbons and
nonaromatic olefin and acetylene complexes.
Homogenous catalysts will be discussed. P,
352.

754 Physical Methods in Inorganic
Chemistry 3
The study of instrumental methods and
spectral interpretation used to investigate in-
organic compounds. EPR, X-ray, NMR,
UV-Vis and IR will be discussed. P, Ch 344,
352.

756 Coordination Chemistry 3
The study of metal-ligand compounds.
Emphasis will be focused on transition metal
complexes with Group V, VI, and VIA
donor ligands. Topics to be discussed will in-
clude bond theory, structure and reactivity.
P, Ch 352.

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

764 Biochemistry I 3(F, 3.0) S 1989
Study of metabolism of carbohydrates and
lipids. Includes aspects of enzyme kinetics
and regulation as well as principles and
characteristics of ATP-synthesizing com-

766 Biochemistry II 3(F, 3.0) S 1990
Study of the metabolism of amino acids,
proteins, nucleotides and nucleic acids. In-
cludes some aspects of enzymology and the
mechanism of intra and intercellular com-

767 Biophysical Chemistry 3
Discussion of the theoretical and practical
aspects of biophysical methods. These will
include an examination of electrophoresis,
centrifugation, light scattering, optical
rotary dispersion, X-ray diffraction, viscosity/diffusion, and spectroscopy. P, 340,
662.

768 Plant Biochemistry 3
Chemistry of structural and functional
systems of plants with special emphasis on
bioenergetics, photosynthesis, nitrogen fixa-
tion, sulfur metabolism, carbohydrate inter-
conversion, secondary plant products, seed
development and fruit ripening, and genome

769 Nutritional Biochemistry 3
Study of the biochemistry of systems that
are significant in nutrition including
metabolism, requirements and deficiencies.

772 Seminar 1(F, 1.0) FS
Required of all graduate majors in chemis-
try.

781 Bioinorganic Chemistry 3(F, 3.0) F 1990
A study of biological systems stressing the
role of metals ions, primarily the transition
metals. Model systems included in the discus-
sion. P, 120 (4 credits), 354 or consent. Alter-
nate years.

782 Radioisootope Techniques 3(F, 3.0) FS
Theory and measurement of radioactivity.
Techniques for the application of radioactive
isotopes in chemical and biological ex-
perimentation. P, consent.

790 M.S. Thesis in Chemistry 1-7
890 Ph.D. Dissertation Var.
891 Dissertation Sustaining 1

The following Physics courses may be used
in either the graduate major or minor pro-
gram.

Phys 635 Reactor Physics 3(F, 3.0) S
Phys 637 Science of Solids 3(F, 3.0)
Phys 743 Statistical Mechanics 2(F, 2.0)
Phys 775 Advanced Quantum Mechanics
3(F, 3.0)

Phys 779 Group Theory in Quantum
Mechanics 3(F, 3.0)

791 Thesis Sustaining 1

*To be arranged.
DEPARTMENT OF CHILD DEVELOPMENT AND FAMILY RELATIONS

Assistant Professor Mary Kay Helling, Acting Head
Professor Jay Richardson

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 (CDFR)

643 Current Topics 1-3 (1-3,0) F
Study of current issues and concerns in human development, family therapy, and family studies. Focus on topics not included in other graduate courses in the department. P, consent. Can be repeated.

702 Seminar 1-3 (1-3,0)
(On sufficient demand)
Reports and discussions of current literature, including research methodology in human development, family studies, and family therapy. Maximum of 4 credits may be applied to advanced degree. P, consent.

711 Child Development Theory and Application 3(3,0)S
In-depth study of human development. Emphasis upon current theories and their application to an understanding of the developmental growth processes; relationship between cognitive, social, physical and emotional development and behavior; range of normality in growth and behavior. Focus on normal development but with consideration of impact of deviance from normative development on child, family, neighborhood.

742 Family Relations 3(3,0) FSu
Current theoretical approaches to family interactions; impact of various forces (social, personal, intra-personal) upon dynamic aspects of family relationships; patterns and sequences of coalitions and alliances; factors which result in stress and breakdown or enhanced and rewarding relationships. Emphasis upon normal families but family problems are also studied.

744 Human Development: Gender Issues, Roles and Relationships 3(3,0) Su
(On sufficient demand)
Study of recent literature regarding changing gender roles on individual development across the lifespan, family relationships, employment, and other areas of life. P, consent.

776 Early Childhood Education, Administration and Practice 1-4
(On sufficient demand)
Field experience with early childhood education (teaching, supervising, and administration). P, 211, 361, 362, 364, departmental consent.

777 Child and Family Counseling 3(3,0)S
(On sufficient demand)
Theory and philosophy of counseling and therapy with children and families using a family systems approach. P, instructor consent.

782 Special Problems 2-4 credits as arranged
Individual study for qualified students. P, consent.

DEPARTMENT OF CIVIL ENGINEERING

Professor Dwayne Rollag, Head
Professors Buckley, Dornbush, Koepell, Hassoun, Larson (Emeritus), Prasuhn, Selim, Sigl
Associate Professor Abdul-Shafi

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 (CE)

611 Bituminous Materials 2(2,2) F
Properties of bituminous materials including their compatibility with various types of aggregates. Asphalt cement surface courses are designed and tested for stability. Standard tests are performed on bituminous materials with emphasis on test results. P, CE 216.

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

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 consent.

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

633 Open Channel Hydraulics 3(3,0) F

711 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.

635 Water Resources Engineering 3(3,0) S
Topics related to water resources engineering including: multiple purpose river development, economic analysis of flood control measures, aspects of water law and other topics related to surface and groundwater hydrology and administrative aspects of water resources planning. P, 433.

636 Foundation Engineering 2(2,3)
Bearing capacity, load induced pressures and settlements, soil exploration and sampling, lateral earth pressure, retaining walls, sheet pile structures, pile formations and casings. P, 446.

646 Advanced Soils Engineering 2(3,0) S
Application of basic soil mechanics to engineering problems. Stability, compaction, embankments, seepage, draining, and stabilization. P, 446.

652 Prestressed Concrete 3(3,0)

655 Pre-cast Concrete Structures 3

656 Advanced Reinforced Concrete design 3(3,0)

657 Matrix Analysis of Structures 3(3,0)

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

700-701 Seminar 0-1
Current, state-of-the-art, topics in civil engineering.

720 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.

724 Land Treatment of Water 2(3,3) Su
State-of-the-art planning and process design of land treatment systems for the disposal of municipal, industrial, and agricultural wastes. Physical, chemical and biological limiting factors with emphasis on site selection and process feasibility. Land disposal of slurges.

730 Water Quality Analysis 3(1,6) F
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.

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

735 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.
733 Advanced Water Resources Engineering
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, 635.

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

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

749 Structural Dynamics 3(3,0) F

751 Plastic Design 2(0,6)
Modes of failure, plastic hinges, design rules and applications.

754 Advanced Design of Steel Structures 3(3,0) S
Design of slender compression elements, tapered members, hybrid plate girders, column base plates subjected to bending moments, bolted and welded connections. Cold form steel structures. P, 455. Alternate years.

763 Highway Administration and Economy 3(3,0) Su
Highway administration, highways 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.

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

769 Design of Steel and Concrete Bridges 3(3,0) S

770 Engineering Research or Design Paper 2
Conduct a research or design project and write a report on the work done using thesis format.

790 Thesis 1-7 FSSu
Independent investigation of special problem and written thesis.

791 Thesis Sustaining 1 FSSu
Elective course for special or detailed study or investigation.

793 Special Topics 1-3
Special topics in the field of Civil Engineering. P, consent.

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DEPARTMENT OF COMPUTER SCIENCE

Professor Gerald E. Bergum, Head

610 Structure of Higher Level Languages 3(3,0) F
Formal definition of the syntax and semantics of programming languages; semantics both by means of interpreters and by using the automatic approach. Concepts underlying programming languages and their instantiations in a selected group of languages. Program description at compilation time and execution time. P, CSc 114 and CSc 213 or CSc 271 and CSc 313 or CSc 316.

620 Artificial Intelligence 3(3,0) FS
Introduction to ideas, issues and applications of Artificial Intelligence. Knowledge representation, problem solving, search, inference techniques, theorem proving, expert systems, Artificial Intelligence programming languages.

630 Principles of Data Base System Design 3(3,0) S

647 Computer Graphics 3(3,0) F

700/701 Seminar 0-1
Current state-of-the-art topics in Computer Science. P, permission of Instructor.

740 Management Information Systems 3(3,0)FS
Computer appreciation course providing technical background for understanding and raising issues treated in other courses. Structure and operation of computer systems. Hardware technology and software development. Tools and methods for developing computer applications. Structure and components of Management Information Systems. Using the computer to support operations of management in planning and control and decision making. MIS development, organization, management and evaluation. Acquiring computer resources. The computer industry and profession. P, CSc 313 or 316 and CSc 361, 610, 620.

790 Thesis 1-7 FSSu
Independent investigation of special problem and written thesis.

791 Thesis Sustaining 1 FSSu
Elective course for special or detailed study or investigation.

792 Research Report/Design Paper 2
Conduct an approved research or design project and complete an approved research report or design paper in Computer Science.
### DEPARTMENT OF DAIRY SCIENCE

Professor John G. Parsons, Head
Professors Baker (Emeritus), Schingoethe, Spurgeon (Emeritus), Voelker (Emeritus), Associate Professor Baer

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 (DS)**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credits</th>
<th>Semester</th>
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<tbody>
<tr>
<td>612 Physiology of Lactation</td>
<td>3(3,0)</td>
<td>S 1989</td>
</tr>
<tr>
<td>622 Advanced Dairy Microbiology</td>
<td>3(2,3)</td>
<td>S 1990</td>
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### DEPARTMENT OF ECONOMICS

Professor Ardelle Lundeen, Head
Professors Aanderud (Emeritus), Allen (Emeritus), Dobbs, Gilbert, Greenbaum, Helfinstine (Emeritus), Hsia, Kamps, Kim, Kohlmeyer (Emeritus), Lamberton, Murra, Myers (Emeritus), Shane, Thompson (Emeritus), Taylor
Associate Professor Janssen

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

The graduate curriculum is designed to prepare students for professional placement or further graduate study. Emphasis is placed on theory and development of analytical skills. Students can take supporting courses in agribusiness management, applied economics or other disciplines which suit their interests and career goals. A limited number of research assistantships are available for qualified students. Additional information is available from the Economics Department, Seobey Hall, SDSU.

Graduate minor offered:
Economics

Prerequisites for graduate study:
Unconditional admission requires that applicants have a Bachelor’s Degree including successful completion of courses in Intermediate Microeconomic Theory, Intermediate Macroeconomic Theory, Statistics and Calculus. Applicants who otherwise qualify for admission can take these courses during their first year in the M.S. program. Additional background in mathematics, statistics and communications will benefit graduate students in economics.

**Requirements for the Master of Science Degree:**

Option A requires a minimum of 30 semester credits, including a thesis (5 credits) and comprehensive oral examination.

Option B requires a minimum of 32 semester credits, including a research paper (2 credits) and comprehensive oral examination.

All students must complete the core requirements plus sufficient additional graduate hours in this department and either a minor in another department or supporting courses.

No graduate credit on a converted basis for 300-499 advanced undergraduate courses will be granted for the following courses: Econ 301 Intermediate Microeconomics; Econ 302 Intermediate Macroeconomics; Econ 380 Personal Finance; Stat 341 Statistical Methods I.

**Core Requirements**

Econ 724 Advanced Quantitative Economics 3

Econ 701 Research Methods 2

Econ 703 Advanced Macroeconomics 3

Econ 704 Advanced Microeconomics 3

Econ 705 Applied Economic Theory 3

J.D./M.S. in Economics A cooperative program between the University of South Dakota School of Law and South Dakota State University. The Department of Economics is available. The two institutions mutually accept up to eleven semester hours of transferred credit. Students design their academic program in Economics to best suit their career goals and interests. For details, students should consult with the USD Law School or SDSU Economics Department.

### Agricultural Economics (AgEc)

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<tr>
<th>Course Title</th>
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<th>Semester</th>
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<tbody>
<tr>
<td>630 Advanced Agricultural Marketing and Prices</td>
<td>3(3,0)</td>
<td>F 1989</td>
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Economic theory and quantitative techniques used in analysis of agricultural market problems, construction of economic models, statistical estimates of supply and demand, and price forecasting.

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<th>Semester</th>
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<tbody>
<tr>
<td>670 Advanced Farm and Ranch Management</td>
<td>3(3,0)</td>
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Leasing arrangements, capital investment, computerized accounting and budgeting. Use of linear programming as a tool for planning and organizing the farm business.

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<tr>
<th>Course Title</th>
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<th>Semester</th>
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<tbody>
<tr>
<td>690 Special Problems</td>
<td>1-3(1-3,0)</td>
<td>F</td>
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</table>

Advanced work in area of economics of particular interest to an individual student. Area of study must have prior approval of a graduate faculty member.

### Economics (Econ)

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<tr>
<th>Course Title</th>
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<th>Semester</th>
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<tr>
<td>604 History of Economic Thought</td>
<td>3(3,0)</td>
<td>F 1989</td>
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The historical development of economic ideas. A study of the various schools of economic thought and the economic environment which produced them. P, 301, 302 or consent.

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<tr>
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<th>Semester</th>
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<tr>
<td>620 Economics of the Public Sector</td>
<td>3(3,0)</td>
<td>F 1990</td>
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The effects of public policies—fiscal, monetary, and regulatory—on the economic well-being of individuals, groups and society. Welfare economics and social choice theory. P, 301, 302 or consent.

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<tr>
<th>Course Title</th>
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<th>Semester</th>
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<tbody>
<tr>
<td>640 Economics of the International Sector</td>
<td>3(3,0)</td>
<td>F</td>
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</table>

International flow of trade and balance of payments. Monetary and fiscal policies. Trade controls and their effect upon the agricultural and domestic economies. Significant current developments in trade and finance.

P, 201, 202, 330 or consent.

### 711 Rumino logically

Biocatalytic, physiological, and microbiological activity occurring in the rumen and the relation of rumen function to animal response. P, Vet 361 and Vet 323 or consent. Alternate years.

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<tr>
<th>Course Title</th>
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<th>Semester</th>
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<tr>
<td>731 Laboratory Techniques in Dairy Science</td>
<td>2(0,6)</td>
<td>F 1990</td>
</tr>
</tbody>
</table>

Current research techniques in Dairy Science including photometry, selective ion electrodes, and column, thin-layer, and gas chromatography of milk and plant or animal tissues. P, Ch 361 or consent. Alternate years.
DIVISION OF EDUCATION

Darrell Jensen, Dean
Professors Edeburn, Everett, Hanson, Lingren, Scholten (Emeritus), Steiney, Sundet (Emeritus), Widvey
Associate Professors Moeller, Marshall, Smith
Howard Smith, Supervisor, Counseling and Human Resource Development;
Clark Hanson, Supervisor, Agricultural Education;
Chuck Lingren, Supervisor, Educational Administration;
Carl Edeburn, Supervisor, Teacher Education

Program Options and Specific Prerequisites:
The Graduate Program in Education is designed to provide professional preparation above the Bachelor's degree. The program includes the following options:

(1) The Agricultural Education major is designed to provide the professional preparation and competencies for teachers in Agricultural Education/Agri-Business. Specific prerequisites include a course in General Psychology, nine credits in General Education, and eight credits of science and mathematics.

(2) The Educational Administration major is designed to provide the basic professional preparation for those who expect to become qualified administrators in schools where active student education programs for other institutions, businesses, industries and service-oriented agencies that have educational programs. The South Dakota State Board of Education requires two years of teaching experience for administrator certification.

(3) The Counseling and Human Resource Development major is designed to assist the student to develop personally and professionally so that the person can function more effectively in a helping relationship with others. The program emphasizes the development of the professional competencies expected of qualified counselors and staff members in schools, higher education, agencies and other institutions.

(4) The Curriculum and Instruction major is designed to provide advanced work in the area(s) of instruction and in Education for those who are potential educators or who are employed in schools where certification is required and for those who teach in higher education or in business, industry or other service-oriented educational programs.

The courses in the Education Division are divided into the following areas: Agricultural Education (AgEd), Adult Higher Education (AHed), Counseling and Human Resource Development (CHRD), Driver's Education (DrEd), Educational Administration (EdAd), Educational Evaluation and Research (EdER), Educational Foundations (EdFn), Elementary Education (EEd), Educational Psychology (EPsy), Secondary Education (SeEd), and Vocational Teacher 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.
681 Workshop in Adult and Continuing Education 1-3
Special areas in adult and continuing education are comprehensively explored in an intensive time framework. Designed to increase specific skills and understanding in a current area.

691 Problems 1-3 FSSu
Directed reading and research in selected individual adult and continuing education topics.

710 Adult Curriculum and Teaching 3(3,0) F

711 Organization and Administration of Adult Education 3(3,0) S
Organization and implementation of adult education programs. Particular emphasis on curriculum development, financing, staffing, marketing, and evaluation of adult programs.

751 Principles of College Teaching 3(3,0) S
An analysis of teaching methodologies, planning procedures, evaluation techniques, and professional relationships. Emphasis will be on learning and using strategies suitable for teaching.

752 Seminar 1-3 FSSu
Selected area of education including special investigation, reports, and discussion.

759 Internship in Education 1-6 FSSu
On the job participation in teaching or related fields in schools or other agencies under the supervision of local personnel and a staff member from the Division of Education.

792 Research Problem in Adult Education 2 FSSu
A problem is selected, analyzed, and reported in form approved by the research adviser. Required of all graduate students in education qualifying for Master's of Education degree under Option B. Can be elected under Option C if desired. P, consent.

Counseling and Human Resource Development (CHRD)

603 School Counseling 3(3,0) SSu
A study of the role and function of a K-12 school counselor including individual counseling, small group counseling, classroom guidance, and consultation with parents, teachers, administrators.

610 Foundations of Guidance 3(3,0) FSSu
Developing basic human relations and helping skills: self-awareness and self-examination process; emphasis on understanding self and understanding others. Introduction to basic counseling and helping skills.

630 Gender Issues in Counseling 3(3,0) FSSu
Emphasis on increasing the counselor's knowledge and awareness of facts and factors in gender specific experiences which are relevant to the counseling situation.

651 Mental Health and Personality Development 3(3,0) F
The nature of personality and developmental theory, mental health issues of children, adolescence and adults with emphasis on programs/strategies for positive mental health. Various personality assessment methods are used.

661 Theories of Counseling 3(3,0) FSSu
An overview of major theories, the methods employed and appropriate applications. Assist beginning counseling students in comprehending scope of various approaches in dealing with clients.

681 Workshop 1-3
Special topics are comprehensively explored in an intensive time framework. Designed to increase specific skills and understandings in a current topic area.

682 Seminar 1-3 FSSu
Selected area of education including special investigation, reports, and discussion.

690 Special Topics 1-3 FSSu
Advanced courses taught upon demand covering such topics as career intervention, multi-cultural counseling, stress and depression, mid-life, chemical dependency, etc.

706 Counseling the Victim 3(3,0) SSu
Study of effective counseling during the crisis and recovery stages of the healing process. Addresses the victim's experience with such issues as developmental concerns, dissociation, post-traumatic reaction, denial, and loss of memory about the events.

Agricultural Education (AgEd)

605 Seminar 1-2(1.0) or (2.0) FSSu
Selected areas of Agricultural Education including special investigation, reports, and discussion.

606 Problems 1-3 FSSu
Directed reading and research in selected agricultural education topics.

706 Adult Education in Agriculture 2(2,0) Su
Policies, methods, materials and organization of adult education program in vocational agriculture/agri-business; course planning, procedures, media, followup and evaluation in adult program. P, graduate student in Agricultural Education.

707 Supervised Occupational Experience and Student Groups in Agricultural Education 2(2,0) Su
Emphasizes relationships of occupational experience and vocational student organization in agriculture to instructional programs; needs, scope, techniques and materials in developing and improving these programs. P, graduate student in Agricultural Education.

776 Curriculum in Agricultural Education 2(2,0) Su
For teachers, administrators and supervisors of vocational agriculture/agri-business programs at secondary, post secondary and adult levels; principles and procedures in course building, courses of study, and curriculum. P, graduate student in Agricultural Education.

792 Research Problem in Agricultural Education 2 FSSu
A problem is selected, analyzed, and reported in form approved by the research adviser. Required of all graduate students in education qualifying for Master's of Education degree under Option B. Can be elected under Option C if desired. P, consent.

713 Administration and Management of Human Services Programs 3(0,0) Su
Developing and managing a comprehensive counseling program in schools and agencies. Emphasis on the planning process management, budgeting, organizational structure, supervision, evaluation and consultation.

716 Human Resource Management in Business and Industry 3(3,0) Su
This course will focus on the human factors affecting the workplace. Specific topics to be covered will include employee assistance programs, wellness programs, management training, conflict resolution, and career planning.

721 Counseling Through the Life Span I 3(3,0) FSSu
Provides an understanding of the developmental needs of children and adolescents and appropriate intervention methods to be used in counseling.

722 Counseling Through the Life Span II 3(3,0) FSSu
A study of young, middle-aged and older adults to increase understanding of the developmental needs and intervention strategies necessary to enhance individuals in effective therapeutic relationships.

736 Appraisal of the Individual 3(3,0) FSSu
Assessment methods used in studying individuals. Standardized instruments, self-report inventories, observation, case study techniques and other non-standardized assessment tools are used. Recording, analyzing, compiling and interpreting data for use in counseling setting.

742 Career Counseling and Planning 3(3,0) FSSu
Examination of the career development and counseling process through the life span. Assist those intending to counsel at elementary, secondary, higher education and the community/workplace. To explore strategies and resources for career/life planning. Various interest inventories and personality assessment methods are used.

755 Mental Pathology 3(3,0) F
Focuses on the various abnormalities in personalities, behaviors and levels of functioning in society. Specific attention given to the behavioral disorders which are most commonly seen in our society.

766 Group Counseling 2(2,0) FSSu
Processes and procedures used in small group counseling. Students participate in group counseling, facilitate in-class counseling sessions and develop structured units for specific populations. P, CHRD 610, CHRD 661.

770 Student Development: Theory and Practice 3(3,0) F
Develops an understanding of college student personnel functions and their interrelatedness in a coordinated effort to provide student services. Focuses on the personnel administrator's role in understanding and incorporating concepts to student development.

771 Student Personnel Services 3(3,0) S
Focuses on legal cases and precedents that have a major impact on higher education and the field of student personnel administration, the development of conflict management skills, control theory, transactional analysis, and other communication concepts.
787 Counseling Practicum 3 FSSu
Emphasis on developing/refining counseling skills and personal counseling theory. Minimum of 30 one-hour counseling sessions. Limited to advanced graduate majors in CHRD and consent.

788 Group Counseling Practicum 2-4 FSSu
Supervised practicum in conducting small group counseling sessions. P, CHRD 766.

789 Internship in Counseling and Human Resource Development 2-6 FSSu
Practical experience in a counseling and guidance setting.

790 Thesis 1-7 FSSu

791 Thesis Sustaining 1 FSSu

792 Research Problems 2 FSSu
A problem is selected, analyzed, and reported in form approved by the research adviser. Required of all graduate students in counseling qualifying for Master's degree under Option B. Can be elected under Option C if desired. P, consent.

793 Problems 1-3 FSSu
Directed reading and research in selected individual guidance and counseling topics.

Driver's Education (DrEd)

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

670 Advanced Driver Education 3(3,1)
Traffic accident problems; survey of research studies in driver education and protection; sources of materials, measurement of driver attitudes. May be conducted as regular course or short course involving full two weeks (80 hours) of instruction. P, 370.

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

672 Alcohol and Drugs in Relation to the Driving Task 2(2,0)
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.

Educational Administration (EdAd)

700 Public School Administration 3 FSu
A broad overview of administration. Will examine administration as an applied science and analyze the organizational, political, and human relations systems as forces affecting administration. Specific topics will include conflict resolution, crisis management, planning, staff development, evaluation, and communications theory.

710 Elementary School Administration 3(3,0) Su
Emphasis is on the elementary principal as an instructional leader with major topics focusing on staff recruitment, supervision, evaluation, student services, rights and responsibilities of teacher, research on effective schools, parent/community relationships, and the principal's role in dealing with current issues facing our schools.

711 Secondary School Administration 3(3,0) Su
Emphasis is on the secondary principal as an instructional leader with major topics focusing on staff recruitment, supervision, evaluation, student services, rights and responsibilities, research on effective schools, parent/community relationships and the principal's role in dealing with current issues facing our schools.

712 Counselor Counseling Practicum 3(3,0) Su
Focusing on staff recruitment, supervision and evaluation, student services, rights and responsibilities, research on effective schools, parent/community relationships and the principal's role in dealing with current issues facing our schools.

715 Supervision 3(3,0) SSu
A study of leadership styles and the effects different styles have on motivating people. Emphasis on utilizing and developing human potential.

730 School Finance 2(2,0) S
Develop an understanding and a working knowledge of school finance theory and practice. Emphasis will be placed on the school finance reform movement in recent years.

732 School Building and Grounds 2(2,0) Su

735 School Law 3(3,0) FSSu
Legal foundations of elementary and secondary education in our society; legal powers and responsibilities of school boards, administrators, teachers, parents (guardians) and students. Emphasis will be placed upon the values underlying these foundations, powers and responsibilities.

740 Administration of Reading Programs 3(3,0) Su
Provides a framework of knowledge to guide administrators in providing leadership in the development of the reading curriculum. Focuses on topics such as overview of reading approaches, recent research, the role of the principal, evaluating programs, and choosing a basal. The course is also of value to classroom teachers who, though not directly involved in the teaching of reading, want background in the area.

781 Workshop 1-3 FSSu
Special areas in education administration are comprehensively explored in an intensive time framework. Designed to increase specific skills and understanding in a current area.

782 Seminar 1-3 FSSu
Study in selected areas of education administration including special investigation, reports, and discussion.

789 Internship in Education 1-6 Cr. FSSu
On-job participation in administration or working with administrative tasks in public schools under supervision of local school administrator and a staff member from Division of Education.

792 Research Problem in Educational Administration 2 FSSu
A problem is selected, analyzed, and reported in form approved by the research adviser. Required of all graduate students in education qualifying for Master's of Education degree under Option B. Can be elected under Option C if desired. P, consent.

793 Problems 1-3 FSSu
Directed reading and research in selected education administration topics.

Education, Evaluation and Research (EdER)

690 Special Topics 1-3 FSSu
Advanced courses will be taught upon demand covering such topics as Least Restrictive Environment, computers in education, observation techniques for classroom evaluation.

711 Group Testing 3(3,0) Su
Theory and principles of standardized group tests. Aptitude, achievement, career, and personality assessment instruments are examined. Practice in administration, scoring, and interpretation of results.

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

Educational Foundations (EdFn)

605 Computers in the Classroom 2(2,0) F
Examines the relationship between teaching methods, learning theory, and the place of the computer in the classroom; covers such topics as the data processing cycle, an overview of computer hardware and software, computer vocabulary, career opportunities, and some programming. P, EPsy 302 or consent.

618 BASIC Programming Applications in Education 3(3,0) S
Examines the utilization of microcomputers and microcomputer software in the classroom; covers BASIC programming language which allows educators to effectively evaluate and modify software programs to meet the needs of teachers and students in the classroom. P, EPsy 302 or consent.

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

622 Human Relations 3(3,0) Su
Deals with issues surrounding the diversity of populations, both within the schools and in our global society. Part of this diversity within the schools can be attributed to the multi-cultural nature of the American population, including the integration of handicapped and gifted children.

651 Programming for Gifted and Talented 3(3,0) Su
Examines curriculum methods and materials for gifted and talented children and youth. Students will be exposed to various programming models, IEP development, differentiated curricular concepts, as well as strategies to facilitate higher level thinking skills and skills in self-directed learning.

690 Special Topics 1-3 FSSu
Advanced study covering such topics as Introduction to Multi-Cultural Education, Introduction to Law Related Education, and Interpretation and Implementation of Public Law 94-142.
700 Working With Exceptional Children 3(3,0) Su
Assist regular classroom teachers to better understand and more effectively teach students with special learning needs. Focuses on learning disabilities, mental retardation, and behavior disorders. Also includes short sections regarding hearing impairments, visual impairments, orthopedic or health impairments, speech/language disorders, and the gifted. Regular classroom curricular adaptations and modifications are included.

727 Group Processes 3(3,0) SSu
A survey of small group constructs, research, and principles of application. Emphasis on learning methods and skills of group observation as well as developing knowledge of group roles and dynamics. Members will learn experimentally about groups by participating, observing, and analyzing opportunities to experience their own behaviors and styles as they deem appropriate.

744 Research on Effective Schools 3(3,0) FSu
Addresses the extensive research relating to the effective school movement. Pertinent conceptualizations and research related to school climate, instructional leadership, focus, and the establishment of school/teacher expectations will be discussed. Research-based tools and skills will be employed.

745 Effective Teaching: Theory Into Practice 2(2,0) SSu
Opportunity for participants to learn additional techniques for use in classroom teaching. The theory underlying the techniques and applications are explained. Emphasis will be on techniques which allow students to gain skills in processing and manipulating information and for participation in social model skills.

752 Foundations of Reading 3(3,0) Su
Description of normal process of development in reading skills and techniques which may be used in remedying 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 3(3,0) Su
General nature of causes of reading disability; principles of diagnosis and use of instruments; basic principles of individual remediation; case studies; evaluation of progress of the disabled reader; adaptation of techniques to classroom. P. Epsy 302.

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.

Elementary Education (SeEd)

681 Workshop 1-3
Special areas in elementary education are comprehensively explored in an intensive time framework. Designed to increase specific skills and understanding in a current area.

773 Elementary School Curriculum 3(3,0) Su
A study of the nature and principles of curriculum development in the elementary schools. Processes of curriculum change, development and evaluation will be examined. Roles of teachers, administrators, students and the public in curriculum change will be studied.

Educational Psychology (EPsy)

608 Humanistic Approaches to Teacher Effectiveness 2(2,0) FSu
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.

630 Learning Disabilities 3(3,0) Su
Examines the identification and assessment of learning disabilities in students. Provides a variety of teaching and learning strategies. Includes both federal and state laws, rules, and guidelines.

650 Gifted and Talented 3(3,0) Su
Examines the Gifted and Talented field; explores the development of gifted/talented children as well as identification and curriculum adaptations for meeting the needs of these children; also focuses on issues surrounding the parents and families of gifted and talented as well as program development and evaluation.

652 Enhancing Creativity 3(3,0) Su
Explores the various dimensions of creativity, including what it is, how it develops, how to teach creative students, and how to evaluate creative works. Emphasis will be on how to work with students who already exhibit significant creative abilities as well as how to foster creativity with all students.

670 Adolescent Psychology 3(3,0) Su
Physical, social, emotional, intellectual and vocational aspects of adolescent development. Emphasis is upon increasing understanding of the disabled adolescent and their problems.

740 Advanced Educational Psychology 3(3,0) Su
A study of theories of learning. The goal of the course is for each student to gain insight into their own beliefs about how learning occurs.

671 Practicum in Individual Testing 4(4,0) S
Intensive training in the administration and scoring of individual psychological tests; emphasis on the Stanford Binet and Wechsler scales. P. consent. Master's degree candidate in CHRD. Class limited.

Secondary Education (SeEd)

672 Motivation and Discipline 2 FSu
Theories of motivation and discipline and their application in the classroom. Stresses techniques for preventing discipline problems, with emphasis upon ways to provide success experiences and positive reinforcement for students. Emphasizes effective procedures of group management as applied to the classroom situation. The course is appropriate for teachers, guidance, and administrative personnel.
Vocational Teacher Training Education (VTTE)

625 Development of Vocational Education Thought and Practice (3,0) Su
For all teachers, administrators, supervisors, coordinators and guidance workers. Emphasis on philosophy, origins and development of vocational, technical and practical arts education programs at adult, post-secondary, secondary and prevocational levels. Delivery systems, principles, career education, vocational guidance, and current and emerging trends and issues are stressed. P, senior in Education

673 Problems: Home Economics or Agricultural Education 1-4 FSSu
Directed reading and research in selected individual topics.

731 Administration and Supervision of Vocational Education 3(3,0) Su
Organization, administration of vocational-technical education and the practical arts at all levels. Local-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.

COLLEGE OF ENGINEERING

Duane E. Sander, Acting Dean

Three 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 or research paper (of thesis quality and style) and a comprehensive oral examination.

Master of Science in Agricultural Engineering
Option A and B are available just as in the case of the M.S. degree program in Engineering. See departmental detailed description.

Master of Science in Industrial Management
This degree requires a minimum of 30 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 the opportunity for an interdisciplinary education for engineers who will become leaders and experts in: 1. development and control of land, water and energy resources; 2. development and promotion of industrialization; 3. application of engineering principles to technological problems; 4. 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, Mechanical Engineering, Mathematics, Physics, and Computer Science, but from departments throughout the University which are related with the individual student's research area, such as Chemistry, Zoology, Microbiology, Plant Science, Rural Sociology, Economics, Statistics, etc.

Research organizations which exist on campus for the purpose of assistance and direction in research include the following: Engineering and Environmental Research Center, Engineering Extension, Water Resources Institute, Agricultural Experiment Station, and the Center for Power System Studies. These and other mission-oriented organizations as well as all academic departments on campus offer the graduate student a wealth of assistance and course offerings.

The formal course offerings for Master of Science in Engineering are divided into four groups:
1. A primary core
2. A secondary core
3. Supporting courses
4. A thesis, design, or research paper.

The primary core shall consist of at least seven (7) credits of graduate level courses chosen from subjects within the following areas: mathematics, physics, statistics, operations research, instrumentation, and seminar. These courses shall be chosen after consultation with the departmental advisor to give the student an advanced technical background to pursue research and advanced design.

The secondary core consists of courses taken from the following list:

AE 615 - Advanced Agricultural Tractors & Machines
AE 622 - Bio-Environmental Engineering
AE 633 - Advanced Irrigation Engineering
AE 642 - Engineering Phases of Crop Processing
AE 733 - Ground Water Engineering In Agriculture
AE 772 - Smelting
CE 611 - Bituminous Materials
CE 623 - Environmental Engineering
CE 624 - Industrial Waste Treatment
CE 633 - Open Channel Hydraulics
CE 634 - Fluvial Hydraulics
CE 630 - Foundations Engineering
CE 640 - Advanced Soils Engineering
CE 656 - Advanced Reinforced Concrete Design
CE 657 - Matrix Analysis of Structure
CE 726 - Water Quality Analysis
CE 728 - Water Treatment Plant Design
CE 754 - Advanced Steel Design
CE 764 - Advanced Transportation Engineering
EE 715 - Linear Systems Theory
EE 720 - Advanced Digital Hardware
EE 765 - Electrical Properties of Materials
EE 770 - Information and Signal Processing
EE 785 - Microwave Theory
ME 603 - Thermo-Fluid Energy Systems
ME 635 - Modeling and Simulation of Dynamic Systems
ME 711 - Advanced Heat Transfer
ME 721 - Viscous Flow I
ME 741 - Advanced Stress Analysis in Mechanical Design
Phy 637 - Science of Solids
Phys 725 - Plasma Physics
Phys 751 - Theoretical Mechanics

These courses shall be taken to broaden the student's interdisciplinary background or to strengthen the student's background and ability to pursue research or advanced design. A minimum of 15 hours of course work must be taken from the primary and secondary core. These courses shall be determined by consultation with a departmental adviser. The supporting courses can be chosen from a number of departments and colleges at South Dakota State University to allow the student further specialization within a primary professional area in engineering or further developments of interdisciplinary interests.

The thesis provides 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.

The design or research 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 requires courses from the business and technical areas. The degree is offered through the College of Engineering at South Dakota State University. Management coursework may be taken at South Dakota State University or the School of Business at the University of South Dakota. The thesis will be written and defended at South Dakota State University.

This program is designed to allow the non-technical student the opportunity to expand in technical areas and to give the technical person exposure to the business administration, management, and economics areas of industry.
A total of 30 credit hours of graduate-level credits must be earned for the Master of Science in Industrial Management degree. A thesis as well as an oral examination are required. The Plan of Study, which is developed individually for each student, is composed of a major and minor field of study. The minor field must include at least 6 graduate credits. The thesis will normally account for 5 to 7 credits in the major field. A technically oriented person could choose management and business related courses for the minor field or vice-versa, depending on the emphasis desired.

A number of acceptable courses in Management, Business and Economics are offered through the University of South Dakota and South Dakota State University. Engineering and technical courses which can be used for the Plan of Study are offered through South Dakota State University. Also, Psychology and Sociology courses related to Industrial Management are offered through South Dakota State University.

DEPARTMENT OF ELECTRICAL ENGINEERING

Professor V.G. Ellerbruch, Head
Professors Finch, Knabach, Manning (Emeritus), Sander, Storry (Emeritus)
Associate Professor Miron

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)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>610</td>
<td>Passive and Active Filter Design</td>
<td>3(3,0) or 3(2,3)</td>
</tr>
<tr>
<td>620</td>
<td>Integrated Circuit Engineering</td>
<td>3(3,0)</td>
</tr>
<tr>
<td>622</td>
<td>RF Electronics</td>
<td>3(3,2)</td>
</tr>
<tr>
<td>631</td>
<td>Computer Analysis of Power Systems</td>
<td>3(3,0)</td>
</tr>
<tr>
<td>633</td>
<td>Alternate Energy Conversions</td>
<td>2(2,0)</td>
</tr>
<tr>
<td>647</td>
<td>Advanced Microprocessor System Design</td>
<td>3(3,0)</td>
</tr>
<tr>
<td>650</td>
<td>Biomedical Electronics</td>
<td>2(2,0)</td>
</tr>
<tr>
<td>651</td>
<td>Biomedical Instrumentation &amp; Safety for Health Facilities</td>
<td>3(3,0)</td>
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<tr>
<td>670</td>
<td>Communication Systems</td>
<td>3(3,0)</td>
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<tr>
<td>671</td>
<td>Optical Fiber Communications</td>
<td>3(3,0)</td>
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<tr>
<td>691</td>
<td>Special Topics in Electrical Engineering</td>
<td>1-3</td>
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<tr>
<td>700-701</td>
<td>Seminar</td>
<td>0-1</td>
</tr>
<tr>
<td>715</td>
<td>Linear Network Theory</td>
<td>3(3,0)</td>
</tr>
<tr>
<td>720</td>
<td>Advanced Digital Hardware</td>
<td>3(3,0)</td>
</tr>
</tbody>
</table>

A BS degree in a field of technology or engineering or a BS or BA degree in a non-technical business oriented discipline, along with certain necessary background courses, are required for entry into the program. Non-traditional students are encouraged to pursue this course of study.

785 Microwave Theory | 3(3,0) |
Transmission lines, resonant cavities, waveguide junctions, and components. Active devices, lasers, masers, P, EE 485.

790 | Thesis in Electrical Engineering | 1-3 |

791 | Thesis Sustaining | 1-3 |

792 | Engineering Research or Design Paper | 2(2,0) FSSu |

720 | Advanced Digital Hardware | 3(3,0) |
Topics may include a deeper examination of fundamentals of combinational and sequential circuits, design for testability, advanced function implementation, design with current programmable technologies.
ENGINEERING MECHANICS

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 (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 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.

DEPARTMENT OF ENGLISH

Professor Ruth Alexander, Head
Professors Brown (Emeritus), Duggan, Evans, Foreman (Emeritus), Kildahl, Marken (Emeritus), Walz (Emeritus), West, Williams. Withington, Woodard, Yarbrough
Associate Professors Brandt, 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 Head. For the graduate minor a minimum of 6 semester hours of undergraduate credit in English or consent of the Department Head.

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 9 hours must be included in a field related to the major or in two fields supporting the major. The candidate must have a reading knowledge of at least one modern foreign language, or must have at least two years of undergraduate credit in a foreign language on the transcript. Unless English 706 or a similar course has been taken previously, it is required for the M.A. A full-time student may complete the degree requirements in one academic year. Graduate assistants should be able to complete the requirements in five semesters.

The candidate will present a thesis which reports the results of research directed by a member of the 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.

Qualifying Exam
Prior to being admitted to candidacy for the Master's degree, each graduate student will take a written qualifying examination based on a reading list of representative literary works.

Note:
Before registering for graduate work the graduate student should consult the adviser for graduate studies in the English Department.

English (Eng)

619 Comparative Novel 3(3,0) F
Selected European and international novels.

625 Victorian Literature 3(3,0)
Intensive study of the chief writers of British poetry and prose from 1840 to 1900.

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

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

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

724 Theory of Plates & Shells 3(3,0)

731 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.

741 Finite Element Analysis 3(3,0)

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

648 The American Realists and Naturalists 3(3,0)
An examination of the works of Chaucer, with some attention to his sources and his language. Alternate years.

650 Modern American Novel 3(3,0)
Intensive study of selected American novelists of the era before 1920 and through the post World War II novel, particularly emphasizing twentieth century themes and forms in the novel.

655 Contemporary Drama 3(3,0)
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.

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

706 Research Tools in the Humanities 3(3,0)
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

707 Speech/English/Drama for Teachers 3(3,0) 1-3 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.

720 Studies in Early English Literature 3(3,0)
Intensive study of a phase of English literature of the era before 1550.

722 Studies in Restoration Literature 3(3,0) Intensive study of a great writer or group of writers or of a significant aspect of English neoclassical literature.
726 Studies in Seventeenth Century Literature (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.

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

758 Modern American Thought (3,0)
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.

784 Literary Criticism (3,0)
The tradition of literary criticism from Plato to the present.

790 Thesis P, 690.

DEPARTMENT OF FOREIGN LANGUAGE

Professors Barnes (Emeritus), Redhead, Richter

660 Topics in French, German or Spanish Literature 1-4 (1-4,0)
An intensive examination of a significant writer(s), period or theme in French, German, or Spanish literature. It may be repeated for credit if topic is different.

690 Special Topics in Language & Culture 1-3 (1-3,0)
Readings and discussions of selected topics dealing with a variety of aspects of culture. Training and practice in the use of the spoken language. May be repeated for credit.

692 Seminar in Literature (Topical) 1-3 (1-3,0)
Seminar on a selected author or period including the cultural climate in which the literature was written. Reading, class discussion, and a written paper will provide an opportunity to renew or improve skills in the language and to deepen understanding of the culture. May be repeated for credit.

DEPARTMENT OF GENERAL ENGINEERING (GE)

Assistant Professor Terry Forest, Acting Head
Administrative Committee:
Dean of Engineering D.E. Sander
Professors Ellerbruch, Rollag, Hellickson, Ghazi, Hein, Yocom

Graduate major offered:
The Master of Science in Industrial Management degree is offered by the Department of General Engineering and coordinated through the College of Engineering with the University of South Dakota School of Business as well as other colleges on the SDSU campus. This degree provides an opportunity for technically oriented students to broaden their management knowledge or management oriented students to broaden their technical knowledge and thereby become better industrial managers. The program is provided for traditional as well as non-traditional students who recognize the need for additional training in order to improve their management and technical skills.

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

610 Human Factors in Engineering and Design
Human factors engineering (HFE)—sometimes called ergonomics—deals with optimizing working and living conditions through designing for human use. The central approach of HFE involves the systematic application of relevant information about user characteristics, behavior and expectations in the design of man-made products, equipment, facilities, and environments. The objectives of HFE are (1) to enhance the effectiveness and efficiency of work and other human activities; and (2) to enhance the product users comfort, safety, health and satisfaction. P, Math 111, junior standing or consent of instructor.

620 Industrial Safety Engineering
Safety requirements and standards common to all industries and processes are reviewed. Attention is focused on legal safety requirements, particularly the Occupational Safety and Health Administration (OSHA) Standards. Emphasis is placed on how to recognize, evaluate, and control safety hazards associated with common industrial methods and technologies.

625 Management of Industrial Safety
Industrial accidents are caused by error-making human beings. Safety results achieved only through "safety engineering" and OSHA compliance are limited. Optimum levels of accident prevention can only be achieved through a coordinated program of both safety engineering and safety management. The focus on modern safety management includes: Management's direction of safety, measuring safety performance, behavior modification, motivating safety performance, profiling, program organization, products safety, and safety in the adjacent fleet.

700-701 Seminar 0-1 (1,0) FS
703 Designing the Workplace for Productivity 3
Designing the workplace to support the structuring of interpersonal communication and action in the workspace and to optimize the use of human energy through the total integration of corporate policy and culture with the physical environment. Includes the evaluation of operation procedures, the construction of behavior, computer assisted facilities management, developing control and order in the workplace, perceived stability as corporate support, flexibility as a catalyst to successful innovation.

790 Thesis 5-7
791 Thesis Sustaining 1
792 Engineering Design or Research Paper 1-2
793 Special Topics 1-3

Linguistics (Ling)

620 The New English 3(3,0) FJan

643 Development of the English Language 3(3,0) S
Historical survey of the phonology, grammar, syntax, and lexicon of English leading to an understanding of the present state of the language and future developments.
DEPARTMENT OF GEOGRAPHY

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

The Department of Geography offers graduate students the opportunity to earn the Master of Science degree. The degree program is designed to prepare students for employment in such areas as planning, geographic techniques, government service, business and teaching. Likewise the program is designed to provide the students with the education background necessary for further graduate study.

The graduate curriculum is organized through formal courses, seminars, internship experiences and supervised research. The student seeking the Master of Science degree is expected to select courses that will provide a sound background in Geography supported by courses outside the department. Areas outside the department beneficial to the student include Civil Engineering, History, Economics, Education, Biology, Engineering, Plant Science, Planning, Political Science and Sociology. The minor or supporting areas from outside the department should be selected from these or other disciplines, to provide the student with a balanced, well-developed background.

The department offers several special programs for students interested in unique educational experiences. Among programs offered are: a multidisciplinary Planning minor, the Classroom on Wheels Field Experience; the Futurology Institute; the Industrial Development Workshop; and the Workshops on Teaching Geography. Other Special Programs can be taken through educational experiences provided for in the Alternatives and Options Programs of the College of Arts and Science, and cooperative education programs with the EROS Data Center and the Office of Remote Sensing. Internships can be arranged with planning districts, governmental agencies and business and industry.

Graduate minor offered:
Geography, Planning

Prerequisites for graduate study:
A Bachelor's degree with at least 24 credits in geography or cognate social or physical sciences. If a student is deficient in geographic background, certain deficiencies may have to be removed by taking courses for which no degree credits will be earned.

Credit Requirements
Option A requires a minimum of thirty (30) semester credits for the Master's degree, of which at least 22 must be earned in the major. The thesis accounts for 6 of these credits.

A minimum of 8 credits must be selected from one department other than Geography as a minor field, or at least 2 different departments for supporting course fields for the Master's degree. Courses in the Department of Geography may be used as supporting courses provided they are considered sufficiently diverse by the major department.

Option B requires a minimum of 32 semester credits including a research paper and a comprehensive oral examination.

Geography (Geo)

600 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, physical geography, population geography, historical geography, and systematic techniques. 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.

700 Seminar in Geography: (Topical) 1-4 FS
Studies in selected geography fields. This course may be repeated for credit. The specific topic to be studied will change each semester.

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

760 Advanced Demographic Theories and Techniques 3(3,0) S (See Sociology 760). Alternate years.

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.

770 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.

779 Thesis in Geography 1-6

791 Thesis Sustaining 1

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

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

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION AND RECREATION

Professor Edward P. Hogan, Head
Professors Gritzner (Graduate Coordinator), Opheim

Graduate major 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, the General Exam of the Graduate Record Exam, and prerequisites to the courses to be pursued.

Thesis Option:
Option A requires a minimum of 30 semester credits, including a thesis and comprehensive oral examination.

The thesis is to be completed in an area of emphasis in Health, Physical Education, and Recreation. Areas of emphasis include: Athletic Administration, Behavioral Science, Exercise Physiology, Pedagogy, and Sports Medicine.

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.

650 Safety Education 2(2,0)
Curriculum planning and methods of presentation in the field of safety education.

681 Workshop 1-3
See HPER 681

760 Advanced Administration of School Health Programs 2(2,0)
Methods of health instruction; problems of health service; problems in supervision of health environment; recent trends and problems in safety education. P, permission of staff.
Health, Physical Education and Recreation (HPER)

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

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

741 Philosophy of Physical Education, and Recreation 3(3,0)
Discussion and analysis of major philosophical contributions to physical education. Formation and evaluation of one’s belief concerning physical education. P, consent.

742 Psycho-Social Aspects of Sport 2(2,0) S
Psychological and socio-cultural principles and theories applied to physical education and sport. Interpretation and analysis of behavior in sport. P, consent.

743 Basic Issues in Health, Physical Education and Recreation 2(2,0) S
Directed reading in recent literature in field; discussion of current problems; critical analysis of recent research. P, consent.

744 Supervision of Physical Education and Recreation 2(2,0)
Techniques, principles, organization and philosophy of supervision in this field. P, consent.

745 Sports Medicine
A review of the basic fundamentals of athletic training and exposure to recent developments in the sports medicine field. 751 Advanced Evaluation of Health, Physical Education, and Recreation 3(3,0)
Critical look at the measurement tools and techniques currently used in the assessment of the product and process in physical education. Discussion of current issues and trends, in evaluation. Computer work. P, consent.

760 Motor Learning and Development 2(2,0) S
Analysis of various teaching methods, survey of research in motor learning. Demonstrations and study of methods applied to various activities. P, consent.

765 Athlete Profiling
Application of measurement and evaluation technique to assess physiological, psychological sociological, and motor performance dimensions of elite athletes.

783 Research Methods in Health, Physical Education and Recreation 3(3,0) F
By studying prevalent quantitative and qualitative research techniques students will become critical consumers and potential producers of research relevant to Health, Physical Education and Recreation. Computer work. P, consent.

790 Thesis in Health, Physical Education and Recreation 1-7 FSSu
791 Thesis Sustaining 1
792 Individual Research and Study in Health Physical Education and Recreation 1-4 FSSu
Special problems by individuals. Results of study presented in special reports and term papers. P, major in this field.

Physical Education (PE)

660 Methods and Materials for Elementary Physical Education 2(2,0)
Analysis of activities, materials, techniques, and methods used in physical education for elementary grades. Progression in curriculum planning in areas of dance, games, self-testing, and movement exploration. P, consent.

730 Physical Education Teacher Education Readings, lectures, and discussions designed to analyze the process of preparing physical educators for the teaching profession.

750 Applied Exercise Physiology 3(3,0) F
Physiological basis of factors which influence physical fitness and physical performance; application of physiological measures to fitness programs, critical analysis of current literature; emphasis on biochemical, neuromuscular and circulatory-respiratory function, body composition and physical training. P, undergraduate Exercise Physiology.

770 Advanced Administration of Interscholastic Athletics 2(2,0) Su
Budgets, public relations problems, subsidization, objectives of athletics, staff organization, control of athletics, both interscholastic and intercollegiate, and general policies of athletics. P, consent.

771 Current Trends in Athletics 3(2,1) Su
For professionals who are experienced in coaching. Lectures, demonstrations, and visual aids are used to show the latest developments in athletics. P, one year coaching experience.

772 Seminar—Financial Management of Sports Programs
A seminar type course that gives the student interested in sports administration an opportunity to take an in-depth look into various areas of financial management. Examples of some of these areas, but not a complete list are: Fund Raising, Guarantees, Budgeting, Scholarship Programs, TV and Radio Receipts and Marketing.

Physical Therapy (PT)

681 Workshops in HPER
See HPER 681

682 Seminars 2(2,0) FSSu
See HPER 682

790 Thesis 1-7
See HPER 790

791 Thesis Sustaining 1
See HPER 791

792 Individual Research & Study 1-4 FSSu
See HPER 792

Recreation (Recr)

740 Recreation and Leisure in American Society 2(2,0)
Problems related to equipment; establishing programs; budget and finance; selecting and supervising staff; public relations activities. P, consent.

DEPARTMENT OF HISTORY

Professor Rodney Bell, Head.
Professors Funchion, Sweeney, Miller, Volstorf (Emeritus)

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 (Hist)

638 European Intellectual History 3(3,0)
History of literature and the arts, leading cultural and ideological movements of Western man from the Renaissance to the present.

641 Europe in the 19th Century 3(3,0)
Europe, 1815-1914. The emerging power struggle in 19th Century Europe, the race for world empire, forces leading up to the outbreak of WW I and scientific, cultural and artistic achievements of the age.

660 Topics in History 1-4
An intensive examination of major historical themes, issues, and problems. Topics will include, but are not limited to, the following: War and Society; The Hero in History, Republics in Western Civilization; Christianity and the Roman Empire.

668 American Diplomacy Since 1945 3
Detailed and interpretive analysis of American Diplomatic history since 1945.

671-672 Cultural History of the United States
Development of American society and culture; changes in values, ideas, beliefs, institutions, behavior, arts, leisure, and material culture.

691 Conflicting Interpretations of American History 3(3,0)
Analysis of questions of historical interpretations in the field of U.S. history which are currently being debated by scholars.

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

793 Seminar in History 1-3
Edna Page Anderson  
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 of Home Economics.

Core Requirements

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

The following core credits are required:
- Home Economics 701—Seminar in Home Economics 2 cr.
- Home Economics 700—Research Methods in Home Economics 3 cr.
- Home Economics 790—Thesis in Home Economics or Home Economics 793—Individual Research and Study: Area of Concentration or Home Economics 794—Internship: Area of Concentration

In addition to these research requirements, a statistics course must be taken prior to enrollment in Research Methods. Additional credits in statistics and research methods are encouraged and may be required for some concentrations.

A minimum of nineteen credits in the area of concentration are required including 3 credits in Seminar in Home Economics and a minimum of 5 credits in Thesis, Individual Research and Study, or Internship.

Supporting courses may be selected from any of the other colleges and departments at South Dakota State University. Courses must contribute to an integrated plan of study.

Plan of Study

All plans of study must be signed by both the dean of the College of Home Economics and the major adviser. (Major adviser forwards to dean. They are then forwarded to the graduate school for action.

600 Practicum in Home Economics Related Occupations (2-6 cr.)

This course is for persons wishing to get experience in a job or career related to their subject specialization. A wide variety of experiences are possible. The supervising faculty member and student develop a learning plan prior to the practicum. P, consent.

Special Problems 1-4

Individual research and study individual research and study Home Economics. May be repeated for a total of 4 credits. P, consent of instructor and department.

790 Thesis in Home Economics 1-7

791 Thesis Sustaining 1

792 Problems in Home Economics 1-2

(On sufficient demand)


793 Individual Research and Study 1-7

794 Internship 1-7

DEPARTMENT OF HOME ECONOMICS EDUCATION

Associate Professor Virginia Clark, Head
Professor Edna Page Anderson, Associate Professor Delores Kluckman, Professor Gilbert (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.

Home Economics Education (HEd)

673 Special Problems 1-4

(On sufficient demand)

Individual research and study in Home Economics Education. May be repeated to a total of four credits. P, consent.

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.

702 Seminar in Home Economics Education 1-2

(On sufficient demand)

Review and discussion of current literature in home economics education.

711 History and Philosophy of Home Economics 2(2,0)

(On sufficient demand)

Analysis of historical developments impacting on the profession and field of home economics; critical investigation of various concepts in home economics.

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.

743 Current Topics 1-3

(On sufficient demand)

Study of contemporary issues and concerns in the field of Home Economics Education. Focus on topics not included in other graduate courses in the department. Can be repeated. P, consent.

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 home economics. Evaluation instruments developed. P, 412 or equivalent.

773 Special Problems 1-4

Individual research and study in Home Economics Education. May be repeated for a total of four credits. P, consent of instructor and department.
DEPARTMENT OF JOURNALISM AND MASS COMMUNICATION

Professor Richard W. Lee, Head
Professor Van Onsmeren
Associate Professors Laird (Emeritus),
Wentz (Emeritus)

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) individuals 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 develop 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 and required to complete specified courses to meet deficiencies. 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.

608 Public Opinion and Propaganda 3(3,0) S
Formation and measurement of public opinion; the role of the mass media; propaganda techniques, agencies, theories.

Mass Communication (MCom)

610 Seminar in Mass Communication 2(2,0) F
Work selected areas of journalism and mass communication including special investigation, reports and discussions.

615 Editorial Writing and Policy 2(2,0) F
Opinions function of periodicals; great editorialists and editorial writers; writing of editorials; shaping policy.

617 Media Administration and Management 3(3,0) FS
Business practices, newspaper, magazine and broadcast management.

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

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

651 Special Problems in Communication 1-4 FSSu
Individual research and study in communication. May be repeated to a total of four credits in problems courses. P, consent.

663 Workshop in Communication 1-4 Su
Understanding the mass media; using media in the classroom, supervising school publications. For high school or college instructors and publication advisers.

664 Film Studies 3(3,0) F
See MCom 664 under Department of Speech.

672 Mass Media in Society 3(3,0) S
Rights and responsibilities of the press; relation of the media to individuals and society; role of media in a free society.

673 Public Relations 3(3,0) SSu
Interpreting institutional and industrial policies and programs to the public.

666 Projective Geometry 3(3,0) SSu
Workshop in Communication

790 Thesis in Journalism 1-6 FSSu
791 Thesis Sustaining 1
792 Research Methods in Communication 3(3,0) S
Application of social science research methods and techniques to the study of interpersonal and mass communication. Elementary statistical procedures.

DEPARTMENT OF MATHEMATICS

Professor K. Yocom, Head
Professors Bennett, Bergum, Kranzler
(Emeritus), Lacher, Wente (Emeritus)

Graduate majors offered:
Master of Science with a major in Mathematics and Master of Science Teaching (separate listing).

Graduate minor offered:
Mathematics

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 (expository) 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 (Math)

661 Intro to Topology 3(3,0) S
A first course in point-set topology, covering the elementary concepts of metric and general topological spaces; closure, interior, boundary, connectedness, compactness, and separation. Special attention is given to continuity of functions. P, 225, 253

666 Projective Geometry 3(3,0) S
(On demand)
A synthetic and/or analytic approach to geometric properties invariant under projective transformations: Theorems of Desargues, Pascal, Brianchon and applications. P, 224 or consent of instructor.
DEPARTMENT OF MECHANICAL ENGINEERING

Professor H. S. Ghazi, Head
Professor K. Christianson
Associate Professors H. Hamidzadeh, A. Moutsoglou

Note: Prerequisites for all 700 level courses are: grade standing or consent.

The following Mechanical 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. Each course is taught on sufficient demand.

Mechanical Engineering (ME)

627 Gas Dynamics I 3(3,0) F

640 Computer-Aided Design 3(3,0) F
The use of digital computer as a design tool. Techniques and algorithms which increase the reliability 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.

690 Special Problems 1-5 F
Provides an opportunity for study or investigation of special problems or project at graduate level. P, or consent.

695 Special Topics 1-3
700/701 Seminar 0-1

726-727 Real Variables I, II 3(3,0) FS
Set Theory, The Real Number System, Theory of Functions of a Real Variable, Lebesgue Measure, the Lebesgue Integral, Differentiation and Integration, Metric Spaces, Topological Spaces, Compact Spaces, Measure and Integration, The Daniell Integral, Topology, and Mappings of Measure Spaces.

728 Complex Variables I 3(3,0) F

731 Ordinary Differential Equations 3(3,0) F

730 Complex Variables II 3(3,0) S
Continuation of 728, Laurent series, calculus of residues, conformal mapping, analytic continuation, Riemann surfaces, infinite products, special functions. P, 728.

739 Advanced Metallurgy 3(3,0) S
Crystal lattices and diffraction by crystals. Structure determination, defects, registration by microscopic methods, single crystal orientation and analysis of stress caused by phase transformation.

741 Advanced Stress Analysis in Mechanical Design 3(3,0) S

745 Advanced Machine Design 3(3,0) S

758 Gas Dynamics II 3(3,0) F
Continuation of Gas Dynamics I. Treatment of two-dimensional and axially symmetric bodies in subsonic, supersonic, and hypersonic flow. Consideration of both idealized isentropic flows and presence of oblique shocks. P, 627.

761 Operations Research 3(3,0) S
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.
762 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.

763 Topics in Reliability Engineering 3(3,0)
Probability concepts and typical models involved in the statistical prediction of reliability. Methods for estimating required parameters from experimental data. Reliability and maintainability techniques in practice, and a survey of recent developments in the field.

765 Systems Analysis 3(3,0)
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.

767 Decision Theory 3(3,0)

DEPARTMENT OF MICROBIOLOGY

Professor Robert Todd, Head
Professors Baker (Emeritus), Pengra, Semeniuk (Emeritus), Sword, Westby; Associate Professor Kirkbride
Assistant Professor Westfall

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.
All Microbiology applicants are required to take the Graduate Record Examination.
For the graduate minor, a Bachelor’s degree including prerequisites for the graduate courses elected.

Microbiology (Micr)

DS 622 Advanced Dairy Microbiology
3(2,3) S
(See description in Dairy Science)

624 Virology
3(2,3) S

637 Systematic Bacteriology 4(2,4) F 1990
Techniques for isolation, identification, classification and preservation of bacterial cultures are presented. Current topic areas and theory in taxonomy and nomenclature are discussed in detail. P, 332 (or equivalent) or consent.

692 Advances in Microbiology 1-4 FS
In-depth study of selected areas or specialities within Microbiology to strengthen and expand the current knowledge and technical skills of graduate students in Microbiology. Prerequisites will vary with area studied.

713 Industrial Microbiology 4(2,4) F 1989
A course detailing the use of microorganisms by people. Topics include the production of food and beverages, agricultural and industrial chemicals, pharmaceuticals, and alternate fuels. Legal and ethical ramifications are presented. P, 332 (or equivalent) and consent. 535-535 and Ch 361, 260 (or equivalent) are recommended.

738 Microbial Metabolism 4(2,4) S 1990
A course dealing with microbial respiration of organic and inorganic compounds, anaerobic respiration, the various fermentations, photosynthesis, nitrogen fixation, and the biosynthesis of certain organic intermediates. The lab introduces the student to the usage of various research equipment. Elementary biochemistry recommended.

742 Graduate Seminar 1(1,0) S
P, 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 (Mus)

690 Independent Studies 1-3
691 Directed Studies 1-3
695 Course Specials 1-5
791 Directed Studies 1-4

790 Thesis 5-7
791 Thesis Sustaining 1
792 Research Report/Design Paper 1
794 Special Problems 1-3
795 Special Topics 1-3

790 Thesis in Music 5-7 FSSu
COLLEGE OF NURSING

Carmen Westwick, Dean
Professors Hofland, C. Peterson,
E. Peterson, Blazey (Emeritus),
Johnson (Emeritus)
Associate Professor Doherty, Hegge,
Hardin-Palmer
Assistant Professor P. Gasper

Program Focus
The general purpose of graduate education in nursing is to prepare professional leaders with special knowledge and skills to meet the nation's needs in nursing service and nursing education. The aim of the program at South Dakota State University is to prepare nurses to practice at an advanced level in nursing and in the functional roles of either nurse educator, clinician, or patient care manager. Achievement of this aim includes study in related fields and the use of research in the examination of nursing problems.

Objectives of Program
The graduate of the Master of Science in nursing program will:

1. Synthesize advanced knowledge from the sciences, humanities, other cognates, and nursing in the development of a conceptual framework.
3. Contribute to the development of nursing as a scientific discipline through the generation of new knowledge and expansion of existing knowledge by application of the deliberative process at an advanced level.
4. Practice with expertise at an advanced level in the specialized nursing care of the client.
5. Synthesize and utilize knowledge and skills basic to the functional role of clinician, nurse educator, or patient care manager.
6. Evidence competence in research by evaluating research, conducting a research study and using research results in advanced nursing practice and in a functional role.
7. Plan and initiate leadership and change strategies to improve nursing practice, health care, and the health care system.
8. Collaborate with clients, community and other health professionals to enhance the delivery of health care to the client.

Prerequisites for graduate study:
In addition to meeting basic requirements for admission to the Graduate School, applicants for graduate study in nursing must have:

1. A bachelor's degree in nursing from an NLN accredited program with an upper division major in nursing.
2. Maintained a "B" average (3.0 or higher on a 4 point grading system).
3. Current licensure in South Dakota or be eligible to obtain licensure.
4. Professional nursing liability insurance.
5. One year of experience in nursing practice.
6. A course in physical assessment or documented skills in this area (evidenced by test or transcript).
7. A course in statistics, including descriptive and inferential statistics.
8. Submitted results of the Graduate Record Examination Aptitude Test to the College of Nursing.

Candidates not meeting basic prerequisites may be given special consideration if it appears that deficiencies can be corrected.

General Program Description
The degree granted is the Master of Science with a major in nursing. The program gives the student an opportunity to acquire a broad graduate education focusing on the health needs of clients in primary, secondary and tertiary care settings. The program requires a minimum of 38-41 semester hours which may be completed in three to four semesters of full-time study. Part-time study is available.

Formal course offerings in the program are divided into the following groups: core courses which all students take; functional role courses specific to either teaching, patient care management or advanced clinical practice; courses which support the major and/or the functional role; and elective courses. The student may choose to do either a thesis or a research project. Plans of study vary slightly for these two options. A comprehensive written or oral examination is required of all students.

Students may choose to focus on the older client by emphasizing gerontological coursework in the supportive and elective areas.

Core Courses (All students)
Nurs 610 Theory and Conceptual Frameworks in Nursing
Nurs 620 Pathophysiological Basis for Nursing Practice
Nurs 694 Research Methods in Nursing
Nurs 720 Leadership and Role Development
Nurs 760 Advanced Concepts in Nursing I
Nurs 765 Advanced Concepts in Nursing II
Nurs 782 Advanced Communication for Nursing Practice

Functional Role Courses (Vary depending on option)

1. Nurse Educator
Nurs 710 Curriculum Development in Nursing
Nurs 775 Nurse Role Practicum, Nursing Education Section
2. Patient-care Manager
Nurs 725 Patient Care Management
Nurs 775 Nurse Role Practicum, Patient Care Management Section
3. Advanced Clinician (Two suboptions)
Clinical Specialist in Adult Care
Nurs 770 Clinical Nursing Specialization (Secondary/Tertiary Care Section)
Adult Nurse Practitioner
Nurs 770 Clinical Nursing Specialization (Primary Care Section)
Nurs 775 Nurse Role Practicum.
(Advanced Clinical Practice Section)

Support Courses
Courses taken from other colleges and departments which support either the major and/or functional role.

Elective Courses
Courses taken either in nursing or other areas of study depending on student's interests.

Two Options for Master of Science Degree
Option A requires a thesis (Nurs 790 Thesis in Nursing 5 credits)
Option B requires a research project (Nurs 792 Problems in Nursing Research 2 credits) and five (5) elective credits.

Nursing (Nurs)

Required Courses: Core

610 Theory and Conceptual Framework in Nursing 2(2,0)
A systematic study and interpretation of nursing phenomena by critical examination of theoretical concepts and models.

620 Pathophysiological Basis for Nursing Practice 2(2,0)
Manifestations of complex clinical problems analyzed through physiological and pathophysiological mechanisms with implications for nursing practice. Requires a basic knowledge of anatomy and physiology.

694 Research Methods in Nursing 3(3,0)
Components of the research process with emphasis on research in nursing and the health care system. (P, statistics course; P or concurrent, Nurs 760).

720 Leadership and Role Development 2(2,0)
Opportunity for analysis and critical review of current issues regarding the nurse's role in delivery of health care services. (P or concurrent, Nurs 610, Nurs 760, or consent of instructor).

760 Advanced Concepts in Nursing I 3(3,2)
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/her health status. (P, regular graduate student status; P or concurrent, Nurs 610, Nurs 690, 694).

765 Advanced Concepts in Nursing II 4(2,6)
(Continuation of Nurs 760). See Nurs 760 for course description. (P, Nurs 694, Nurs 760; P or concurrent, Nurs 762, 780).

782 Advanced Communication for Nursing Practice 3(3,3)
Seminar and supervised experiences with application of the therapeutic communication process to prevention, treatment, and rehabilitation of adults and/or families in health and illness. (P, regular status; P or concurrent Nurs 610, Nurs 760 or consent of instructor).

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Required Courses: Within Role Options

710 Curriculum Development in Nursing  2(2,0)
Principles of curriculum development and their application to nursing curricula. Selection, organization, and evaluation of learning experiences. (P or concurrent, Nurs 610), or consent of instructor.

725 Patient Care Management  3(3,0)
Identification and analysis of management theories influencing middle management nursing roles in a variety of patient care situations. (P or concurrent, Nurs 765, Nurs 782, or consent of instructor).

770 Clinical Nursing Specialization  6(3,9)
Extension and refinement of professional expertise in a clinical field of the student's choice. (P, Nurs 765).

775 Nurse Role Practicum  4-12(0,12-36)
Supervised experience in nursing role: Nursing Education Section.
Teaching in classroom and/or clinical services 4(0,12) (P or concurrent Nurs 710, P Nurs 765)
Patient Care Management Section.
Nursing middle management in selected patient care settings 4(0,12) (P or concurrent Nurs 725, P Nurs 765).

Advanced Clinical Practice Section.
Application of clinical knowledge and skills in various health care settings by working interdependently with nurse and/or physician preceptors 12(0,36) (P, Nurs 770).

Required Courses: Two Research Options

790 Thesis  5
(P, Nurs 694; regular admission status; P or concurrent Nurs 760).
or
792 Problems in Nursing Research  1-3
Application of the nursing research process with particular emphasis on problems of inquiry in the health care system. (Project or non-thesis option) (P, Nurs 694; regular admission status; P or concurrent Nurs 760)
May be repeated up to three times for a maximum of three (3) credits.

Elective Nursing Courses
(Available on sufficient demand)

625 Human Sexuality in Health Care  3(3,0)
Provides the opportunity to identify, study and discuss those areas in human sexuality which concern human interaction and in particular the work with clients and their families in health care. P, graduate student in nursing; graduate student in other disciplines with permission of instructor.

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

635 Death and Dying: Principles and Practice of Care  3(3,0)
Provides an opportunity to identify and discuss issues surrounding death and ways in which health professionals may provide appropriate care for the dying person and family.

640 Legal and Ethical Accountability in Health Care  2
Study of the ethical positions and legal factors influencing behavior and decision making in health care. Emphasis on developing a justifiable ethical framework with consequent rights, responsibilities and conflicts. (P, graduate students in nursing and other health professionals with instructor permission).

645 Management of Acute and Chronic Pain  2(2,0)
Provides opportunity to identify and discuss management principles of acute and chronic pain with noninvasive and invasive measures. P, graduate nursing student, other graduate students with instructor's permission.

655 Health and the Older Adult  2(2,0)
Issues and factors affecting the older adult will be analyzed for their implications in planning and implementing health care for this group. A guided study approach to a conventional course. P, senior or graduate nursing student, graduate or senior student of other health disciplines or by consent of the instructor.

665 Health Care for Victims of Abuse  3(3,0)
Opportunities to study the historical perspectives of health care for the victim; to assess the current physical, psychological and emotional health care needs of the victim; to plan and implement intervention procedures and to evaluate the treatment modes in appropriate health care facilities. P, Psychology 101, Sociology 100, senior or graduate nursing student, graduate or senior student of health disciplines or by consent of instructor.

670 Issues in Health Care Delivery  3
Study of the organization and the political, economic and social aspects of international, national and regional health care systems.

690 Seminar: Guided Study in Nursing  1-4
May be either seminar or laboratory or combination of these.
Investigation of a selected problem in nursing theory or practice. May be repeated for two semesters for variable credit.

692 Special Problems  1-3
Directed study, analysis and/or research of selected problems related to clinical practice in nursing. may be a combination of discussion/conference and clinical experience. Open to qualified graduate students by consent. Limit of 4 credits can be applied to a degree.

695 Special Topics  1-3(1-3,0)
Review and discussion of special concerns, issues or trends in the nursing profession, such as, but not limited to, legislation, ethics, administration, education. Topics will be of a non-clinical nature. Open to qualified graduate students by consent.

780 Seminar in Advanced Nursing  1-3(1-3,0)
Discussion and reports of current literature, practices, or research in nursing. (P, consent) Limit of 3 credits applied to Master's degree.

785 Self Care and the Older Adult  3(3,0)
Analysis of various factors which alter the self care of the older adult. A guided study approach to a conventional course. P or C Bio 625 Biology of Aging, P Nurs 694 Research Methods in Nursing, Nurs 760 Advanced Concepts in Nursing, Nurs 555/655 Health and the Older Adult.
DEPARTMENT OF NUTRITION AND FOOD SCIENCE

Associate Professor Michael G. Crews, Head

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 (NFS)

603 Seminar in Food And Nutrition 1-2

Reports and discussion of current literature in various areas of food and nutrition. P. consent.

660 Maternal and Infant Nutrition 3

Fundamental principles of nutrition during pregnancy, lactation, infancy, and early childhood. Topics include stages of fetal development, maternal physiological and anatomical alterations, nutritional guidance in prenatal care, normal growth and development, food intake and its regulations. P. 321 or consent.

661 Special Problems 1-3 as arranged

Special study in food and nutrition. P. consent.

662 Sociocultural Aspects of Nutrition 3

The study of diverse dietary patterns and their impact on nutritional health including food attitudes, socioeconomic structures, cultural patterns of food intake and their effect on nutrient composition of the diet. P. 221 or 321 or consent.

724 Recent Development and New Approaches in Human Nutrition 3(3,0)

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.

725 Nutrition and Human Performance 3

This course is designed to develop an understanding of nutrition, based upon knowledge of the biochemical and physiological process and functions of specific nutrients in meeting nutritional requirements. Emphasis will be placed upon the relationship of optimal nutrition and physical efficiency and performance.

734 Techniques in Nutrition Research 3(1,6)

Laboratory experience using methods, measurements and instruments for obtaining nutritional data. P. Chem 260 or consent.

DEPARTMENT OF PHYSICS

Professor W. Hein, Head

Professors Duffy, Graetzer, Miller (Emeritus); Associate Professor Leisure; Assistant Professors Sippel, Rauber

Graduate majors offered. Master of Science Teaching (separate listing).

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 (Phys)

621 Electrodynamics 3(3,0)

Complex quantities, circuits, Maxwell’s equations, waves in general, planar, cylindrical, and spherical waves, approximation methods, plasmas. P. 421.

635 Reactor Physics 3(3,0)

Fission process: moderation and diffusion of neutrons; critical equation; reactor control; environmental effects; nuclear fusion. P. 433 or consent.

637 Science of Solids 3(3,0) S

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.

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. 421 or consent.

700 Seminar 0-1 FS

Current, state-of-the-art, topics in engineering and physics. All graduate students are required to take this course each semester in residence and no more than twice for credit. Students registering for zero credit will be required to attend all sessions. Students who register for one credit will be required to write a paper and make a presentation on a subject related to their research or design paper.

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 3(3,0)

Derivations of Boltzmann distribution law, Bose-Einstein statistics, Fermi-Dirac statistics, basic theory of gas and liquid states, order-disorder phenomena, the partition function. P. 341.

751 Theoretical Mechanics 3(3,0)

Further development of Lagrangian and Hamiltonian methods, canonical transformations, rigid body motion, relativistic mechanics. P. 351.

761 Plasma Physics 3(3,0)

Elementary processes in a plasma, trajectories of charged particles, collective effects, creation of plasma, plasma instabilities, applications. P. 421.

771 Quantum Mechanics 3(3,0)

Hermitian operators, matrix methods, perturbation theory, Dirac wave equation, four-fermion interactions. P. 351, 471.

779 Group Theory in Quantum Mechanics 3(3,0)

Symmetry transformations, continuous groups, finite groups, applications to valence theory, Lorentz group, fundamental particles. P. 471.

790 Thesis 5-7 as arranged. FS

791 Thesis Sustaining 1

792 Research or Design Paper 2 FSSu

Conduct a research or design project and write a report on the work done using thesis format.

793 Special Topics

Special projects either from a theoretical or experimental approach. P. consent.
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.

DEPARTMENT OF PLANT SCIENCE (Agronomy, Entomology, Plant Pathology)

Professor Maurice L. Horton, Head Professors Arnold, Brage (Emeritus), Buchenau, P. Carson (Emeritus), Dybing (USDA) Fine (Emeritus), Gardner (Emeritus), Hoffman (USD), Kantack, Kenevick, Kieckhefer (USDA), Kineh (Emeritus), Kohl, Malo, McDaniel, Moore, Reeves, Semenuk (Emeritus), Shank (Emeritus), Shubeck (Emeritus), Walgenbach, Westin (Emeritus), White; Associate Professors Boe, M. Carson, Cholick, Lemme

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

Prerequisites for graduate study:
A Bachelor’s degree plus prerequisites for the courses elected. The Master of Science degree with a major in Entomology requires at least 14 prior credits in entomology.

Plant Science (PS)

653 Advanced Genetics 3(3,0) F 1988

Procedures in genetic studies as they relate to molecular and classical genetic applications. Alternate years. delete one 753

700 Special Topics 1-6(1.3 per credits) FSSu


704 Virus and Bacterial Disease of Plants 4(2,4) F 1988

Plant diseases caused by viroids, 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. Alternate years.

711 Insect Ecology and Biological Control 3(2,3) S 1989

Comprehensive study of insects in relation to their environment. Effects on 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.

713 Host-Plant Pathogen Interactions 3(2,3) S 1989

Physiology and genetics and host-parasite interactions. Disease resistance. P, consent. Alternate years.

721 Integrated Crop Pest Management 3(3,0) S

The biological and ecological basis of integrated pest management for midwestern crop insects and the understanding of economic thresholds are emphasized. Pest scouting techniques for major crop pests and simulated management decisions are discussed.

723 Insect Physiology 3(2,2) S 1989

Fundamental physiological process as in insects. Normal and abnormal functioning of adult and immature stages, developmental physiology, physiology of behavior. P, Ch 120 and consent. Alternate years.

732 Field Studies in Pedology 2 Su

Field Techniques used in pedology will be learned by studying soils developed in a variety of geological materials and surface formations during a week-long field exercise. Soil genesis and land use applications will be investigated. The impact of soils upon agronomic management and research will be presented. Students will share transportation, room and board costs. The class may be repeated for a maximum of 4 credits. P, PS/Geo 310 or consent of instructor. Physiographic divisions used as study areas will be rotated so that activities are unique each year.

733 Advanced Soil Genesis 3(2,3) S 1989

Detailed study of the processes of soil genesis and an examination of soil and ecosystems with respect to the soil forming factors of time, parent material, topography, climate and organisms. P, consent. Alternate years.

734 Plant Nematology 3(2,4) F 1989

Nematode diseases of plants with emphasis on collection, isolation, preservation, symptomology, identification, life histories and control of plant parasitic nematodes. P, consent. Alternate years.

741 Crop Breeding Techniques 1 Su 1988

A techniques course where artificial hybridization of crop plants will be demonstrated and carried out. Background material will be offered with each crop. Both field and horticultural crops are included. Alternate years.

743 Physical Properties of Soils 3(3,0) F 1988

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. Alternate years.
744 Soils and Plant Nutrition 3(3,0) S 1989

Plant-soil nutrient relationships including nutrient sink development, uptake, transport to roots, labile soil sources, nutrient deficiencies, and their correction. Emphasis on nitrogen, phosphorus and potassium. P, consent. Alternate years.

751 Advances in Plant Pathology 1(1,0) F 1989

Presentation and in-depth discussion of current topics and controversies in plant pathology. Extensive use of the literature. Oral presentations and term paper required.

752 Genetics Plant Disease Resistance 2(2,0) S 1988

Extensive study of genetics mechanisms in the host and pathogen that determine disease reactions and how these genetic systems interact; breeding plants for disease resistance; discussion of current topics in host-pathogen genetics. Alternate years.

754 Chemical Properties of Soils 4(4,0) F 1989

Chemical considerations of the dynamic interactions of soil-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.

761 Taxonomy of Insects 3(3,0) F 1988

Collection, identification and classification of insects. Techniques of identifying the groups of economic insect pests that affect the production of feed, food and fiber. Alternate years.

763 Environmental and Physiological Aspects of Crop Production 2 S 1989

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.

771 Principles of Insecticide Use 3(2,2) F 1989

Insecticides and chemosterilants, their effects, antidotes, detection, and uses. 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.

773 Cytogenetics 3(2,3) F 1989


780 Advanced Special Problems 1 or 2 FSSu

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

781 Plant Science Seminar 1(1,0) FS

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

783 Crop-Water Relationships 2(2,0) F 1989

An examination of the role of water on crop productivity with an emphasis on environmental and physiological factors affecting the absorption, movement and use of water in crops. Water associated stresses will be analyzed in terms of agronomic and physiological mechanisms of adaptation. P, Bot 427 and consent. Alternate years.

790 Thesis—M.S. 5-7

791 Thesis Sustaining MS

890 DissertationPh. D. var.

891 Dissertation Sustaining Ph.D.

DEPARTMENT OF POLITICAL SCIENCE

Professor Cheever, Head,
Professor Tolle

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.

DEPARTMENT OF PSYCHOLOGY

Professor Alan Branum, Head

660 Topics in Psychology 2-4

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

Individual guided research culminating in formal research paper. May be repeated until 6 credits are earned.

670 Topics in Political Science 1-4

An intensive examination of significant political themes, issues, and problems. Topics will include, but are not limited to, the following: Republics and Self-Government; the Constitution and Civil Liberties; Parties, Elections and Campaigns; Presidential-Congressional Relationships.
DEPARTMENT OF RURAL SOCIOLOGY

Professor J. Satterlee, Head
Professors Dimit (Emeritus), Hes, Kayongo-Male, Mendelsohn, Sauer (Emeritus), Wagner; Associate Professors Baer, Stover

Graduate majors offered:
1. Master of Science Degree With Major in Rural Sociology. Three Options:
   - Option A: Thesis Option: requires a minimum of 30 semester credits including a thesis (5 credits) and comprehensive oral examination.
   - Option B: Planning/Development Option: designed for students seeking careers in domestic and international planning/development. (No thesis) Internship & oral comprehensive exam required.
   - Option B: Non-Thesis Option: requires 32 hours with no thesis. Does require comprehensive written and oral examination. Designed for those wishing to extend their education without the research emphasis.

All students must complete the core requirements plus sufficient additional graduate hours in this department, a minor in another department and/or supporting courses.

2. Doctor of Philosophy Degree with Major in Sociology. Areas of concentration include:
   - Social Theory
   - Research Methodology
   - Social Organization
   - Demography
   - Social Deviance.

Prerequisites for graduate study:
For the graduate major a Bachelor's degree with 24 credits in social science or consent of the department.
For the graduate minor consent of the department. (Send for Dept. Graduate Guide for more details).

Anthropology (Anth)
(See dept. for schedule of offerings)

690 Special Problems in Anthropology 1-3 FSSu
P, open to undergraduate and graduate students with sufficient background and consent.

697 Topics in Anthropology 1-3(1-3,0)
(On demand)
Selected topics pertaining to theory and methods in Anthropology. Subject areas will change from semester to semester. P, consent.

793 Seminars in Anthropology 1-4 FSSu (On demand)
-Teaching of Anthropology
-Advanced General Anthropology
-Advanced Cultural Anthropology
-Archaeological Techniques
-Ethnology
-Ethnography
-Anthropological Theory & Social Thought

Rural Sociology (Soc)
(See dept. for schedule of offerings)

601 Social Deviance (3.0)
This course will examine the nature of negatively evaluated behaviors and the processes by which customs, rules and normative structures of society are constructed. A primary goal of the course is the development of a coherent interpretation of contemporary theories and empirical investigations of social deviance. P, consent.

615 Social Thought 3(3,0)
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.

620 Social Organization 3(3,0)
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.

621 Social Stratification 3(3,0)
Theories of social stratification. Relationship between social class and education, occupational choice, political preference, religious affiliation and social mobility. P, consent.

630 Social Change 3(3,0)
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.

633 Leadership and Group Organization 3(3,0)
Emergence of and types of leaders. Analysis of community power structure. Emphasis on group dynamics, small groups and effective meetings. P, consent.

640 Rural Community Planning 3(3,0)
Structure, activities, problems, resources, and functions of the rural community; methods and techniques of community organization; institutional services and leadership with economic and social relations of the small community to both open city and rural centers. P, consent.

709 Evaluation Research 3 S
Focus on the conceptualization and design of evaluation studies of various governmental programs. Design includes clarification of objectives, selection of an appropriate collection techniques, and specification of target groups. Alternate years.

710 Research Methods in Sociology 3(3,0) S
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.

711 Qualitative Research Methods 3(3,0) F
Qualitative research methods of data collection, analysis, and presentation are examined, emphasis on fieldwork involving participant observation and intensive interviewing; includes consideration of the theoretical, theoretical underpinnings and limitations of qualitative research. P, consent.

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

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

714 Theory Construction 3 S
Focus on theory-building efforts; criteria for development of theories and general approaches to theory construction are covered. These general approaches are examined in depth; various critical approaches to theory development are reviewed. Alternate years.

716 Symbolic Interaction 3 s
Focus on major micro-sociological perspective. Basic concepts, assumptions, and key propositions on development of this perspective. Recent applications and critiques of the perspective are examined. Alternate years.

720 Teaching of Sociology 3 S
Course designed for those planning a career in teaching Sociology at the college/university level; course is applied with "hands-on" experiences in preparation for college teaching.

760 Advanced Demographic Theories and Techniques 3(3,0)
An exploration of population theory and methods focusing upon contemporary literature and the basic population processes of fertility, mortality, and migration. P, 362 or consent.

762 Demographic Resources & Materials 3 S
Focus on demographic publications and resources including Census data material; areas included are population, housing, agriculture, economics, vital statistics reports, special surveys and international materials. Emphasis on a variety of applications across disciplines. Alternate years.

764 Modern Demographic Theory 3 F
Overview of the explanatory factors and determinants related to the population process of fertility, mortality and migration. Emphasis on theoretical models that focus on developed and developing countries. Alternate years.

766 World Population Issues 3 S
Focus on policy formulation and program evaluation as related to population issues; the political economy of national and international efforts are considered; planning a micro-and macro-level decision-making is examined; issues covered are population and resources, the value of children, international migration and major health problems.

750 Special Problems in Sociology 1-3(1-3.0) 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.

781 Internship in Planning 1-6 FSSu
P, Major and Planning options. P-F grade.

790 Thesis—M.S. 1-4 FSSu

791 Thesis—M.S., Sustaining 1-4 FSSu (On demand)
- Sociology of Religion
- Advanced Social Psychology
- Demographic Resources & Materials
- Theory Construction
- Advanced Criminology
- Teaching of Sociology
- Domestic Violence
- Victimology
- Extra-Ordinary Groups

793 Research Paper in Sociology 1-3 FSSu

880 Dissertation Ph.D. 1-12

891 Dissertation Sustaining Ph.D. 1
MASTER OF SCIENCE TEACHING

The Master of Science Teaching Degree is offered with the following majors: chemistry, mathematics, and physics.

Residence and Degree Requirements

Minimum residence requirement for the Master of Science Teaching degree is 20 graduate credits. Transferred credits will be reviewed by the student's adviser and approved by the MST Committee prior to inclusion in the student's Plan of Study. Completion of the degree requires a minimum of 35 credits of which 18 must come from the major department course list.

Requirements for the Minor or Supporting Courses

Each student must include a minimum of 6 credit hours from two of the following department course lists which are not the student’s major department: chemistry, mathematics, and physics. An additional 5 credits must be taken from the fields of biology, chemistry, education, mathematics or physics.

Plan of Study

During the first term of work, the graduate student should plan with her/his adviser the Plan of Study for the Master of Science Teaching degree. The plan is processed the same as for other masters degrees.

Admission to Candidacy

Admission to candidacy is processed the same as for other masters degrees.

Examinations

The students in the program may take challenge exams in selected areas of each departments course offerings. Upon successful completion of these examinations, students will be allowed to proceed directly to more advanced courses. Candidates must pass a comprehensive written examination over the course work in their own program. A comprehensive oral examination will be held prior to final approval for graduation. All other examination requirements are as described for other masters degrees using option C.

Chemistry Major:

Required Courses:

Chem 701 Concepts in Chemistry
Section 1 Atomic Structure and Bonding
2 Periodic Relationships
3 Formulas and Reactions
4 Stoichiometry and Chemical Math
5 Acids, Bases, and Salts
6 Solutions and Equilibria
7 Descriptive Chemistry

Elective Courses:

Chem 702 Environmental Chemistry
703 Computers in Chemistry
704 Industrial Processes
705 Instrumental Chemistry
706 Biological Chemistry
707 Inorganic Chemistry
708 Organic Chemistry
709 Alternative Energy
710 Lecture Demonstrations
711 Instructional Laboratories
712 Consumer Chemistry

Students may challenge and test out of sections of the 701 Concepts in Chemistry course. Students will be required to complete or test out of all sections of Chem 701. An additional 8 credits of chemistry courses will be required for a major in chemistry. Students will also be required to take 6 hours from physics, 6 hours from mathematics and 5 hours of electives from the fields of biology, physics, mathematics, chemistry or education.

Mathematics Major:

Sequence courses will be offered in five areas of mathematics with each course carrying 2 semester credits.

Area I — Algebra

Courses:
711 Functions and Permutations
712 Algebraic Structures
713 Properties of Algebraic Structures
714 Vector Spaces and Linear Transformations
715 Applications of Algebra

Area II — Analysis

Courses:
721 Analytic Geometry
722 Functions, Limits and Continuity
723 Analysis of Algebraic Functions
724 Analysis of Transcendental Functions
725 Convergence

Area III — Geometry

Courses:
761 Foundations of Geometry
762 Advanced Euclidean Geometry
763 Non Euclidean Geometry
764 Projective Geometry

Area IV — Computer Science

Courses:
771 Structured Programming I
772 Structured Programming II
773 Data Structures
774 Discrete Mathematics
775 Computer Applications

Area V — Probability and Statistics

Courses:
781 Intro to Probability
782 Statistics (one and two populations)
783 Statistics (three and four populations)

A degree candidate must take a minimum of 18 credits from the sequences above with at least 2 credits in each of three areas. Prior to the final oral examination, comprehensive examinations must be passed in the three areas selected by the candidate. Students may test out of required courses.

Physics Major:

Required Courses:

Physics
701 Mechanics I
702 Mechanics II
703 Acoustics I
704 Fluids
705 Thermodynamics I
706 Electricity
707 Magnetism
708 Optics I
709 Relativity
710 Introduction to Quantum Theory
711 Quantum Mechanics and the Atom
712 Physics of Molecules and Solids
713 Nuclear and Radiation Physics
714 Astronomy I

Elective Courses:

716 Electrical Circuits
717 Meteorology
718 Energy and the Environment
719 Solid State Physics
720 Solid State Electronics
721 Acoustics II
722 Thermodynamics II
723 Optics II
724 Computers in the Laboratory
725 Astronomy II
726 Careers in Science and Engineering
727 Recent Developments in Physics

The MST with a major in physics will require 18 hours of courses from the above list. Student may also challenge and test out of the required courses. Requirements will also include a minimum of 6 hours of coursework from both chemistry and mathematics together with an additional 5 hours of elective from the fields of biology, chemistry, education or physics.

Chemistry (Chem)

The following courses are particularly designed for secondary school science teachers. Although the primary emphasis will be on course content, particular attention will be focused on laboratory experiments and demonstrations useful in teaching at the secondary level.

701 Concepts in Chemistry 1-10

A course designed for secondary school science teachers. The course will consist of seven concept areas which may be taken independently, such as atomic structure and bonding, acids, bases, and salts, etc. Each unit carries a 1 or 2 credit value.

702 Environmental Chemistry 2

Effect of chemicals on the environment will be discussed. Emphasis will be placed on problems related to the atmosphere and water. Other topics to be included are pesticides and heavy metals. P. Chem 701 or permission.

703 Computers in Chemistry 2

Primarily intended to introduce students to ways in which microcomputers may be used to supplement other teaching methods. No previous programming experience necessary. P. Chem 701 or permission.
712 Algebraic Structures
This course includes definitions and examples, both finite and infinite, of the following algebraic structures: group (Abelian and cyclic), ring (commutative and commutative with unity), integral domain, skew field, field and well-ordered domain. The concept of a subgroup, subring, subdomain and subfield will also be discussed as will the topics of quotient fields and quotient rings. SDF, 711.

710 Introduction to Quantum Theory
Basic experiments and theory leading to quantum theory and the present model of the atom will be studied. The concept of “matter waves” and their probability interpretation will be discussed.

711 Quantum Mechanics and the Atom
Quantum mechanics will be studied in relation to the hydrogen atom and the many electron atoms. Quantum numbers, the Pauli Exclusion principle, the Stern-Gerlach experiment and Zeeman effect will be discussed.

712 Physics of Molecules and Solids
Quantum mechanics will be applied to molecules and bonding in solids. Free electron theory and band theory will be applied to metals, insulators and semiconductors. An introduction to solid state electrical, optical and acoustical devices will be presented.

713 Nuclear and Radiation Physics
An introduction to nuclear structure and nuclear energy levels will be presented. Radioactivity, nuclear reactions, radiation detection and nuclear energy will be studied and applications to nuclear science will then be discussed.

714 Astronomy I
An Introduction to astronomy and basic principles involved. The solar system will be discussed in relation to Kepler's laws and analysis performed. A general study of the universe as seen by an astronomer will be discussed. Observations of the sky by telescope will be carried out when possible.

715 Electric Circuits
A continuation of material from Phys 706 related to circuit analysis. More complex DC circuits will be studied together with AC circuits. An introduction to electronics will also be presented.

717 Meteorology
A study of the physical laws which determine the earth's weather patterns. Basic weather forecasting, weather map analysis and weather front analysis will be included.

718 Energy and the Environment
A study of the available energy resources and the long-term effects of their use on the environment of the earth and its inhabitants. Parts 719 and 720 related to course and discussion. More complex DC circuits will be studied together with AC circuits. An introduction to electronics will also be presented.

720 Solid State Electronics
A study of the application of solid state semiconductor devices in electronics. Specific electronic circuits will be analyzed.

721 Acoustics
A continuation of Acoustics I with emphasis on harmonic analysis of periodic waveforms, musical acoustics, room acoustics and applications to sound reproduction and recording.

722 Thermodynamics II
A continuation of topics from Thermodynamics I with emphasis to applications of the 1st and 2nd laws of thermodynamics. The concepts of entropy, enthalpy and free energy will also be studied.

723 Optics II
A continuation of topics from Optics I with emphasis on more complex analysis in involved physical optics.

724 Computers in the Laboratory
An introduction to the use of microcomputers in the laboratory for the acquisition of data, analysis of data and simulation experiments.

725 Astronomy II
A continuation of topics from Astronomy I with emphasis on the "Cosmos Series." Sky observations by telescope will be carried out when possible.

726 Careers in Science and Engineering
Professional career opportunities in electrical, civil, mechanical and agricultural engineering, computer science, physics and mathematics will be explored, for advising high school students regarding career choices. Department visits and field trips to nearby industries will be arranged.

727 Recent Developments in Physics
Readings will be selected from Scientific American, Physics Today, American Journal of Physics, Physics Teacher and other professional journals, to develop awareness of current topics in physics and sources of information.

735 Computer Applications
Computer applications relevant to the high school curriculum will be studied. Problems will be solved using the PASCAL language. Topics from mathematics, sciences, business and the like will be used. P, Math 772 or consent.

760 Research in Physics
A continuation of topics from Optics I with emphasis on more complex analysis in involved physical optics.

727 Recent Developments in Physics
Readings will be selected from Scientific American, Physics Today, American Journal of Physics, Physics Teacher and other professional journals, to develop awareness of current topics in physics and sources of information.
703 Acoustics I
An introduction to waves in elastic media. Wave energy, the superposition principle and wave interference will be studied. Applications of these principles to audible, ultrasonic and infrasonic waves will be discussed.

704 Fluids
An introduction to the basic properties of static and dynamic fluids. Pascal's Principle, Archimedes Principle and Bernoulli's Equation will be applied to the study of gases and liquids.

705 Thermodynamics I
A study of temperature scales and their relationship to the laws of thermodynamics. Thermal expansion, specific heats, heat conduction, and the mechanical equivalent of heat will be studied. Applications to the first law of thermodynamics will be discussed.

706 Electricity
A study of electrotechnics by use of Coulomb's Law and Gauss's Law. The concept of electric field and electric potential will be introduced and applied to capacitors and resistances. Simple circuits will be analyzed.

707 Magnetism
A study of the basic properties of the magnetic field and its interaction with currents. Faraday's law will be discussed and applications made to generators, inductors and electric motors. Magnetic properties of matter will also be studied.

708 Optics
A study of geometric and physical optics. Applications of basic properties of light will be made to lenses, optical instruments and fiber optics. Diffraction and interference effects will be analyzed with both laser and incoherent light sources.

709 Relativity
An introduction will be made to both classical and Einstein relativity. The concepts of length contraction, time dilation simultaneity, relativistic mechanics and rest energy will be investigated. An introduction to general relativity and its relationship to the concept of the "black hole" will be discussed.

713 Properties of Algebraic Structures
This course covers such topics as the uniqueness of the identity, the inverse in an algebraic structure, which algebraic structures have cancellation and divisors of zero, what exponential rules hold in various structures, when are two structures basically the same (isomorphic) and how does one solve equations in different structures. P, 712.

714 Vector Spaces and Linear Transformations
The topics covered in this course are: vector spaces, linearly independent and dependent sets of vectors, basis for a vector space, linear transformations and their relation to matrices, orthogonality, similarity, diagonalization, eigenvectors, eigenvalues, Gram-Schmidt process and geometry of transformations. P, 713.

715 Applications of Algebra
The purpose of this course is to show how the algebraic structures previously discussed are used to solve problems in graph theory, linear programming, probability and statistics, theory of games, differential equations and discrete mathematics. P, 714.

721 Analytic Geometry
Analytic geometry of two and three dimensions including coordinate systems, lines, planes, conic sections, and rotation and translation of axes. P, College Algebra.

722 Functions, Limits and Continuity
A careful study of the theory of limits for sequences and functions and the general properties of continuous functions. P, Math 721 or a prior course in calculus.

723 Analysis of Algebraic Functions
Differentiation and integration of algebraic functions of one variable with emphasis on applications to graphing of functions and the solution of problems by the methods of calculus. P, Math 722 or consent of the instructor.

724 Analysis of Transcendental Functions
A careful study of the trigonometric and exponential functions and their inverses with particular attention to the differentiation and integration of these functions. P, Math 723 or consent of the instructor.

725 Convergence
A careful study of sequences and series of real numbers and functions with emphasis on how they are related to the algebraic and transcendental functions. P, Math 724 or consent of the instructor.

761 Foundations of Geometry
A study of the axioms necessary to prove theorems in geometry and a systematic development of Euclidean geometry using these axioms. P, none.

762 Advanced Euclidean Geometry
Special properties of triangles and circles, geometrical transformations, and inverte geometry. P, Math 761 or consent of the instructor.

763 Non-Euclidean Geometry
An introductory study of hyperbolic geometry with an emphasis on models of hyperbolic geometry and its relationship to Euclidean geometry. P, Math 761 or consent of the instructor.

764 Projective Geometry
A study of projective geometry as an extension of Euclidean geometry and an axiomatic development of projective geometry as a non-Euclidean geometry. P, Math 761 or consent of the instructor.

771 Structured Programming I
An introduction to concepts of structured programming using the PASCAL language. Topics will include syntax, selection, looping and procedures. P, Math 113.

772 Structured Programming II
Topics will include data types, arrays, functions and packed arrays. P, Math 771 or consent.

773 Data Structures
The study of list, string and graph structures using the PASCAL language. P, Math 772 or consent.

774 Discrete Mathematics
The study of sets and functions, binary relations including trees, state graphs and automata, discrete probability, recursion and algebra. P, FORTRAN or PASCAL.

DEPARTMENT OF SPEECH

Professor Judith Zivanovic, Head
Professors Denton, Ferguson, Hoogstraat (Emeritus), Johnson, Meyer, Schliessmann, Stine (Emeritus), Widvey;

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 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.

These 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 adviser.

Degree requirements:
The required curriculum for the Master of Arts degree with a major in Speech consists of: (1) A minimum of 22 semester hours in Speech including 5-7 hours in SpCm 790, and electives approved by the adviser 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.

Radio Television & Film (RTF)

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 for instruction.

660 Special Problems in Radio, Television or Film
1-2
Directed research. May be repeated to a total of 4 credits in problem courses. P, consent.

664 Film Studies 3(3,0)
Film art forms, artists, and critics. Viewing and making films.
792 Research Methods in RT&F 3(3,0)
See MCom 791, Research Methods in Communication under Department of Journalism and Mass Communication.

Speech Communication (SpCm)

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

624 Persuasion 2(2,0)

STATISTICS (Stat)

Professor W. Lee Tucker
Coordinator of Instruction
Administrative Committee: Professors Edeburn, Hsi, Kim, Lacher, Manahan, Nielsen, Tucker; Associate Professors Evenson, Ewing, Vandever; Instructor Ellingson

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, and Social Sciences. P, 341 or 381. Credit not given for both 641 and 681.

645 Nonparametric Statistics 2
Covers many standard nonparametric methods of analysis. Methods will be compared with one another and with parametric methods where applicable. Attention will be given to: (1) analogies with regression and ANOVA; (2) emphasis on construction of tests tailored to specific problems. P, 341 or 381.

651 Interpretation of Statistical Software Output 2
Interpretation of statistical software package(s) include statistics such as correlation, means, standard deviation, standard error, t-test, chi-square, simple and multiple linear and curvilinear regression, and balanced and unbalanced analysis of variance. P, 641 or 681.

681 Statistics for Physical Sciences 3
Analysis of variance, various types of regression, and other statistical techniques and distributions. P, 541 or 381. Credit not given for both 641 and 681.

761 Experimental Design 3
Experimental designs involving confounding will be explored as it relates to factorial experiments, incomplete block, lattice, and incomplete Latin square designs. P Stat 641 or 681.

DEPARTMENT OF TEXTILES, CLOTHING & INTERIOR DESIGN

Professor Sandra Evers, Head
Professors Lund (Emeritus), Lyle (Emeritus), Semenik (Emeritus) Stoflet (Emeritus)

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 (TCID)

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

743 Current Topics 1-3
Study of contemporary issues and concerns in the field of Textiles, Clothing and Interior Design. Focus on topics not included in other graduate courses in the department. P, consent. Can be repeated.

744 New Development in Textiles 3(3,0) Su

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

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

773 Costumes and Textiles through the Ages 3(3,0)
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.

792 Special Problems in Textiles, Clothing and Interior Design 1-4
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. Can be repeated.
VETERINARY SCIENCE (Vet)

Professor Dennis Nelson, Head
Professors Francis, Johnson, Kirkbridge, Swanson;
Associate Professor Benfield, Libal, Vickers
Assistant Professor Zeman

No major or minor is offered in this department. The following courses may be used in the major or minor as supporting courses in the graduate program.

624 Virology 4
Basic course discussing the characterization, structure, replication of viruses and the pathogenesis of viral disease in man and animals. Laboratory exercises emphasize techniques in virus isolation, characterization, and detection by immunological assays. P, MICR 422 or consent. Cross-listed as MICR 524, 624.

690 Problems in Veterinary Science 1-3 FS
Consent of Department Head.
723 Systemic Physiology 4(3,3) F
Physical aspects of cell and tissue functions, and the neuroendocrine system, central and autonomic nervous systems, and endocrine function. Discuss various interrelationships to body system functions and maintenance of homeostasis. P, VET 323 or consent of instructor. Cross-listed as BIO 723.
725 Systemic Physiology 4(3,3) S
Continuation of VET 723 involving principles learned in VET 723 with their application to the functioning of the systems (cardiovascular, pulmonary, renal, gastrointestinal tract, etc.) to maintain homeostasis. P, VET 723. Cross-listed as BIO 725.

727 Endocrinology 4(3,3) F
Discussions of synthesis, degradation, actions, interactions, and relationships of the endocrine hormones and neurotransmitters. Mainly the metabolic hormones will be discussed, and reproductive hormones as they influence metabolic hormones, body functions, and homeostasis. P, VET 725 or consent of instructor. Cross-listed as BIO 727.
729 Principles and Techniques of Electron Microscopy 4(2,4) F
Principles and techniques of scanning and transmission electron microscopy. Includes hands-on laboratory experience in tissue preparation and instrument operation. Basically oriented to life science applications, but other interests are welcome. P, consent of instructor.

DEPARTMENT OF WILDLIFE AND FISHERIES SCIENCES

Professor Charles Scalaet, Head
Professors Flake, Lindner, Emeritus
Associate Professor Berry
Assistant Professor Higgins

Graduate Majors Offered:
Master of Science with a major in Wildlife and Fisheries Sciences. There are two options available, the Wildlife Option and the Fisheries Option.

Graduate minor offered:
Wildlife Biology

Prerequisites for graduate study:
For the graduate major in Wildlife and Fisheries Sciences 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 Sciences (WL)

*611 Limnology 4(2,6) S
Even years
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, Bio 211, or consent. Alternate years.

*613 Advanced Fisheries Management 3(2,3) F
Even years
Principles and techniques of selected practices for reservoir, pond, and stream fisheries management. P, WL 367, 412, or consent of instructor. Alternate years.

*615 Upland Game Ecology and Management 3(2,3) S
Odd years
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 individual species management. P, WL 411 and consent. Alternate years.

*617 Big Game Ecology and Management 3(2,3) S
Even years
Big game life histories and distributions. Relationships of nutrition, reproduction, interspecific competition, and predation to management of big game habitat and harvest. Techniques for research for management of big game. P, WL 411 and consent of instructor. Alternate years.

*619 Waterfowl Ecology and Management 3(2,3) F
Odd years

690 Special Topics in Wildlife and Fisheries 1-3 as arranged FSSu
Limit of 5 credits for M.S. degree
Graduate students may secure small group instruction in a variety of topics such as technical writing, stream ecology, ecosystems analysis, wildlife population regulation, and others. P, consent.

711 Aquatic Ecology 4(2,6) F
Odd years
Qualitative and quantitative measurements of aquatic populations including primary production of biomass. Interrelations 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, WL 611 and consent. Alternate years.

713 Animal Population Dynamics 3(2,3) F
Even years
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 populations of various animal groups. P, consent. Alternate years.

714 Fish Structure and Function 3(2,3) S
Odd years
Emphasis on anatomy, physiology, and histology of fishes and how these areas relate to fish management, water pollution, and fish culture. Economically important game and cultured species are stressed. P, consent of instructor. Alternate years.

715 Wildlife Research Design 3(2,3) S
Even years
Use of the scientific method for designing wildlife research and developing proposals. Familiarization of field and laboratory methods and instrumentation. Practical experience with computer and statistical models for data analysis. P, consent of instructor. Alternate years.

716 Aquaculture 3(2,3) S
Even years
Extent and potential for aquaculture. Emphasis placed on culture methods of important commercial and sport fishes and invertebrates of North America. P, consent of instructor. Alternate years.

790 Thesis in Wildlife 1-7 as arranged FSSu
1-7 as arranged FSSu
Graduate students may secure small group instruction in the variety of topics such as technical writing, stream ecology, ecosystems analysis, wildlife population regulation, and others. P, consent.

791 Thesis Sustaining 1 FSSu
1 FSSu

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

780 Research Problems 1-3 FSSu
1-3 FSSu
Individualized instruction on specific research problems. P, consent of instructor.

*Field trips required in these courses may result in pro-rata changes to defray transportation costs.
ABDUL-SHAFI, ABDUL K., Associate Professor of Civil Engineering, 1958; B.S., Utah State College, 1953; M.S., University of Missouri, 1955.


ALEXANDER, RUTH A., Professor and Head of English, Coordinator of General Studies in Humanities, 1952; B.A., Michigan State University, 1945; M.A., University of Missouri, 1947; Ph.D., Michigan State University, 1952.


ARNOLD-W. EUGENE Professor of Plant Science, 1970; Ph.D., North Dakota State University, 1965; Ph.D., North Dakota State University, 1970.

BAER, LINDA, Associate Professor of Rural Sociology, 1983; B.S., Washington State University, 1971; M.S., Colorado State University, 1975; Ph.D., South Dakota State University, 1983.

BAER, ROBERT J., Assistant Professor of Dairy Science, 1982; B.S., University of Georgia, 1977; M.S., 1979; Ph.D., 1982.

BELL, RONNEY, Professor and Head of History and Political Science, 1970; B.S., Jamestown College, 1955; M.A., University of Michigan, 1956; Ph.D., 1975.


BENFIELD, DAVID A., Associate Professor of Veterinary Science, 1979; B.S., Purdue University, 1973; M.S., 1976; Ph.D., University of Missouri, 1979.

BERGUM, GERALD E., Head of Computer Science, 1970; M.S., Professor of Mathematics, 1970; B.S., University of Minnesota, 1958; M.S., University of Notre Dame, 1962; Ph.D., Washington State University, 1969.

BERRY CHARLES, Associate Professor of Wildlife & Fisheries, (USFW) 1985; B.A., Randolf Macoin College M.S., Forham University; Ph.D., Virginia Polytech & State University.


BILLOW, JOYE ANN, Professor and Head of Pharmacy Practice, 1972; B.S., Temple University, 1968; Ph.D., 1972.

BOE, ARVID A., Assistant Professor of Plant Science, 1976, 1979; B.A., Pacific Lutheran University, 1972; M.A., University of South Dakota, 1976; Ph.D., SDSU, 1979.


BRANDT, BRUCE, Associate Professor of English, 1979; B.A., University of Denver, 1969; M.A., 1971; Ph.D., Harvard University, 1977.

BRYANT, DAVID A., Dean of the College of Agriculture and Biological Sciences, Professor of Animal and Range Sciences, 1987; A.A., Lower Columbia College, 1963; M.S., Texas Technical University, 1967; Ph.D., University of Arizona, 1971.

BUCHENAU, GEORGE W., Professor of Plant Science, 1959; B.S., New Mexico State University, 1954; M.S., 1955; Ph.D., Iowa State University, 1960.

BUCKLEY, ERNEST, Dean of the College of Engineering, Professor of Civil Engineering, 1983; B.S., SDSU, 1948; M.S., Kansas State University, 1949; Ph.D., University of Texas, 1972.

CARSON, MARTIN, Assistant Professor of Plant Science, 1985; B.S., Eastern Illinois University, 1975; M.S., University of Illinois, 1978; Ph.D., University of Illinois, 1989.

CASCHELLA, PETER J., Professor of Pharmaceutical Sciences, 1977; B.S., Wagner College, 1968; B.S., Temple University, 1971; Ph.D., University of Houston, 1977.

CHAPPELL, GARY S., Professor and Head of Pharmaceutical Sciences, 1973; B.S., Ohio State University, 1963; Ph.D., University of Kansas, 1967.

CHEEVER, JR., HERBERT E., Professor of Political Science, 1968; B.S., SDSU, 1960; M.A., University of Iowa, 1962; Ph.D., 1967.

CHEN, CHEN-HO, Professor of Biology, 1960; B.S., National Taiwan University, 1954; M.S., Louisiana State University, 1960; Ph.D., SDSU, 1964.

CHOLICK, FRED, Associate Professor of Plant Science, 1981; B.S., Oregon State University, 1972; M.S., Colorado State University, 1978; Ph.D., 1977.

CHRISTIANSON, KENNETH D., Professor of Mechanical Engineering, 1955; B.S., SDSU, 1949; M.S., 1956.

CHU, SHU TUNC, Associate Professor of Agricultural Engineering, 1967; B.S., National Taiwan University, 1956; M.S., University of Minnesota, 1960; Ph.D., 1966.

CLARK, VIRGINIA L., Associate Professor and Head of Home Economics Education, 1977; B.S., University of Tennessee, 1969; M.S., 1976; Ph.D., University of Pennsylvania, 1984.

COSTELLO, W. S., Extension Meat Specialist, Associate Professor of Animal & Range Science, 1965; B.S., North Dakota State University, 1954; M.S., Oklahoma State University, 1960; Ph.D., 1963.

CREWS, MICHAEL, Associate Professor and Head of Nutrition Food Science, 1984; B.S., Virginia Polytechnic Institute and State University, 1972; Ph.D., 1978.

DE BOER, DARRELL W., Professor of Agricultural Engineering, 1969; B.S., Iowa State University, 1963; M.S., 1964; Ph.D., 1970.

DENTON, CLARENCE E., Professor of Speech, 1956; B.S., University of Nebraska, 1950; M.A., Louisiana State University, 1954; M.F.A. University of Minnesota, 1965.

DOBBS, THOMAS L., Professor of Economics, 1978; B.S., SDSU, 1965; Ph.D., University of Maryland, 1966.

DORNBUSH, JAMES N., Professor of Civil Engineering, 1949, Registered Professional Engineer (Minn.) 1949; B.S., SDSU, 1948; M.S., University of Minnesota, 1933; D.Sc., Washington University, 1962.

DUFFY, GEORGE H., Professor of Physics, 1945; A.B., Cornell College, 1942; A.M., Princeton University, 1944; Ph.D., 1945.


DWIVEDI, CHANDRABHAR, Associate Professor of Pharmaceutical Sciences, 1987; B.S., Gorakhpur University, 1964; M.S., 1966; Ph.D., Lucknow University, 1972.

DYING, C. DEAN, Professor of Plant Science, USDA, 1960; B.S., Colorado State University, 1953; M.S., 1955; Ph.D., University of California, 1959.


ELLERBRUCH, VIRGIL G., Professor and Head of Electrical Engineering, 1967; Registered, Professional Engineer (So. Dak.); B.S., University of Wyoming, 1960, M.S., 1961; Ph.D., 1969.

EMERICK, ROYCE J., Professor of Station Biochemistry, Professor of Animal Science, 1957; B.S., Oklahoma State University, 1952; M.S., University of Wisconsin, 1955; Ph.D., 1957.


EVenson, DONald, Professor of Chemistry, 1983; B.S., Augustana College, 1964; Ph.D., University of Colorado, 1968.

EVERETT, V. DUANE, Professor of Educational Psychology, 1953; M.S., University of Nebraska, 1953; M.S., 1962; Ed. D., 1966.

EVERS, SANDRA J., Professor and Head of Department of Textiles, Clothing and Interior Designs, 1982; B.S., Iowa State University, 1960; M.A., University of Minnesota, 1964; Ph.D., Michigan State University, 1975.

EWING, JOHN L., Associate Professor of Health, Physical Education and Recreation, 1983; B.A., Ashbury College, 1974; M.S., University of Kentucky, 1975; Ph.D., University of Minnesota, 1982.


FINCH, ROBERT G., Professor of Electrical Engineering, 1974; B.S., Michigan State University, 1958; M.S., 1960; Ph.D., Purdue University, 1974.

FIRLEN, PAUL, Assistant Professor of Plant Science, 1981; B.S., SDSU, 1975; M.S., 1977; Ph.D., Colorado State University, 1979.
FLAKE, LESTER D., Professor of Wildlife and Fisheries, 1972; B.S., Brigham Young University, 1965; M.S., 1966; Ph.D., Washington State University, 1971.


FRANCIS, DAVID H., Professor of Veterinary Science, 1978; B.S., University of Missouri, 1971; M.S., Brigham Young University, 1974; Ph.D., University of Minnesota, 1978.

FROEHlich, DONELL P., Ph.D., Associate Professor of Agricultural Engineering, 1982; B.S., SDSU, 1972; M.S., 1973; Ph.D., Cornell University, 1976.


GAMBILL, NORMAN, Professor and Head, Visual Arts, 1984; B.A., Emory University, 1962; M.A., University of Iowa, 1966; Ph.D., Syracuse University, 1976.

GARTNER, F. ROBERT, Professor of Animal Science, 1956; B.S., University of Wyoming, 1950; M.S., University of California, 1956; Ph.D., University of Wyoming, 1961.

GARRICK, R. HENRY, Professor of Chemistry, 1964; B.S., Oklahoma State University, 1958; M.S., University of Iowa, 1962, Ph.D., 1964.

GHAZI, HASSAN S., Ph.D., Professor of Mechanical Engineering, 1984; B.S., Purdue University, 1954; M.S., Ohio State University, 1956; Ph.D., 1962.

GILBERT, L. HARDY, Professor of Economics, 1966; B.A., Central Bible Institute, 1957; B.S., Washington State University, 1961; M.A., 1962; Ph.D., Oregon State University, 1967.

GILLILAND, MARLENE M., Adjunct Associate Professor of Nursing, 1978; B.S., Augsburg College, 1950; M.S., George Washington University, 1958; M.S.N., Vanderbilt University, 1971.

GRAETZER, HANS G., Professor of Physics, 1956; B.A., Oberlin College, 1952; M.S. Yale University, 1953, Ph.D., 1956.

GRANHOLM, NELS, Professor of Biology 1971; B.A., University of Massachusetts, 1960; Ph.D., Michigan State University, 1964.

GREENBAUM, HARRY, Professor of Economics, 1961; B.S., Texas A&M University, 1955; M.S., Ohio State University, 1956, Ph.D., 1961.

GRITZNER, CHARLES F., Professor of Geography, 1980; B.A., Arizona State University, 1959; M.A., Louisiana State University, 1960; Ph.D., 1966.

HAERTL, ROBERT J., Professor of Biology, 1969; B.S., University of Illinois, 1961; M.S., 1963; Ph.D., Oregon State University, 1966.

HAMIDZADEH, HAMID R., Associate Professor of Mechanical Engineering, 1956; B.S., Arya Meher University, 1974; M.S., Imperial College (University of London), 1975; Ph.D., 1978.

HANSON, CLARK W., Professor of Education, 1968; B.S., University of Minnesota, 1963; M.A., 1971; Ph.D., Iowa State University, 1972.

HARTFIELD, WARREN G., Professor and Head of Music, 1961; B.A., University of Northern Iowa, 1952; M.A., University of Iowa, 1958; Ph.D., 1967.

HECHT, HARRY G., Professor of Chemistry, 1973; B.S., Brigham Young University, 1959; M.S., 1960; Ph.D., University of Utah, 1962.

HEEGER, MARGARET, Associate Professor and Coordinator of Continuing Education, 1977; B.A., Gustavus Adolphus College, 1969; M.S., University of Minnesota, 1984; Ed.D., University of South Dakota, 1983.

HEIN, WARREN W., Professor and Head of Physics, 1979; B.S., University of Wisconsin, 1966; Ph.D., Iowa State University, 1970.

HELICKSON, MYLO, Professor and Head of Agricultural Engineering, 1969; B.S., North Dakota State University, 1964; M.S., 1966; Ph.D., West Virginia University, 1969.

HESS, DONNA J., Professor of Rural Sociology, 1974; A.B., Marquette University, 1965; M.A., State University of New York, 1971; Ph.D., Michigan State University, 1974.

HIETBRINK, BERNARD E., Professor of Plant Science, USDA, 1963; B.S., Purdue University, 1954; M.S., 1959; Ph.D., University of Wisconsin, 1961.

HICKS, KENNETH F., Adjunct Assistant Professor of Wildlife and Fisheries Sciences, 1985; M.S., Colorado State University, 1968; Ph.D., 1968, North Dakota State University, 1981.

HILDERBRAND, DAVID C., Associate Professor of Chemistry, 1974; B.A., University of California, 1960; Ph.D., 1963.

HOGAN, EDWARD P., Professor of Plant Science, 1980; B.A., Hastings College, 1957; Ph.D., Washington State University, 1962.


HOGAN, EDWARD P., Professor and Head of Geography, 1967; B.S., St. Louis University, 1961; A.M., 1962, Ph.D., 1969.

HOLT, MARICE L., Professor and Head of Plant Science, 1944; B.S., Purdue University, 1953; M.S., 1959; Ph.D., Iowa State University, 1962.

HONG, FELIX H., Associate Professor of Economics, 1963; B.S., University of Nanking (China) 1942; M.S., University of Wisconsin, 1953; Ph.D., 1956.

HUTCHESON, JR., HARVEY J., Professor of Biology, 1957; B.S., Oklahoma State University, 1951; M.S., 1956; Ph.D., Utah State University, 1962.

JENSEN, DARRELL M., Dean of Education, Associate Professor of Education, 1971; B.S., Northwest Missouri State, 1959; M.A., Drake University, 1965; Ph.D., University of Iowa, 1971.

JENSEN, WILLIAM P., Professor of Chemistry, 1967; B.S., University of Minnesota, 1959; Ph.D., University of Iowa, 1964.

JOHNSON, JAMES L., Associate Professor of Speech, Director of Theatre, 1973; B.S., Kansas State University, 1966; M.A., University of South Dakota, 1961; Ph.D., University of Kansas, 1973.


KANTACK, BENJAMIN H., Extension Entomologist, Professor of Plant Science, 1962; B.S., Kansas State University, 1931; M.S., Oklahoma State University, 1954; Ph.D., University of Nebraska, 1963.

KAYONGO-MALE, DIANE, Professor of Rural Sociology, 1985; B.S., State University College-Buffalo, 1979; M.A., Michigan State University, 1972; Ph.D., Michigan State University, 1974.

KENDICK, DONALD G., Professor of Plant Science, Professor of Station Biochemistry, 1959; B.S., University of Wisconsin, 1951; Ph.D., Michigan State University, 1959.

KIECKHEFER, ROBERT W., Associate Professor of Plant Science, USDA, 1963; B.S., University of Wisconsin, 1955; M.S., University of Minnesota, 1958; Ph.D., University of Minnesota, 1963.


KIRKBRIDE, CLYDE A., Professor of Veterinary Science, Associate Professor of Microbiology, 1967; D.V.M., Oklahoma State University, 1953; M.S., SDSU, 1970.

KLUCKMAN, DELores M., Associate Professor of Home Economics, 1974; B.S., SDSU, 1960; M.A., University of Minnesota, 1967; Ed.D., Oregon State University, 1970.

KNABACH, WAYNE E., Professor of Electrical Engineering, 1957, Registered Professional Engineer (So Dkota); B.S., SDSU, 1940, M.S., 1941.

KOEPSELL, PAUL L., Professor of Civil Engineering, 1967, Registered Professional Engineer (So Dkota); B.S., SDSU, 1959, M.S., University of Minnesota, 1965; Ph.D., Oklahoma State University, 1965.

LAMBERTON, CHARLES, Professor of Economics, 1974; B.A., University of Minnesota, 1962; M.A., University of Wyoming, 1970; Ph.D., Iowa State University, 1975.
LARSON, GARY E., Associate Professor of Biology, 1979; B.S., Kearney State College, 1972; Ph.D., North Dakota State University, 1979.

LEE, RICHARD W., Professor and Head of Journalism and Mass Communications, 1978; B.S., University of Illinois, 1956; M.A., Southern Illinois University, 1964; Ph.D., University of Iowa, 1972.

LEISURE, O. W., Associate Professor of Physics, 1963; B.S., SDSU, 1960; M.S., 1966.

LEMM, GARY D., Associate Professor of Plant Science, 1981; B.S., SDSU, 1974; M.S., 1975; Ph.D., University of Nebraska, 1979.

LIBAL, GEORGE W., Professor of Animal Science, 1968; B.S., University of Nebraska, 1968; M.A., 1986; Ph.D., SDSU, 1974.

LIBAL, MELISSA C., Associate Professor of Veterinary Science, 1979; B.A., Indiana University, 1970; M.S., University of California, 1974; D.V.M., 1977.


MOORE, RAYMOND A., Associate Dean of Agriculture and Biological Sciences, Director of Agricultural Experiment Station, Professor of Plant Science, 1986; B.S., SDSU, 1951, M.S., 1956; Ph.D., Purdue University, 1961.

MOUTSOGLOU, ALEXANDROS, Associate Professor of Mechanical Engineering, 1986; B.S., University of Missouri, 1973; M.S., 1974; Ph.D., 1977.

MURRA, GENE, Professor of Economics, Extension Economist, Livestock Marketing, 1970; B.S., SDSU, 1959; M.S., 1960; Ph.D., Ohio State University, 1963.


MYERS, REX C., Dean of the College of Arts and Science, 1986; B.S., University of Montana, 1967; M.A., 1970; Ph.D., Western State College, 1972.

OMODT, GARY W., Professor and Head of Pharmaceutical Chemistry, 1958; B.S., University of Minnesota, 1953; Ph.D., 1959.

OPHEIM, LEE A., Professor of Geography, 1969; B.S., University of Minnesota, 1952; M.A., St. Louis University, 1959; Ph.D., 1961.

PALMER, IVAN S., Professor of Chemistry, 1962; B.S., SDSU, 1955; M.S., 1956; Ph.D., Pennsylvania State University, 1960.

PARSONS, JOHN G., Professor and Head of Dairy Science, 1968; B.S., University of Montana, 1961; M.S., 1963; Ph.D., Pennsylvania State University, 1968.

PENG, BORIS, Professor of Microbiology, 1957; B.S., SDSU, 1951; M.S., 1953; Ph.D., University of Wisconsin, 1959.

PETERSON, CAROL J., Vice President for Academic Affairs, 1987; Professor of Nursing, 1977; Diploma, Methodist-Kahler School of Nursing, 1960; B.S., University of Minnesota, 1963; M.Ed., 1964; Ph.D., 1967.

PETERSON, EVELYN, Professor of Nursing, 1954; B.S., University of Washington, 1951; M.S., 1958; D.N.S., University of California, 1975.

PETERSON, GARY, Professor of Biology, 1973; B.S., University of Utah, 1963; M.S., Emporia Kansas State College, 1963; D.A., University of Northern Colorado, 1971.

POWERS, RICHARD W., Vice President for Administration, 1986; B.A., Allegheny College, 1958; Ph.D., Indiana University, 1969.

PRASHAR, D. PAUL, Professor of Horticulture-Forstry, 1969; B.S., Government Agricultural College (Ludhiana, India), 1952; M.S., University of Minnesota, 1955; Ph.D., University of Missouri, 1960.

PRAUHN, ALAN, Professor of Civil Engineering, 1978; B.S., Ohio State University, 1951; M.S., University of Iowa, 1963; Ph.D., University of Connecticut, 1968.


Raney, A., Leon, Dean of Libraries, Professor of Library Science, 1972; B.S., University of Central Arkansas, 1969; M.S., Louisiana State University, 1962; Ph.D., Indiana University, 1972.

RauBer, JOEL D., Assistant Professor of Physics, 1985; B.S., Emory University, 1978; Ph.D., University of North Carolina, 1985.

redHEAD, RUTH W., Professor of Foreign Languages, 1962; B.Ed., University of Vermont, 1943; M.Ed., 1954; Ph.D., University of Minnesota, 1971.

RitEves, DALE, Professor of Plant Science, 1975; B.S., Kansas State University, 1958; M.S., 1963; Ph.D., Colorado State University, 1969.

RitEves, Robert B., Professor of Geography, Courtesy Appointment, 1974; B.S., University of North Dakota, 1967; M.S., Stanford University, 1950; Ph.D., 1965.

RicHARDs, J. ERNEST, Professor of Mathematics, 1947; B.S., SDSU, 1946; M.A., University of South Dakota, 1950.

RICHARDSON, JAY R., Professor and Head of Child Development and Family Relations, 1963; B.S., Brigham Young University, 1957; M.S., 1958; Ed.D., Pennsylvania State University, 1969.


RolleC, DWayNE A., Professor and Head of Civil Engineering, 1965; Registered Professional Engineer (So.Dak., Iowa, Minn.); B.C.E., University of Minnesota, 1959; M.S., SDSU, 1966; Ph.D., Purdue University, 1971.

Romans, John, Professor and Head of Animal Science, 1981; B.S., Iowa State University, 1955; M.S., 1964; Ph.D., SDSU, 1967.

Rue, ROLLAND R., Professor of Chemistry, 1962; B.A., Macalester College, 1957; Ph.D., Iowa State University, 1962.

sander, Duane E., Professor of Electrical Engineering, 1967; Registered Professional Engineer (So.Dak., Minn.); B.S., South Dakota School of Mines and Technology, 1960; M.S., Iowa State University, 1962; Ph.D., 1964.

satterlee, James, Professor and Head of Rural Sociology, 1963; B.S., SDSU, 1962; M.S., 1963; Ph.D., 1970.

SCHINGOETHE, DAVID J., Professor of Dairy Science, 1969; B.S., University of Illinois, 1964; M.S., 1965; Ph.D., Michigan State University, 1968.

SCHLIESSMANN, MICHAEL R., Associate Professor of Speech, 1974; B.S., SDSU, 1973; M.S., 1974; Ph.D., University of Kansas, 1981.

SCHMIESING, BRIAN H., Associate Professor of Economics, 1983; B.S., North Dakota State University, 1973; M.S., University of Kentucky, 1975; Ph.D., University of Wisconsin, 1980.

SCHLINGER, ALIA., Professor of Civil Engineering, 1977; B.S., Ain Shams University, Egypt, 1967; M.S., University of Missouri, 1974; Ph.D., 1976.

SHANE, RICHARD C., Associate Professor of Economics, 1977; B.S., SDSU, 1969; M.S., University of Arizona, 1971; Ph.D., Washington State University, 1978.

SIGL, ARDEN B., Professor of Civil Engineering, 1967; B.S., SDSU, 1967; M.S., 1969; Ph.D., Northwestern University, 1977.

SIPPEL, WALDEMAR G., Associate Professor of Physics, 1953; B.A., University of South Dakota, 1947; M.A., 1950.

SLYTER, ARTHUR LOWELL, Associate Professor of Animal Science, 1970; B.S., Kansas State University, 1964; M.S., University of Nebraska, 1966; Ph.D., Kansas State University; 1969.


SPINAR, LEO H., Professor of Chemistry, 1966; B.A., University of South Dakota, 1951; M.S., University of Wisconsin, 1953; Ph.D., 1958.

STEINLEY, GARY L., Professor of Education, 1979; B.S., Black Hills State College, 1963; M.A., California State University, 1969; Ph.D., University of Utah, 1970.

STOVER, RONALD, Assistant Professor of Rural Sociology, 1983; B.A., University of Georgia at Athens, 1970; M.A., 1973; Ph.D., 1975.

SUTTER, GERALD R., Associate Professor of Plant Science, USDA, 1965; B.A., Winona State College, 1969; M.S., Iowa State University, 1965; Ph.D., 1965.

SWANSON, ROBERT, Professor in Veterinary Science, 1965; B.S., Fort Hays State College, 1953; D.V.M., Kansas State University, 1960; M.S., 1960; Ph.D., 1964.


SWORD, CHRISTOPHER P., Dean of Graduate School, Director of Research, Acting Director of Energy Research and Conservation Institute, Professor of Microbiology, 1976; B.S., Loyola University, 1951; Ph.D., University of California, 1959.

TAYLOR, DONALD, Professor of Economics, 1980; B.S., Cornell University, 1959; M.S., University of Minnesota, 1964; Ph.D., 1965.

TODD, ROBERT L., Professor and Head of Department of Microbiology, 1982; B.S., SDSU, 1965; M.S., 1967; Ph.D., University of Guelph, 1974.


TORREY, GEORGE, Assistant Professor of Dairy Science, 1982; B.S., Iowa State University, 1966; M.S., 1965; Ph.D., University of Wisconsin, 1976.

TUCKER, W. LEE, Experiment Station Statistician, Professor and Coordinator of Statistics 1963; B.S., University of Kentucky, 1952; M.S., North Carolina State University, 1957; Ph.D., 1963.

VAN OMMEREN, ROGER L., Professor of Journalism, 1974; B.A., University of South Dakota, 1961; M.S., University of Wisconsin, 1963; Ph.D., South Illinois University, 1964.

VICKERS, MARY LYNNE, Associate Professor of Veterinary Science, 1984; B.S., North Carolina State University, 1974; M.S., University of Wisconsin, 1976; Ph.D., 1981.

WADDOW, WILLIAM, Professor of Chemistry, 1963; B.S., Trinity College, 1960; M.S., 1961; Ph.D., Pennsylvania State University, 1966.


WALGENBACH, DAVID D., Professor of Plant Science, 1974; B.S., Iowa State University, 1959; M.S., University of Wisconsin, 1962; Ph.D., 1965.


WEST, THOMAS P., Associate Professor of Chemistry, 1985; B.S., Purdue University, 1974; M.S., Texas A&M University, 1976; Ph.D., 1980.

WESTBY, CARL A., Professor of Microbiology, 1973; B.A., University of California, 1958; Ph.D., 1958.

WESTFALL, HELEN N., Assistant Professor of Microbiology, 1985; B.S., West Virginia University, 1971; M.S., Old Dominion University, 1974; Ph.D., 1980.

WESTWICK, CARMEN, Dean of the College of Nursing; Professor of Nursing, 1988; B.S.N., State University of Iowa, 1958; M.S., University of Colorado, 1963; Ph.D., University of Denver, 1972.

WHALEN, RICHARD H., Associate Professor of Biology, 1967; B.S., College of St. Thomas, 1954; M.S., University of Illinois, 1956; Ph.D., Purdue University, 1965.

WHITE, EVERETT M., Professor of Plant Science, 1954; B.S., Iowa State University, 1948; M.S., 1950; Ph.D., 1953.

WIDVEY, HAROLD, Professor of Speech, Director of Forensics, 1972; B.S., Ed., Northern State College, 1957; M.S. Ed., 1961; Ph.D., University of Nebraska, 1971.


WILLIAMS, LOUIS P., Professor of English, 1965; B.A., University of Texas, 1960; M.A., 1965; Ph.D., University of Minnesota, 1976.

WITHRINGTON, PAUL, Professor of English, 1970; B.A., Baylor University, 1954; M.A., University of Texas, 1960; Ph.D., 1964.

WOODARD, CHARLES, Professor of English, 1975; B.S., Dakota State College, 1964; M.A., University of Nebraska, 1967; Ph.D., University of Oklahoma, 1975.

YARBROUGH, JERRY W., Professor of English, Director of University Honors Program, 1968; B.A., Abilene Christian University, 1960; M.A., University of Texas, 1962; Ph.D., 1968.

YOCOM, KENNETH L., Professor and Head of Mathematics, 1962; B.S., South Dakota School of Mines and Technology, 1960; M.S., University of Wyoming, 1962; Ph.D., 1972.

ZEMAN, DAVID H., Assistant Professor of Animal Disease & Diagnostic Lab, 1986; B.S., North Dakota State University, 1976; D.V.M., Oklahoma State University, 1980; Ph.D., Louisiana State University, 1986.

ZIVANOVIĆ, JUDITH, Professor and Head of Speech, 1969; B.A., University of Evansville, 1963; M.A., University of Wisconsin, 1967; Ph.D., 1968.

BAILEY, JR., HAROLD, Vice President for Academic Affairs Emeritus, Professor Pharmacy, 1951; B.S., Massachusetts College of Pharmacy, 1944; M.S., 1948; Ph.D., Purdue University, 1951.

BARNES, ALLEN R., Regental Professor Foreign Languages/Dean Emeritus, College of Arts and Sciences, 1961; A.B., Hastings College, 1948; M.A., University of Idaho, 1951; Ph.D., University of Madrid, 1953; Certificate University of Vera Cruz (Mexico), 1955.

BLAZLEY, CHARLES H., Professor Emeritus of Health Science, Professor of Health, Physical Education and Recreation, 1966; B.S., University of State of New York (Brockport), 1959; M.S., 1960; Ed.D., University of Oregon, 1971.

BRACE, L., Associate Dean Emeritus of Agriculture and Biological Sciences, Director of Resident Instruction, Professor Emeritus of Plant Science, 1950; B.S., University of Minnesota, 1946; Ph.D., 1950.

BRANDWEIN, BERNARD J., Professor Chemistry, 1956; B.S., Purdue University, 1948; M.S., 1951; Ph.D., 1953.

BRIGGS, HILTON M., President Emeritus, Distinguished Professor of Agriculture, 1958; B.S., Iowa State University, 1933; M.A., North Dakota State University, 1935; Ph.D., Cornell University, 1938; D.Sc., (Honorary) North Dakota State University, 1963; Doctor of Higher Education Administration (Honorary), University of South Dakota/Vermillion, 1974.

BUSCH, LEON F., Associate Professor Emeritus of Animal Science, 1954; B.S., University of Kentucky, 1950; M.S., 1951; Ph.D., Cornell University, 1954.

CARLSON, WENDELL, Professor of Animal Science Emeritus, Leader of Poultry Research and Development Section, 1948; B.S., Colorado State University, 1942; M.S., Cornell University, 1948; Ph.D., 1949.

CASBON, PAUL, Professor Emeritus of Plant Science, 1948; B.S., Northwest Missouri State University, 1941; M.S., Iowa State University, 1947.

CRABBS, JERALDINE, Associate Professor Emeritus of Health, Physical Education and Recreation, 1953; B.A., University of Northern Iowa, 1933; M.S., University of Colorado, 1958.

DERSCHEID, LYLE L., Emeritus Extension Agronomist and Professor Emeritus of Plant Science, 1946; B.S., SDSU, 1943; M.S., 1948; Ph.D., Iowa State University, 1951.

DIMIT, ROBERT M., Professor Emeritus of Rural Sociology, 1952; B.A., Pennsylvania State University, 1948; M.S., 1949; Ph.D., Iowa State University, 1954.

DINKEL, C. A., Professor Emeritus of Animal Science, 1951; B.S., Iowa State University, 1948; M.S., SDSU, 1949; Ph.D., Iowa State University, 1953.

DRACY, ARTHUR E., Professor Emeritus of Biological Engineering, 1948; B.S., University of Minnesota, 1943; M.S., 1946; Ph.D., 1949.

EMBRY, LAWRENCE B., Professor Emeritus of Animal Science, 1950, 1960; B.S., University of Kentucky, 1942; M.S., Cornell University, 1948; Ph.D., 1950.

ENGEBRETSON, HELEN, Professor Emeritus of Mathematics, 1945; B.A., St. Olaf College, 1944; M.A., University of Minnesota, 1945.


GARDNER, WAYNE S., Professor Emeritus of Plant Science, 1967; B.S., Utah State University, 1950; M.S., 1951; Ph.D., University of California, 1967.

GILBERT, ARDICE, Dean Emeritus of Home Economics, Professor of Home Economics Education, 1966; B.S., SDSU, 1959; M.S., Iowa State University, 1966; Ph.D., 1974.

GROSS, GUILFORD C., Professor Emeritus of Pharmacy, 1940; B.S., SDSU, 1940; M.A., 1940; Ph.D., University of Florida, 1952.

HETFINTINE, REX D., Associate Dean Emeritus of Graduate School, Professor Emeritus of Economics, 1960; B.S., Iowa State University, 1932; M.S., 1947; Ph.D., University of California, 1958.

HENDRICKSON, JOHN F., Professor of Political Science, 1954; B.A., University of Iowa, 1947; M.A., University of Minnesota, 1949; Ph.D., University of Iowa, 1952.

HOOGESTRAAT, WAYNE E., Professor of Speech, 1960; B.A., Sioux Falls College, 1951; M.A., University of South Dakota, 1953; Ed.D., Pennsylvania State University, 1963.


HUGHENS, ERVIN, Professor Emeritus of Biology, 1952; B.S., Baylor University, 1943; M.S., Texas A&M University, 1949; Ph.D., University of Illinois, 1952.

JOHNSON, ELMER R., Professor Emeritus of Chemistry, 1946; B.S., SDSU, 1933; Ph.D., University of Wisconsin, 1940.

KINCH, RAYMOND, Professor Emeritus of Plant Science, M.S., 1936; University of Nebraska.

KLC, HARLAN L., Professor Emeritus of Chemistry, 1947; B.S., SDSU, 1930; M.S., University of South Dakota, 1944; Ph.D., University of Wisconsin, 1949.

KOHLMEYER, WILLIAM, Professor Emeritus of Animal Science and Economics, 1944; B.S., Iowa State University, 1928; M.S., Purdue University, 1938.

KRAZLER, ALBERT W., Professor Emeritus of Mathematics, 1943; B.S., North Dakota State University, 1937; M.S., University of Minnesota, 1950.

LAIRD, RUTH, Associate Professor Emeritus of Journalism, 1966; B.A., Cornell College, 1935; M.A., University of Iowa, 1966.

LEWIS, JAMES K., Professor Emeritus of Animal Science, 1950; B.S., Colorado State University, 1948; M.S., Montana State University, 1950.

LINDER, RAYMOND L., Professor Emeritus of Wildlife and Fisheries Sciences, B.S., University of Nebraska, 1953; M.S., Iowa State University, 1955; Ph.D., University of Nebraska, 1964.

LUND, LILLIAN O., Professor Emeritus of Textiles, Clothing and Interior Design, 1944; B.A., St. Olaf College, 1936; M.S., University of Minnesota, 1944.


LYLE, MARY FRANCES, State Home Demonstration Leader Emeritus, Ph.D., University of Wisconsin, 1958.

MANKIN, CLEON J., Professor Emeritus of Plant Science, 1953; B.S., New Mexico Highlands University, 1938; M.S., New Mexico State University, 1950; Ph.D., Washington State College, 1953. Ph.D., Washington State College, 1953.

MARKEN, JAMES W., Professor of English, 1967; B.A., University of Akron, 1947; M.A., Indiana University, 1950; Ph.D., 1953.

MARKLAND, BEN C., Professor Emeritus of Journalism, Ph.D., University of Michigan, 1955.

MCCARTY, J. WALTERS, Professor of Animal Science, Director of International Programs, 1948; B.S., SDSU, 1947; M.S., University of Minnesota, 1948.

MILLER, BRUCE L., Professor of Physics, 1955; B.S., SDSU, 1948; M.S., University of Kansas, 1951; Ph.D., 1953.

MINYARD, JOSEPH A., Extension Livestock Specialist, Professor Emeritus of Animal Science, 1955; B.S., West Texas State University, 1951; M.S., SDSU, 1959.


MUSSON, ALFRED L., Professor Emeritus of Animal Science, 1952; B.S., University of Connecticut, 1933; M.S., Iowa State University, 1934; Ph.D., 1951.

MYERS, MAX, Professor Emeritus of Economics, 1946; B.S., SDSU, 1938; M.S., Cornell University, 1942; Ph.D., 1950.

OLSON, OSCAR E., Professor Emeritus of Chemistry, 1937; B.S., SDSU, 1936; M.S., 1937; Ph.D., University of Wisconsin, 1948.

PEARSON, DAVID F., Vice President for Administration Emeritus, Professor Emeritus of Economics, 1957; B.S., SDSU, 1939; J.D., University of South Dakota, 1959.

PETERSON, RONALD M., Professor of Horticulture-Forestry, 1953; B.S., Colorado State University, 1947; M.S., University of California, 1949; Ph.D., University of Minnesota, 1953.

REDMAN, KENNETH, Professor Emeritus of Pharmacognosy, 1951; B.S., University of Washington, 1930; Ph.D., University of Wisconsin, 1941.

ROBINSON, GLENN, Professor Emeritus of HPER, 1957; B.A, Monmouth College, 1932; M.A., Columbia University, 1942.

ROSENBERGER, ALICE, Professor Emeritus of Home Economics, 1928; B.A., Iowa State University, 1916; M.S. 1928.
SANDFORT, JOHN F., Professor Emeritus of Mechanical Engineering, 1958; B.M.E., Ohio State University, 1933; B.S., 1934; M.S., Iowa State University, 1948.

SAUER, HOWARD M., Professor Emeritus of Rural Sociology, 1938; B.A., Des Moines University, 1929; M.A., Iowa State University, 1931.


SEHENIUK, GEORGE, Professor Emeritus of Plant Science and Microbiology, 1952; B.S., University of Alberta, 1932; M.S., 1934; Ph.D., Iowa State University, 1938.

SHANK, D. BOYD, Professor Emeritus of Plant Science, 1946; B.S., University of Nebraska, 1935; Ph.D., Iowa State University, 1941.

SHUBECK, FRED E., Professor Emeritus of Plant Science, 1951; B.A., SDSU, 1940; Ph.D., University of Minnesota, 1951.


SOGN, ARTHUR, Associate Professor Emeritus of Economics, 1968; B.S., SDSU, 1948; M.S., 1959.

SPURGEON, KENNETH R., Professor Emeritus of Dairy Science, 1958; B.S., Purdue University, 1942; M.S., 1948; Ph.D., University of Wisconsin, 1951.

STINE, LAWRENCE C., Professor Emeritus of Speech, Director Emeritus of Theatre, Associate Dean Emeritus of Arts and Sciences, 1952; A.B., Butler University, 1947; M.A., University of Iowa, 1951; Ph.D., 1962.

STOFLET, DOROTHY, Professor Emeritus of Textiles, Clothing and Interior Design, 1953; B.A., Coe College, 1933; M.S., Iowa State University, 1948.

STORRY, JUNIS O., Amdahl Distinguished Professor of Engineering, Director, Engineering Experiment Station, Director, Engineering Extension, 1946; B.S., SDSU, 1942; Ph.D., Iowa State University, 1967.

SUNDET, STANLEY A., Director Emeritus of Placement, Professor Emeritus of Education, 1946; B.S., SDSU, 1933; M.S., Iowa State University, 1939; Ph.D., University of Minnesota, 1955.

TAYLOR, CHARLES A., Professor Emeritus of Botany, 1949; B.S., Cornell University 1935; M.S., 1939.

THOMPSON, JOHN E., Professor Emeritus of Economics, 1952; B.S., University of South Dakota, 1950; M.S., South Dakota State University, 1953; Ph.D., University of Wisconsin, 1960.

TRUMP, ALFRED G., Professor Emeritus of Library Science, A.B., University of Michigan, 1933; A.M., 1938.

VOELKER, HOWARD H., Professor of Dairy Science, 1954; B.S., Iowa State University, 1946; M.S., Kansas State University, 1949; Ph.D., Iowa State University, 1955.

WAHLSTROM, RICHARD C., Professor of Animal Science, 1952; B.S., University of Nebraska, 1948; M.S., University of Illinois, 1950; Ph.D., 1952.

WALSTROM, ROBERT J., Professor of Plant Science, 1955; B.S., University of Nebraska, 1947; M.S., 1949; Ph.D., Iowa State University, 1955.

WALZ, JEAN D., Professor Emeritus of English, 1960; B.S., Northern State College, 1933; M.A., University of South Dakota, 1939.

WEBSTER, VICTOR., Professor Emeritus of Chemistry, 1936; B.A., Iowa State University, 1930; M.S., 1931; Ph.D., 1933.

WELLS, DARRELL G., Professor Plant Science, 1962; B.S., SDSU, 1941; M.S., Washington State University, 1943; Ph.D., Iowa State University, 1949.

WENTZ, WOODROW F., Associate Professor Emeritus of Journalism, Supervisor Emeritus of Instructional TV, 1938; B.S., SDSU, 1938; M.A., University of Oklahoma, 1950.

WESTIN, FREDERICK C., Head of Soil Sciences, Remote Sensing Institute, Professor of Plant Science, 1947; B.S., University of Wisconsin, 1941; M.S., 1947; Ph.D., 1952.

WHITEHEAD, EUGENE I., Professor Emeritus of Station Biochemistry, 1941; B.S., SDSU, 1939; M.S., 1941.

WIERMA, JOHN, Professor Emeritus of Agricultural Engineering, Director of Water Resources Institute, 1943; Registered Engineer (South Dakota); B.S., SDSU, 1943; M.S., 1950; Ph.D., University of California, 1970.

WILLIAMS, PERRY W., Professor Emeritus of Physics, 1936; B.A., Dakota Wesleyan University, 1936; M.S., SDSU, 1940.

WILLIAMSON, WARREN, Professor of Health, Physical Education, and Recreation, Coordinator of Intramurals and Recreation, 1956; B.S., SDSU, 1951; M.S., 1954.

WILLS, RENA, Professor Emeritus of Nutrition and Food Science, 1952; B.S., Iowa State University, 1940; M.S., 1946.
# Application for Admission

**Graduate School, Box 2201, South Dakota State University, Brookings, South Dakota 57007**

1. **Name**
   - (Last)
   - (Other or Former Name, If any)
   - (First)
   - (Middle)

2. **Current Mailing Address**
   - Street, RFD, or Box
   - City
   - State or Country
   - Zip Code
   - Phone

3. **Permanent Mailing Address**

4. **Social Security No.**

5. **Date of Birth**
   - Day
   - Month
   - Year

5a. **Place of Birth**
   - City
   - State or Country

6. **Citizen of what country**

7. **Legal Resident of**
   - County
   - State

8. **Name of person to be notified in case of emergency**
   - Address
   - Relationship
   - Phone

9. **Degree received (if none, state when bachelor's degree will be earned and remaining requirements).**
   - Baccalaureate degree or equivalent from an accredited institution is a prerequisite for pursuing graduate work. Official transcripts of ALL academic work must be submitted.

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<tr>
<th>Institution</th>
<th>Address</th>
<th>Degrees earned (if any)</th>
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10. **Standardized admissions tests taken (GRE, MAT, TOEFL). TOEFL required for international students**

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11. **Degree sought (check one)**
   - □ None
   - □ Master of Arts
   - □ Master of Science
   - □ Master of Science Teaching
   - □ Master of Education
   - □ Doctor of Philosophy

12. **Major department**
   - Area of interest

13. **Term graduate work will begin:**
   - □ Fall
   - □ Spring
   - □ Summer
   - Year

14. **Indicate where you will enroll initially:**
   - □ On campus
   - □ Lifelong Learning & Outreach

15. **Required for Civil Rights/Affirmative Action Reporting:**

   - Sex: □ Male, □ Female
   - Ethnic Group: □ White, □ Black, □ Asian, □ American Indian, □ Hispanic
   - Citizenship: □ Native-born, □ Naturalized, □ Alien, □ Resident Alien
   - Visa Status
   - Handicapped: □ Audio, □ Visually, □ Learning Disabled, □ Mobility—Ambulatory, □ Mobility—Wheel Chair

16. **I hereby certify that I am registered with the Selective Service pursuant to the Military Selective Service Act, 50 USC 453, as amended and in effect on January 1, 1988, or for a reason specified in 50 USC 453, I am not required to be registered.**

   All answers I have given on this application are complete and accurate to the best of my knowledge. If admitted, I agree to observe the rules and regulations of South Dakota State University and to pay all fees and charges assessed thereunder.

   Signature of Applicant ____________________________ Date ________ 

   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 Equal Opportunity/Affirmative Action Employer (Female/Male).
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