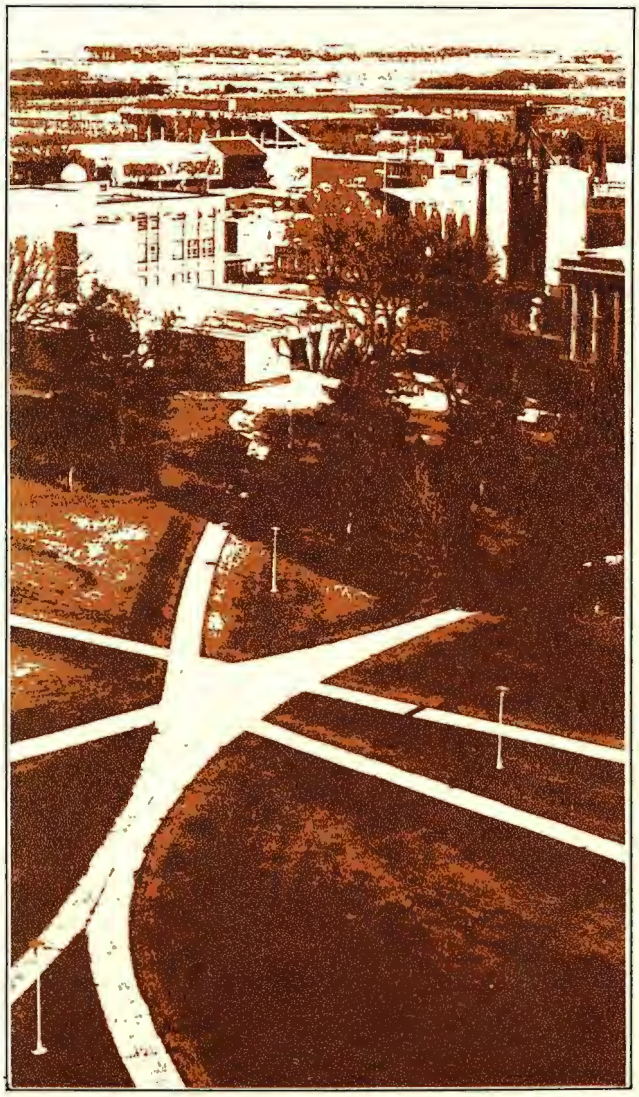

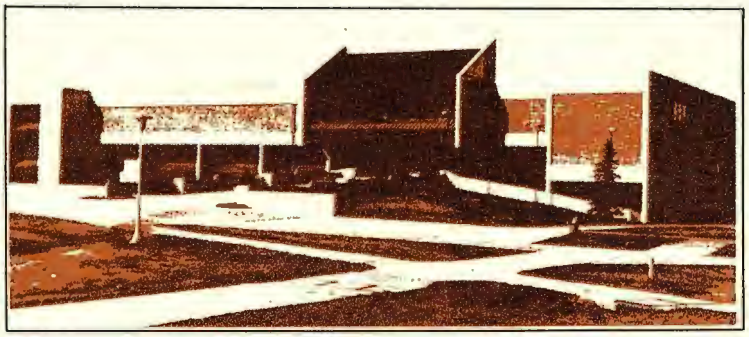

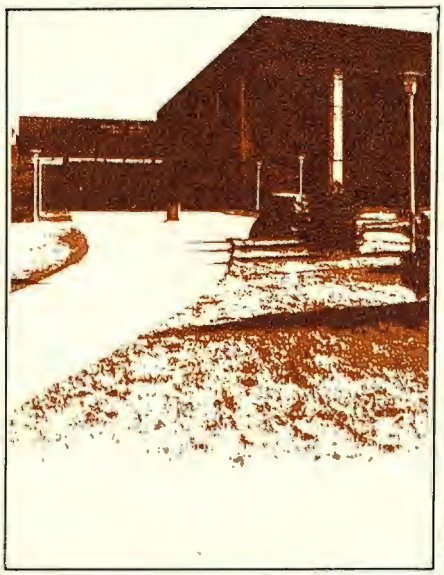

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raduate Study

South Dakota State University Bulletin

SOUTH DAKOTA STATE UNIVERSITY BULLETIN (USPS 474-180)

Graduate School edition
Volume 72, Number 2, December 1981

Published quarterly by South Dakota State University
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Due to conditions which may arise beyond the control of South Dakota State University, statements in this catalog may be changed during the 1981-82 and 1982-83 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 unforseen 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).

6M—7-81-31.

APPLICATION FOR ADMISSION (see instructions before completing)

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 (if different from 2) _____

4. Date of Birth _____ Month Day Year 4a. Place of Birth _____ City State or Country

5. Social Security No. _____ 6. Citizen of what country _____ 7. ☐ U.S. Veteran

8. Name of person to be notified in case of emergency _____

_____ Relationship Address

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.)

All institutions attended and addresses	Degrees earned (if any)	Dates attended

10. Standardized admissions tests taken (GRE, MAT, TOEFL). TOEFL required for international students, see instruction sheet.

Standardized admission test	Latest date taken	Score

11. Degree sought (check one) ☐ None ☐ Master of Arts ☐ Master of Science ☐ Master of Education (☐ Teaching ☐ Administration ☐ Guidance & Counseling) ☐ 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 ☐ Continuing Education

Signature of Applicant _____ Date _____

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Information requested in this section will **only** be used for statistical and/or affirmative action purposes and will be treated as confidential.

This section will be detached before your application is rated.

Name _____

SEX		ETHNIC GROUP/RACE*					CITIZENSHIP			
FEMALE	MALE	WHITE	BLACK	ASIAN	AM IND	HISPANIC	NATIVE	NAT'LED	ALIEN	RESIDENT ALIEN

* "Asian" includes "Pacific Islanders" and peoples of the Indian subcontinent and, "American Indian" includes "Alaskan native"

1981-1983 UNIVERSITY CALENDAR

1981 First Semester

August 24-25, Monday, Tuesday ..... Registration
August 26, Wednesday ..... Classes begin
September 7, Monday ..... Labor Day
September 9, Wednesday ..... Last day to add or drop a course and adjust final fees
October 5, Monday ..... Last day to submit graduation card for fall 1981 graduates
October 12, Monday ..... Pioneers' Day—a holiday
October 13, Tuesday ..... Monday classes
November 9, Monday ..... Last day a course may be dropped
November 11, Wednesday ..... Veterans' Day
November 18, Wednesday ..... Thesis due, Graduate Office
November 25, Wednesday ..... Classes close at 5:20 p.m. Thanksgiving recess
November 30, Monday ..... Classes resume
December 1, Tuesday ..... Last day for final orals
December 7, Monday ..... Corrected theses due, Graduate Office
December 12, Saturday ..... Graduation, 10:00 a.m.
December 14-18, Monday-Friday ..... Semester exams
December 23, Wednesday ..... Grades due in Registrar's Office by 5:00 p.m.

1982 Second Semester

January 11-12, Monday, Tuesday ..... Registration
January 13, Wednesday ..... Classes begin
January 26, Tuesday ..... Last day to add or drop a course and adjust final fees
February 15, Monday ..... Presidents' Day—a holiday
February 17, Wednesday ..... Monday classes
February 26, Friday ..... Last day to submit a graduation card for spring 1982 graduates
March 5, Friday ..... Classes close 5:20 p.m.—Spring break
March 15, Monday ..... Classes resume
March 30, Tuesday ..... Last day a course may be dropped
April 8, Thursday ..... Classes close 5:20 p.m.—Easter recess
April 13, Tuesday ..... Classes resume
April 15, Thursday ..... Monday classes
April 15, Thursday ..... Thesis due, Graduate Office
April 27, Tuesday ..... Last day for final orals
May 3, Monday ..... Corrected theses due, Graduate Office
May 8, Saturday ..... 96th Annual Commencement, 10:00 a.m.
May 10-14, Monday-Friday ..... Semester exams
May 19, Wednesday ..... Grades due in Registrar's Office, 5:00 p.m.

1982 Summer Session

June 7, Monday-July 30, Friday ..... Eight-week session
June 7, Monday ..... Registration
June 8, Tuesday ..... Classes begin
June 11, Friday ..... Graduation cards due for Graduate Students graduating Summer 1982
July 5, Monday ..... Holiday
July 7, Wednesday ..... Thesis due, Graduate Office
July 19, Monday ..... Last day for final orals
July 26, Monday ..... Corrected theses due, Graduate Office
July 30, Friday ..... Classes close at 4:20 p.m.

1982 First Semester

August 23-24, Monday, Tuesday ..... Registration
August 25, Wednesday ..... Classes begin
September 6, Monday ..... Labor Day
September 8, Wednesday ..... Last day to add or drop a course and adjust final fees
October 4, Monday ..... Last day to submit graduation card for fall 1982 graduates
October 11, Monday ..... Pioneers' Day—a holiday
November 8, Monday ..... Last day a course may be dropped
November 11, Thursday ..... Veterans' Day
November 17, Wednesday ..... Thesis due, Graduate Office
November 24, Wednesday ..... Classes close at 5:20 p.m. Thanksgiving recess
November 29, Monday ..... Classes resume
November 30, Tuesday ..... Last day for final orals
December 6, Monday ..... Corrected theses due, Graduate Office
December 11, Saturday ..... Graduation, 10:00 a.m.
December 13-17, Monday-Friday ..... Semester exams
December 22, Wednesday ..... Grades due in Registrar's Office by 5:00 p.m.

1983 Second Semester

January 10-11, Monday, Tuesday ..... Registration
January 12, Wednesday ..... Classes begin
January 25, Tuesday ..... Last day to add or drop a course and adjust final fees
February 21, Monday ..... Presidents' Day—a holiday
February 25, Friday ..... Last day to submit a graduation card for spring 1983 graduates
March 4, Friday ..... Classes close 5:20 p.m.—Spring break
March 14, Monday ..... Classes resume
March 29, Tuesday ..... Last day a course may be dropped
March 31, Thursday ..... Classes close 5:20 p.m.—Easter recess
April 5, Tuesday ..... Classes resume
April 14, Thursday ..... Thesis due, Graduate Office
April 26, Tuesday ..... Last day for final orals
May 2, Monday ..... Corrected theses due, Graduate Office
May 7, Saturday ..... 97th Annual Commencement, 10:00 a.m.
May 9-13, Monday-Friday ..... Semester exams
May 18, Wednesday ..... Grades due in Registrar's Office, 5:00 p.m.

1983 Summer Session

June 6, Monday-July 29, Friday ..... Eight-week session
June 6, Monday ..... Registration
June 8, Wednesday ..... Classes begin
June 10, Friday ..... Graduation cards due for Graduate Students graduating Summer 1983
July 4, Monday ..... Holiday
July 6, Wednesday ..... Thesis due, Graduate Office
July 18, Monday ..... Last day for final orals
July 25, Monday ..... Corrected theses due, Graduate Office
July 29, Friday ..... Classes close at 4:20 p.m.

BOARD OF REGENTS

HONORABLE WILLIAM J. SRSTKA, JR. ..... Pierre
(Term Expires 1985)
HONORABLE BONNIE SIVAGE ..... Hayes
(Term Expires January 1, 1983)
HONORABLE MARJORIE MORTIMER ..... Belle Fourche
(Term Expires January 1, 1987)
HONORABLE FREDRIC R. COZAD ..... Martin
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(Term Expires January 1, 1985)
HONORABLE BETTY REDFIELD ..... Hot Springs
(Term Expires January 1, 1983)
HONORABLE HOWARD LEVI ..... Mina Lake
(Term Expires January 1, 1985)
HONORABLE HOWARD OWENS ..... Sturgis
(Term Expires January 1, 1987)
HONORABLE DENNIS McFARLAND ..... Sioux Falls
(Term Expires January 1, 1987)
HONORABLE JEFF HEIMSTRA ..... Student Regent
HONORABLE GORDON FOSTER ..... Pierre
Executive Director of Higher Education

GRADUATE COUNCIL

CHRISTOPHER P. SWORD, Dean of Graduate School, Chairman
EDNA P. ANDERSON, Professor of Home Economics Education, (Social Sciences & Humanities) Term expires 1983
W. EUGENE ARNOLD, Professor of Plant Science, (Biological Sciences) Term expires 1982
ROBERT FINCH, Associate Professor of Electrical Engineering, (Physical Sciences) Term expires 1984
JOHN A. GROVE, Professor of Chemistry, (Physical Sciences) Term expires 1982
CLARK HANSON, Associate Professor of Education, (Education) Term expires 1984
WAYNE HOOGESTRAAT, Professor of Speech, (Social Sciences and Humanities) Term expires 1983
BURRUS McDANIEL, Professor of Plant Science, (Biological Sciences) Term expires 1983
A. LEON RANEY, Dean of Libraries, Professor of Library Science, Ex Officio

OFFICERS OF ADMINISTRATION

SHERWOOD O. BERG, President; Ph.D., University of Minnesota, 1951.
HAROLD S. BAILEY, Jr., Vice President for Academic Affairs; Ph.D., Purdue University, 1951.
GARY R. THIBODEAU, Vice President for Administration; Ph.D., South Dakota State University, 1971.
CHRISTOPHER P. SWORD, Dean, Graduate School and Director of Research, Professor of Microbiology, Ph.D., University of California (Los Angeles), 1959.
ALLEN R. BARNES, Dean, College of Arts and Science, Professor of Foreign Languages; Ph.D., University of Madrid (Spain), 1953.
DELWYN DEARBORN, Dean, College of Agriculture and Biological Sciences, Professor of Animal Science, Ph.D., University of Nebraska, 1971.
DARRELL JENSEN, Dean, Division of Education, Associate Professor of Education; Ph.D., University of Iowa, 1971.
ARDYCE GILBERT, Dean, College of Home Economics, Professor of Home Economics Education; Ph.D., Iowa State University, 1974.
CAROL J. PETERSON, Dean, College of Nursing, Professor of Nursing, Ph.D., University of Minnesota, 1969.
RAYMOND E. HOPPONEN, Dean, College of Pharmacy, Professor of Pharmacy; Ph.D., University of Minnesota, 1958.
JUNIS O. STORRY, Dean, College of Engineering, Director of Engineering Experiment Station, Professor of Electrical Engineering; Ph.D., Iowa State University 1967.

GENERAL INFORMATION

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

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

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

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

The Graduate School

ADMISSION TO THE GRADUATE SCHOOL

Students taking work beyond the Bachelor's degree, whether or not they intend to work for an advanced degree, may be classified as graduate students. Before enrolling in any graduate course, they must be admitted to the Graduate School.

To apply, a form supplied by the Graduate Office must be submitted to that office 15 days prior to the opening of the term. With the application, the following must be provided:

1. One official transcript of undergraduate coursework. This applied to graduates of South Dakota State as well as to graduates of other institutions. However, South Dakota State graduates who do not intend to work toward an advanced degree need not furnish a transcript. If some graduate work has been taken at another institution, one official transcript must be supplied for this also, even though the applicant may not wish to apply this work toward a degree here. For those making application prior to obtaining their Bachelor's degree, an incomplete transcript must be filed with the application. A complete transcript must then be filed during the first term in which the student takes graduate work. (Foreign students must submit a complete transcript at time of application.)
2. An application fee of $15 except by former South Dakota State University, University of South Dakota, Dakota State College, Northern State College, Black Hills State College, or South Dakota School of Mines and Technology students.
3. Two letters of recommendation from persons acquainted with the academic ability of the applicant. The Education Division requests that the two letters of recommendation come from persons having knowledge of the professional competency of the individual. These letters on forms supplied by the Graduate Office should be sent directly to the Graduate Office by the person writing them.
4. Students from foreign countries must also send the following with their applications:
   a. A statement as to whether financial assistance will be required from this institution.
   b. The results of the Test of English as a Foreign Language (TOEFL).

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

After an application for admission and supporting documents are received, they are reviewed by the department concerned. Using the recommendations from the department, the Dean of the Graduate School acts on the application. He then notifies the applicant, the department or committee concerned, the Dean of Student Services, and the Office of the Registrar. After admittance, a physical examination report is required of all students except those enrolled as undergraduates at South Dakota State University during the previous year.

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

Transient Application

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

Unconditional Admission

An applicant may be admitted without condition if a Bachelor's degree has been earned, all undergraduate prerequisites satisfactorily completed for major and minor fields of study, and 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 a 3.0 grade point average may also be considered for unconditional admission if other aspects of their academic record indicate superior performance and potential.

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

Conditional Admission

Conditional admission may be granted if:

1. The applicant meets the requirements for unconditional admission for the last 3 semesters but has not completed the last semester of undergraduate study. Admission is provisional until the Bachelor's degree is granted.
2. The applicant lacks prerequisite undergraduate courses specified by the major department. Admission is conditional until these courses have been completed without graduate credit and to the satisfaction of the department.
3. The applicant has a low grade point average, between 2.5 and 3.0 for his junior-senior years.

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

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

Nondegree Admission

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

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

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

Change of Status

Students admitted provisionally or as Special students (nondegree) may request a change of status after satisfactorily completing 10 hours or more of graduate work. 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.

Readmission

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

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

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

Graduate Record Examination

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

Graduate Credit for Seniors

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

Graduate Study by University Staff

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

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

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

Departmental Requirements

Individual departments may impose additional admission requirements. Inquire of the department in which you are interested concerning such requirements.

Post-Doctoral Study

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

REGISTRATION

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

Normal and Maximum Credit Loads

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

The maximum credit load for graduate assistants is as follows:

	Maximum credits student may carry during the:	
	Academic Year	Summer Session
One-fourth time assistant	30	5
One-half time assistant	22	3
Three-fourths time assistant ..	15	3

In calculating credit loads, audit courses are included at full value. Undergraduate courses are also included at full value.

TUITION AND FEES*

Academic Year

Application fee (new students only)	$15.00
†Tuition per credit hour	$24.48
Undergraduate level courses (resident)	
†Tuition per credit hour	$54.00
Undergraduate level courses (non-resident)	
†Tuition per credit hour	$36.75
Graduate level courses (resident)	
†Tuition per credit hour	$69.30
Graduate level courses (non-resident)	
University Fee-per credit	$ 7.80
to a maximum of $93.60	
General University fee waived for faculty, staff but not Graduate Assistants	
General Instruction Fee, per credit	$ .75

Fees for Auditing Courses

Regular tuition per credit will be charged for auditing a course. Tuition waived for faculty, staff and graduate assistants. Registration as an auditor requires the consent of the department concerned. Such registration carries permission to listen only; no examination or credit is given. Registration for audit is by add slip after registration day.

General Deposit

All students enrolled in 9 or more credits or living in a residence hall must pay a $35.00 deposit. Charges for laboratory breakage, damage to equipment or facilities, library and vehicle fines or special service charges may be charged against this deposit; balance is refundable. A minimum balance of $15.00 must be maintained at all times. The balance at the beginning of any semester must be $35.00 and proper charges will be assessed at final fee payment to reinstate the balance.

Summer Sessions

See Summer Session catalog for tuition and fees.

Thesis Fees

Before the thesis is presented to the Graduate Office in final form, a fee of $9.30 is paid at the Library to cover the cost of binding two copies.

Doctor of Philosophy students will pay a $50 fee to the Graduate School when submitting two final copies of the dissertation. This will cover the cost of microfilming and binding the dissertation, and publishing the abstract in "Microfilm Abstracts." This does not include Registration of Copyright, reprint costs or other incidental fees.

*Subject to change by action of Board of Regents

†Graduate Assistants, Fellows and Trainees on contract with the University pay one-third the resident tuition per credit. Students who are 65 or older pay one-fourth tuition.

Registration for Thesis 790, Thesis Sustaining

All graduate students who have completed the thesis credits specified on their Plans of Study are required to register and pay for 1 credit Thesis 790, Thesis Sustaining, each semester (including Summer) until they complete their thesis.

FINANCIAL AND OTHER INFORMATION

Fellowships and Assistantships

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

Obligation Incurred in Accepting an Assistantship

The Graduate School of South Dakota State, as a member of the Council of Graduate Schools in the United States, subscribes and adheres to the following resolution regarding scholars, fellows, trainees, and graduate assistants: In every case in which a graduate scholarship, fellowship, traineeship or graduate assistantship for the next academic year is offered to an actual prospective graduate student, the student, if he (she) indicates his (her) acceptance before April 15, will have complete freedom through April 15 to submit in writing a resignation of his (her) appointment in order to accept another scholarship, fellowship, traineeship, or graduate assistantship. However, an acceptance given or left in force after April 15 commits him (her) not to accept another appointment without first obtaining formal release for the purpose.

Housing for Graduate Students

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

Living Costs

Living costs, including tuition and fees, for the single resident graduate student are estimated to be approximately $5,000 per academic year. Travel costs are not included.

Graduate Courses During Summer Sessions

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

Credit Restriction for Workshops

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

Credit Restriction for Problems Courses

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

Correspondence Courses

Correspondence courses are not given at the graduate level at this institution. Transfer credit is not allowed for correspondence courses taken elsewhere.

Grades for Thesis and Seminars

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

Filing a Graduation Card

The student must file a graduation card with the Graduate Office not later than four weeks after registration for the term in which he/she expects to receive the advanced degree. A $7 graduation fee is to be paid at the Cashier's Office prior to filing the graduation card. Failure to file this card will result in a delay in graduation.

Scholastic Requirements

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

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

Cap, Gown, and Hood Rental

Caps, gowns, and hoods for Commencement may be rented from the Student Association Bookstore in the Student Union.

Attendance at Commencement

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

Extension and Evening Students

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

Furthermore, students cannot complete all requirements for a degree with Extension and non-resident off-campus evening classes. A minimum of one semester or two summer sessions (12 credits) of full-time on-campus work will be required.

Outdating of course Work

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

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

Transfer of Credits

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

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

Extension courses are not ordinarily transferable.

Library Facilities

H.M. Briggs Library is located adjacent to the new University Student Union on the north side of the campus. Opened in 1977, it features open stacks for all books, journals, microform texts, pamphlets, and reference materials except rare books. The library provides seating for 1,000 readers, including thirty-six faculty and graduate carrels, and 400 individual desks. Holdings number more than 320,000 bound volumes in the general collection, more than 255,000 U.S. and state documents, as well as a sizeable microfilm, microcard, microfiche, map, newspaper, and pamphlet collection.

Degrees and Fields of Study

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

THE MASTER OF ARTS AND MASTER OF SCIENCE DEGREES

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

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

Agricultural Engineering
Agronomy
Animal Science
Biology*
Chemistry
Dairy Science
Economics
Economics, J.D./M.S.**
Engineering
Entomology
Geography
Health, Physical Education and Recreation
Home Economics
Industrial Management
Journalism
Mathematics
Microbiology
Nursing
Plant Pathology
Rural Sociology
Wildlife and Fisheries Sciences
(Wildlife Option)
(Fisheries Option)
Zoology

The major fields shown above may also be selected as minor fields. In addition, Botany, History, Political Science, Mechanized Agriculture (Agricultural Engineering Department) or Planning may be chosen as a minor.

The Advisers

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

Residence and Credit Requirements

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

Requirements for the Major

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

Requirements for the Minor or Supporting Courses

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

*See department listing for description of multi-departmental program.
**(Agricultural emphasis) see page 15.

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

Plan of Study

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

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

Admission to Candidacy

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

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

The Thesis

Students completing a Master of Arts or Master of Science degree in areas requiring a thesis must submit a thesis meeting the requirements of the Department and the Graduate School. All theses, when appropriate, must include a list of non-standard abbreviations and symbols that are used in the thesis. Other requirements of the Graduate School are outlined in the mimeographed "Instructions for Thesis and Research Reports" available from the Graduate Office. Requirements of a department as to style, although they may differ, should be followed. A thesis guide, such as William Giles Campbell, **Form and Style in Thesis Writing**, Boston: Houghton Mifflin, 5th ed., 1978, available from the Bookstore, may be helpful.

The thesis should represent a scholarly contribution to knowledge by the candidate of research related to the major field. Although the thesis accounts for 5 to 7 credits in the major, the number of credits is not necessarily related to the amount of research completed. Credits are given for both the research and writing required for the thesis. Grades for thesis are turned in as Incomplete (I) until the oral examination. If the thesis is accepted by the examination committee, the major adviser and the Dean of the Graduate School, a grade of Satisfactory (E) is given for all thesis credits.

The original copy of the thesis must be filed with the Graduate Office for examination at least 10 days (excluding Sundays and holidays) before the oral examination. The student should distribute one copy to each member of his committee. The original and one copy, corrected in accordance with suggestions by the examination committee and the Graduate Office, must be returned to the Graduate Office with a receipt from the Library showing that $9.30 has been paid for the cost of binding. This should be completed five days prior to commencement.

Non-thesis Options

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

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

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

Language Requirement

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

Examination

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

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

THE MASTER OF EDUCATION DEGREE

The Master of Education degree is offered under two options (see Residence and Degree Requirements below) and with the following majors: Agricultural Education; Educational Administration; Teacher Education; and Counseling, Guidance and Personnel Services.

The Advisers

Each student in the Master of Education degree program will be assigned an adviser, prior to or during the first semester of graduate study.

Residence and Degree Requirements

Minimum residence requirement for the Master of Education degree is 22 graduate credits for Plan A and 25 graduate credits for Plan B, including a minimum of one semester or two summer sessions of full-time graduate work (12 semester hours) on campus. Appeal procedures are available for persons seeking exemption from the preceding policy. The Dean of the Graduate School should be contacted for further information.

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

Option A: A minimum of 32 graduate credits beyond the Bachelor's degree. Two credits must be earned as a research problem in the major field. Of the 32 graduate credits required, 21 must be earned in the major.

Option B: A minimum of 35 graduate credits beyond the Bachelor's degree. No research problem is required. Of the 35 graduate credits required, 24 must be earned in the major.

Requirements for the Minor or Supporting Courses

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

Plan of Study

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

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

Admission to Candidacy

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

The Research Report (Option A)

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

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

Following the oral examination and approval of the research report, the original and first copy are delivered bound to the major department office. This must be done five days before Commencement.

Examinations

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

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

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

THE DOCTOR OF PHILOSOPHY DEGREE

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

Admission Requirements

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

Residence and Credit Requirements

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

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

Outdating of Program and Coursework

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

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

The Advisory Committee

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

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

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

Plan of Study

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

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

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

Transfer of Credits

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

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

The Major

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

The Minor or Supporting Courses

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

Research Tool Requirements

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

Preliminary Examinations

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

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

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

Admission to Candidacy

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

The Thesis

The thesis should represent one academic year of full-time research. Of no specific length, it should advance or modify knowledge and demonstrate the candidate's mastery of the subject. The instructions in "Instructions for Thesis and Research Reports," copies of which are available at the Graduate Office, must be followed in preparation of the thesis. When submitted, it is accompanied by an abstract of no more than 350 words.

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

After the final oral examination, all necessary corrections in the thesis are made and two copies are delivered to the Graduate Office

five days prior to commencement.

At this time an agreement is signed relating to the publication of the abstract and a $50 fee is paid to the Graduate School covering the cost of binding of two copies, microfilming of the thesis and the cost of publishing the abstract.

The Final Examination

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

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

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

Courses of Instruction

COURSE NUMBERING SYSTEM

300-499 series

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

(1) Total credit for courses in this series, when applied to a graduate program, will be reduced by 20 percent discarding all fractions. After such conversion, these credits are defined as "converted credits," which are then considered as graduate credits in meeting the requirements for the various degrees, provided that a grade of at least "B" is attained in each course in this series. For example, if eight credits are earned in this series, they would be equivalent to six graduate credits.
(2) For the Master of Arts, Master of Science or Master of Education degrees, no more than seven converted credits may be applied to the graduate program. They may be applied in the major, minor, or supporting course areas.
(3) For the Doctor of Philosophy degree, no more than 10 converted credits may be applied to the graduate program. They may be applied in the major, minor, or supporting course areas.
(4) Transfer credits may not be applied.
(5) Converted credits may not be applied without the permission of the major adviser or advisory committee, the minor adviser (when applicable), and the Dean of the Graduate School.

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

500-599 series

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

600-699 series

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

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

700-799 series

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

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 D. L. Moe, Head
Professors DeBoer, DeLong (Emeritus), Hellickson, Myers, Wiersma; Associate Professors Chisholm, Chu, Lytle
Assistant Professor Christianson

Graduate major offered:

Master of Science degree with major in Agricultural Engineering. The Agricultural Engineering courses listed below are also offered in support of the Master of Science in Engineering program (See College of Engineering).

Graduate minors offered:

Agricultural Engineering, Mechanized Agriculture.

Prerequisites for graduate study:

For the graduate major a Bachelor of Science degree in engineering or its equivalent.

For the graduate minor prerequisites to the graduate courses elected.

Two Options for Master of Science Degree:

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

Option B requires a minimum of 32 semester credits, including a two-credit design paper and a comprehensive oral examination.

Agricultural Engineering (AE)

603 Energy and Environment 3(3,0) F 1982
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. Alternate years.

612 Advanced Agricultural Tractors and Machines 2(2,0) F 1982
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. Alternate years.

622 Bio-environmental Engineering 2(2,0) F1983
Analysis of farm animals and their environment employing engineering principles combined with biological principles. Homeothermic mechanisms of animals and the influence of thermal environment upon growth and production. P, AE 324. Alternate years.

*** 633 Advanced Irrigation Engineering** 3(2,3) F1982
Basic soil-water-crop relationships. Theory and design of pumping plants, surface, sprinkle, and trickle irrigation systems. Design of pipe network distribution systems. P, AE 434 or consent. Alternate years.

642 Engineering Phases of Crop Processing 2(2,0) F 1982
Study of physical properties of agricultural crops and engineering principles as they apply to cutting, shearing, collecting, packaging, transporting, drying, handling and storing of agricultural products. P, AE 444. Alternate years.

652 Theoretical Micro-Climatology 2(2,0) S 1982

Derivation and application of physical laws to air layer near the ground occupied by plants and animals. Instruments used to take measurements in layer near ground. P, Calculus, Physics, AE 353. Alternate years.

*** 663 Instrumentation** 3(2,3) S 1982, 1983

Principles of transducers, amplifiers and terminating devices in measurement systems with emphasis on transducers and system performance. Techniques and methods for use in engineering and scientific measurement. P, Phy 213, Math 225.

673 Programming Agricultural Systems 3(2,2) S 1982

The use of programs and computers in advanced engineering for the solution of problems occurring in Agricultural Engineering studies. Gathering, processing, evaluating mass engineering and scientific data. P, CSci 312, Engr. Stat. Alternate years.

695 Special Topics 1-3 Cr. On demand.

732 Advanced Hydrology in Agriculture 2(2,0) S 1983

Study of small watershed hydrologic principles. The components of the land phase of the hydrologic or water cycle are studied and a study of the synthesis and interaction of these components is introduced. Mathematical relationships which describe the hydrologic components are reviewed and used to stimulate components of the hydrologic cycle on the digital computer. The principles of soil erosion from small watersheds are also studied and applied to field problems. P, AE 434, PS 352, FORTRAN or consent of instructor. Alternate years.

733 Ground Water Engineering in Agriculture 3(3,0) F 1983

Study of saturated ground water movement. Presentation of theory and procedures for the design of subsurface drainage systems and water supply systems. Introduction of legal aspects of ground water use and pollution. P, EM 331. Alternate years.

770 Special Problems in Agricultural Engineering 1-2(on demand)

Graduate students who wish to pursue detailed studies in one or several areas of the Agricultural Engineering field including meterology and climatology.

771 Graduate Seminar 1(1,0) F 1981, 1983

Discussion and reports of current topics and investigations in Agricultural Engineering. (Limit of 2 credits.)

*** 722 Similitude** 2(1,2) S 1983

A systematic approach to the principles and theory of dimensional analysis, problems of model design and tests. The use of true, distorted and dissimilar models as they pertain to engineering design and research. Alternate years.

790 Thesis 5-7

Mechanized Agriculture (MA)

500-600 Special Topics

(4-day workshops, 6 hrs. per day)

A. Agricultural Machinery, 1982. B. Soil and Water Mechanics, 1983. C. Small Power Units, 1984. D. Agricultural Power Units, 1985. E. Electric Motors and Electrical Controls, 1986. F. Agriculture Structures and Environment, 1987. G. Welding, 1988. Primarily designed for in-service teacher training activities for Vocational Agriculture teachers. Workshops held at several points in state.

*** 612 Advanced Farm Machinery** 2(1,3) Su 1982

Operation, care, adjustment, new developments in farm machinery, with emphasis on field and farmstead machinery as related to needs of agricultural production. Alternate years.

*** 622 Advanced Farm Structures** 2(1,3) Su 1982

Materials for farm construction; construction methods and techniques; new developments in farm building. Alternate years.

*** 642 Advanced Rural Electrification** 2(1,3) Su 1982

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.

*** 662 Advanced Irrigation, Mechanics and Practices** 2(1,3) Su 1983

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.

*** 682 Advanced Farm Engines** 2,(1,3) Su 1983

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 SCIENCE

Professor John Romans, Head; Professors Briggs (Emeritus), Carlson, Dearborn, Dinkel, Embry, Gartner, Kamstra, Kohlmeyer (Emeritus), Kohler, Luther, Morgan, Wahlstrom; Associate Professors Bush, Lewis, Libal, McCarty, McCone, Minyard, Slyter

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, ruminant nutrition, reproductive physiology, meat technology, range management, swine nutrition or poultry nutrition.

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 Courses (AS)

623 Population Genetics 3(3,0) S 1982

Genetic structure of populations, and forces affecting this structure. Theories of biological variation, race and species formation. P, Bio 371 or equivalent. Stat 641 or equivalent highly recommended. Alternate years.

631 Animal nutrition 3(3,0) S 1983

Principles of nutrition in relation to growth, reproduction, lactation, fattening and work. P, Ch 260 and Z 325 or equivalent. Alternate years.

632 Animal Nutrition Laboratory 2(0,6) S 1982

Laboratory methods course involving demonstration and practical work in techniques used in animal nutrition research. P, Ch 260. Alternate years.

636 Avian Nutrition 3(2,2) S 1982

Nutritional requirements and deficiency signs, peculiarities of digestive physiology, formulation of diets and dietary effects upon quantity, quality and efficiency of production of chickens, turkeys, pheasants, ducks, geese. P, 223, desirable antecedent 366, 333. Alternate years.

653 Meat Science 3(2,3) S 1982

Basic physical, chemical, microbiological and histological characteristics of meat and effects of various processing methods on meat products and by-products. P, 241. Alternate years.

681 Range Science Seminar 1(1,0) S

Guest lectures and review of current research and action programs in use of wild lands. P, 322. Limit 2 credits.

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)

See Dairy Science 711 for description

731 Experimental Procedure 2(2,0) F 1983

Research methods and planning of experimental work, necessary records, interpretation of results and presentation of

material. Introduction to research applications of linear programming. P, Stat 641 or equivalent.

732 Advanced Physiology of Reproduction 3(2,2) S 1982

Anatomical and physiological process of reproduction in domestic animals with special emphasis on research techniques and the findings of recent research. P, 433.

733 Nutritional Interrelationships 3(3,0) F

Relationships between nutrients in metabolism. Substitution and sparing effects. Comparing metabolic significance of required nutrients for different animal species.

781 Graduate Seminar 1(1,0) FS

Reports and discussion of current research in animal science. Maximum of two credits for M.S. and four credits for Ph.D.

782 Nutrition Seminar 1(1,0) FS

Reports and discussion of current research in nutrition. Maximum of two credits.

790 Thesis, Master of Science 5-7 Cr.

890 Thesis, Ph.D.

DEPARTMENT OF BIOLOGY

Professor E.J. Hugghins, Head; Professors Chen, Granholm, Hartwig (Emeritus), Holden, Myers, Morgan, Taylor (Emeritus); Associate Professors Haertel, Hutcheson, McMullen, Peterson, Whalen

Graduate majors offered:

Master of Science with Major in Biology:

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." Again the student may select breadth in coursework from all levels of biological organization.

Master of Science with Major in Zoology:

This program requires a minimum of 30 semester credits including a thesis and comprehensive oral exam. This program is designed for students wishing to specialize in animal-oriented coursework and research.

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, including 24 credits in biological sciences or consent.

For the graduate major in Zoology a Bachelor's degree, with at least 14 credits in Zoology or consent.

For the graduate minor in Biology a Bachelor's degree, including 16 credits in biological sciences, or consent.

For the graduate minor in Botany a Bachelor's degree, including at least 6 credits in Botany or consent.

For the graduate minor in Zoology a Bachelor's degree with at least 6 credits of Zoology or consent.

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

Black Hills Natural Sciences Field Station:

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

Biology Courses (Bio)

607 Principles and Techniques in Electron Microscopy 3 FS

Techniques and instruments basic to the preparation, examination and interpretation of specimens with the electron microscope.

651 Biology of Algea 4(2,6) F 1983

Physiology, ecology, taxonomy and evolution of algae. Laboratory includes identification and field and laboratory techniques, P, two years of biological science and one year of chemistry or consent. Alternate years.

673 Cytogenetics 3(2,3) F 1983

To study the nature and behavior of chromosomes in relation to heredity. P, 343 or 371. Alternate years.

695 Strategies in Science Teaching 3(3,0) FSu

Training in identifying and teaching certain processes deemed fundamental to science and scientific behavior.

697 Special Topics FSSu*

Biology of Aging, Biology and the American Woman, Chromosome Analysis, Field Ecology, Human Ecology, Human Physiology.

790 Thesis in Biology 5-7

792 Graduate Seminar 1(1,0) FS

793 Biological Research Problems 2-4

Botany Courses (Bot)

615 Advanced Plant Ecology 4(2,3) Su 1983

Analysis of the energy relationships of communities with emphasis on productivity. Literature readings. Laboratory work in techniques of community analysis. P, Consent. Alternate years.

627 Advanced Plant Physiology 4(2,4) S 1982

Role of organic and inorganic compounds in plant nutrition. Emphasis on photosynthesis, respiration, metabolism, and other cellular processes. P, 427, Ch 120. Alternate years.

685 Growth and Development 4(2,4) S 1983

Relations of light, temperature, water, wind, growth regulators, nutrients and other factors to various stages of plant growth and development. P, 427, Ch 120. Alternate years.

697 Special Topics FSSu*

Advanced Plant Anatomy, Advance Plant Taxonomy, Aquatic Seed Plants, Morphology of Non-Vascular Plants, Morphology of Vascular Plants, Plant Morphogenesis, and Economic Botany.

Zoology Courses (Zool)

723 Advanced Systemic Physiology 4(3,3)F

Various systems of the animal body; coordination and interrelationships of systems; circulation, temperature regulation, muscle, and respiration. P, 325 or consent.

725 Advanced Systemic Physiology 4(3,3) S

Physiology of digestion, rumination, urine formation, reproduction, nervous system, endocrine glands, and special senses. P, 723 or consent.

727 Endocrinology 4(3,3) F 1982

A study of the effects of the secretions of the various glands of the body on growth, development, metabolism, and reproduction of domestic animals. P, 325. Alternate years.

790 Thesis in Zoology 5-7

792 Graduate Seminar in Zoology 1(1,0) FS

Reports and discussions of topics of zoological interest. Maximum of 3 credits accepted. Major students are urged to attend all seminars.

797 Special Topics in Zoology FSSu*

Helminthology, Mammalian Developmental Genetics, and Zoological Research Problems.

*Special topics are taught as regular courses dependent upon student demand. Information about content, prerequisites and semester offered can be obtained from the Biology Department.

DEPARTMENT OF CHEMISTRY

Associate Professor D.C. Hilderbrand, Head
Professors Brandwein, Emerick, Gehrke, Grove, Greb (Emeritus), Halverson, Hecht, Jensen, Johnson (Emeritus), Kenefick, Klug, (Emeritus), Olson, O., (Emeritus), Palmer, Wadsworth, Webster (Emeritus), Worman, Whitehead; Associate Professor Rue;
Assistant Professor Guss (courtesy)

Graduate majors offered:

Master of Science degree with a major in Chemistry.

Graduate minors offered:

Chemistry

Prerequisites for graduate study:

For the graduate major a Bachelor's degree with a major in professional chemistry.

For the graduate minor a Bachelor's degree including prerequisites to the graduate courses selected.

Chemistry Courses (Ch)

622 Advanced Organic Chemistry 3(3,0) S
Review and discussion of nomenclature, stereochemistry, resonance theory, equilibria, elementary kinetics. Discussion of intermediates and mechanisms. Introduction to the chemistry of polymers, heterocyclics, and natural products, P, 328, 344 or concurrent.

624 Structural Determination of Organic Compounds 3(2,3) F 1983
Determination of the structure of organic compounds primarily by spectroscopic techniques. P, 328. Alternate years.

628 Physical Organic Chemistry 3(3,0) F 1982
Physical organic, reaction mechanisms, m.o. calculations, orbital symmetry, and e.s.r. spectroscopy. P, 328 and 344. Alternate years.

632 Advanced Analytical Chemistry 3(3,0) F
Theoretical treatment of principles involved in noninstrumental analytical chemistry including sampling and statistics. P, 344.

634 Analytical Spectroscopy 3(3,0) S 1982
In-depth treatment of the quantitative applications and theory of modern spectroscopy techniques including atomic absorption, emission, and fluorescence; molecular absorption and fluorescence; and X-ray spectroscopy. P, 434. Alternate years.

636 Chromatography and Separations 3(3,0) S 1983
Theory and practice of solvent extraction and paper, thin layer, gas and liquid chromatographic techniques. P, 232. Alternate years.

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

644 Chemical Thermodynamics 3(3,0) F 1982
Discussion of the laws and theories of classical and statistical thermodynamics as related to macroscopic chemical systems. P, 344. Alternate years.

646 Atomic and Molecular Structure 3(2,3) F 1983
Introduction to quantum mechanics and theoretical treatment of chemical structure and binding. P, 328, 344, or concurrent registration in 344. Alternate years.

652 Descriptive Inorganic Chemistry 3(2,3) F 1983
Discussion centered on periodic relationships of the elements. The laboratory work includes preparation and purification of typical inorganic compounds. P, 120 (4 credits), 232, 354. Alternate years.

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

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

662 Principles of Biochemistry 3-5(3,0 or 3,6) F
Chemistry of biological processes occurring in plants and animals. P, 160.

672 Seminar 1(1,0) FS
Required of all graduate majors in chemistry.

681 Bioinorganic Chemistry 3(3,0) F 1982
A study of biological systems stressing the role of metal ions, primarily the transition metals. Model systems included in the discussion. P, 120 (4 credits), 354 or consent. Alternate years.

691 Special Problems *(0,*) FS
P, consent. Limited to a total of 4 credits.

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

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

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

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

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

764 Biochemistry I 3(3,0) S 1983
Biological processes with special emphasis on the catabolism of carbohydrates, lipids, amino acids and generation of phosphate bond energy. P, 662. Alternate years.

766 Biochemistry II 3(3,0) S 1982
Biological processes with special emphasis on the anabolism of carbohydrates, lipids, amino acids, and nucleic acids. The transfer of genetic information. P, 662. Alternate years.

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

790 M.S. Thesis in Chemistry 1-7 credits

The following Physics courses may be used in either the graduate major or minor program.

Phys 635 Reactor Physics 3(3,0) S
Phys 637 Science of Solids 3(3,0)
Phys 743 Statisical Mechanics 2(2,0)
Phys 775 Advanced Quantum Mechanics 3(3,0)
Phys 779 Group Theory in Quantum Mechanics 3(3,0)

* To be arranged.

DEPARTMENT OF CHILD DEVELOPMENT AND FAMILY RELATIONS

Professor Jay Richardson, Head
Professor Day

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

Child Development and Family Relations Courses (CDFR)

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

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

676 Early Childhood Education, Administration and Practicum 2-4
(On sufficient demand)
Practical experience in administration of preschool, kindergarten program. P, 211, 362, 364, 261, consent.

677 Child and Family Counseling 3(3,0) F
Theory and philosophy of counseling with children and their families. P, consent.

682 Special Problems in Human Development and Family Relations 2-4 credits as arranged
Individual study for qualified students. P, consent.

DEPARTMENT OF CIVIL ENGINEERING

Professor Dwayne Rollag, Head
Professors Dornbush, Johnson (Emeritus), Koepsell, Larson, Prasuhn;
Associate Professors Abdul-Shafi, Selim, Sigl

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

Civil Engineering Courses (CE)

611 Bituminous Materials 3(2,3) S
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 equivalent.

625 Environmental Engineering Planning 3(3,0)
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. Graduate standing or consent.

626 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.

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

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

633 Open Channel Hydraulics 3(3,0) F
Energy and momentum principles in open channel flow, flow resistance, flow in uniform and non-uniform channels, flood routing. P, 433.

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

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 ground water hydrology and administrative aspects of water resources planning. P, 433.

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

637 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.

638 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.

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

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

652 Prestressed Concrete 3(3,0) Su
Theory and design of prestressed concrete including pre-tensioning, post-tensioning. P, 456.

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

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

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

690 Special Engineering Problems 1-3 FS
Elective course for special or detailed study or investigation.

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

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

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

756 Advanced Structural Design 4(2,6) S
Design of rigid frames, effect of plastic behavior, details for complex structures, analysis of flat plate floor systems. Design comparisons.

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

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

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

DEPARTMENT OF DAIRY SCIENCE

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

Graduate majors offered:

Master of Science degree with a major in Dairy Science. Doctor of Philosophy degree with major in Animal Science.

Graduate minor offered:

Dairy Science

Prerequisites for graduate study:

For the graduate major a Bachelor's degree with major work substantially equivalent to that required by this department.

For the graduate minor a Bachelor's degree including prerequisites to the graduate courses selected.

Dairy Science Courses (DS)

612 Physiology of Lactation 3(3,0) S 1983
Anatomy and physiology of mammary glands. Factors affecting quality and quantity of milk. P, Vet 223 or equivalent. Alternate years.

622 Advanced Dairy Microbiology 3(2,3) S 1982
Role of microorganisms in manufacture and spoilage of manufactured dairy products. P, 301. Alternate years.

631 Laboratory Techniques in Dairy Science 2(0,6) F 1982
Current research techniques in Dairy Science including photometry, electrophoresis; and column, thin-layer, and gas chromatography of milk and plant or animal tissues. P, Ch 260 or consent. Alternate years.

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

702 Seminar 1(1,0) S
Research report writing, oral reports and discussion of current research in dairy production, dairy manufacturing, and related sciences. Maximum of 2 credits will be

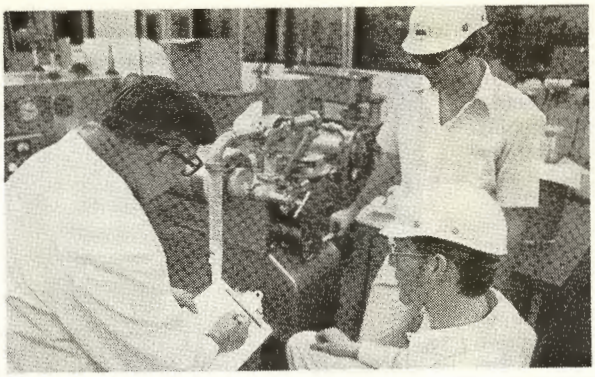
allowed toward either the Master of Science or Doctor of Philosophy degree.

711 Ruminology 3(3,0) F (Offered in 1983)
Biochemical, physiological, and microbiological activity occurring in the rumen and the relation of rumen function to animal response. P, AS 631 or consent. Alternate years.

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

790 M.S. Thesis

890 Ph.D. Thesis



DEPARTMENT OF ECONOMICS

Professor John Thompson, Head
Professors Aanderud, Allen, Gilbert, Greenbaum, Helfinstine (Emeritus), Hsia, Kohlmeyer (Emeritus), Murra, Myers (Emeritus), Smythe (Emeritus), Taylor; Associate Professors Dobbs, Kamps, Kim, Lamberton, Sogn

Graduate majors offered:

Master of Science degree with a major in Economics

Graduate minor offered:

Economics

Prerequisites for graduate study:

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

Two Options for Master of Science Degree:

Option A requires a minimum of 30 semester credits, including a thesis (5 credits) and comprehensive 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, a minor in another department and/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.

Core Requirements

Econ 724 Advanced Quantitative Economics 3
Econ 701 Research Methods 2
Econ 703 Advanced Macroeconomics 3
Econ 704 Advanced Microeconomics 3
Stat 641 Statistical Methods II 3

Suggested Additional Courses

Econ 620 Economics of the Public Sector .. 3
or
AgEc 670 Advanced Farm and Ranch Management 3
Econ 660 Economic Development 3
or
AgEc 630 Advanced Agricultural Marketing and Prices 3
Econ 672 Resource Economics 3
Econ 650 Industrial Organization 3

J.D./M.S. in Economics (Agricultural Emphasis)
A cooperative program between the University of South Dakota and South Dakota State University is available. For details students should consult with the Law School (USD) or Economics Department (SDSU).

Agricultural Economics (AgEc)

630 Advanced Agricultural Marketing and Prices 3(3,0) F 1981, S 1983
The marketing environment; market structure, performance and conduct; measurement and forecasting; pricing problems and policies; financing and risk; marketing alternatives; efficiency; market power; social, legal, and ethical issues; marketing and policy. P, 301, Stat 341.

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

690 Special Problems 1-3(1-3,0) FS
Advanced work or special problems in agricultural cooperation, agricultural finance, farm management, land economics, marketing, public finance, statistics. P, consent.

Economics Courses (Econ)

604 History of Economic Thought 3(3,0) F
Survey of economic theory; various schools of economic thought and economic environments which produced them. P, 301, 302 or consent.

620 Economics of the Public Sector 3(3,0) S
Governmental operations, policies and revenues as related to employment, productivity and economic welfare. Alternatives that would affect social services, education, commerce and trade, fiscal policies, and quality of life. P, 201 or consent.

640 Economics of the International Sector 3(3,0) (Offered on demand)
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.

650 Industrial Organization 3(3,0) F 1982
The elements involved in market power and how they function. Government regulation of markets. The consumer movement. Grades, brands, advertising and promotion. Current changes in marketing strategies. P, 301 and 302 or consent.

660 Economic Development 3(3,0) F 1981, S 1983
Economic development theory, methods of analyzing regional and national development in developing as well as developed economies. Role of public policy in development process. Agricultural and rural development issues emphasized.

672 Resource Economics 3(3,0) S 1982
Economic analysis and planning applied to problems in conservation and development of natural resources. Zoning, land use, and pollution control programs. Methods of evaluating projects and programs.

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

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

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

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

705 Applied Economic Theory 3(3,0) F 1982
Practice in the application of micro- and macroeconomic theory to solutions of real and hypothetical problems. Selection, use of appropriate statistical techniques, research methods. Analytical methods suitable for complex problems.

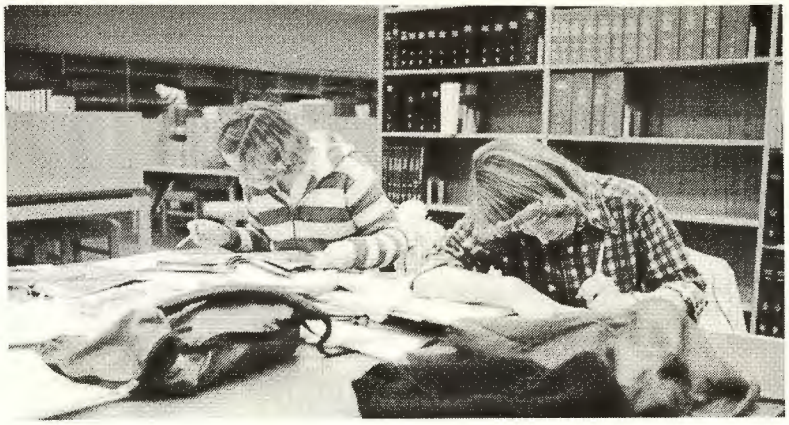
724 Advanced Quantitative Economics 3(3,0) F

Econometric and other quantitative methods applied to decision-making. Market and income models, linear programming, queuing theory, inventory models, and simulation. P, 428.

790 Thesis

791 Graduate Special Topics 1-4

Organized by an instructor in consultation with his or her department head and a group of students. The course will provide a medium through which a specific topic can be pursued. The course will normally be experimental and may be a "one time only" effort for a particular semester and the unique group of students. Maximum: 4 hours credit per semester, 7 hours credit per degree.



DIVISION OF EDUCATION

Darrell Jensen, Dean
Professors Everrett, Gadda (Emeritus), Larsen, Lindstrom, Schmieding, Scholten, Sundet (Emeritus);
Associate Professors Crosswait, Edeburn, Hanson, Herold (Emeritus), Lingren, Menning, Widvey

Graduate majors offered:

Master of Education degree with a major in Agricultural Education; Educational Administration; Teacher Education; and Counseling, Guidance and Personnel Services.

Graduate minors offered:

Agricultural Education; Educational Administration; Teacher Education; and Counseling, Guidance and Personnel Services.

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 certification is required and 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, Guidance and Personnel Services 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 Teacher Education 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 have commitments in higher education or with 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, Guidance and Personnel Services (CGPS), Driver's Education (DrEd), Educational Administration (EdAd), Education, Evaluation and Research (EdER), Educational Foundations (EdFn), Elementary Education (ElEd), Educational Psychology (EPsy), Secondary Education (SeEd), and Vocational Teacher Training Education (VTTE).

Adult Higher Education Courses (AHEd)

600 Special Problems in Extension 2-6 cr. FSSu

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

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

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

681 Workshop in Adult and Continuing Education 1-3 FSSu

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.

682 Seminar 1-3 FSSu

Selected area of education including special investigation, reports, and discussion.

689 Internship in Education 1-3 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.

691 Problems in Adult and Continuing Education 1-3 FSSu

Directed reading and research in selected individual adult and continuing education topics.

711 Organization and Administration of Adult Education 3 Cr.

Organization, development of Adult Education programs. Particular emphasis on Adult Basic Education. Curriculum development, financing, staffing, evaluation of adult programs.

751 Principles of College Teaching 3(3,0) SSU

An analysis of teaching methodologies, planning procedures, evaluation techniques, and professional relationships. Emphasis will be on learning and using strategies suitable for teaching.

792 Research Problem in Adult Education 2

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

Agricultural Education Courses (AgEd)

Professor Clark Hanson, Superviser

605 Seminar 1-2(1,0) or (2,0)

Selected areas of Agricultural Education including special investigation, reports, and discussion.

606 Problems 1-3

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 programs in vocational agriculture/agri-business; course planning, procedures, media, followup and evaluation in adult programs. 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 organizations 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 supervisers 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

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 A. Can be elected under Option B if desired. P, consent.

Counseling, Guidance and Personnel Services Courses (CGPS)

Professor Orville Schmieding, Superviser

600 The Exceptional Child (3,30) SSu

An overview of the types of exceptionalities in children including the mentally retarded, gifted, emotionally disturbed, physically handicapped and speech impaired. Definitions, prevalence, identification, characteristics, and educational and counseling procedures and resources are identified.

603 Elementary School Guidance 3(3,0) FSu

Examination of the counseling process with children. The implementation of developmental guidance programs to meet children's emotional and learning needs.

608 Humanistic Approaches to Teacher Effectiveness 2(2,0) SSu

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

610 Foundations of Guidance 2-3 Cr. FSSu

Developing basic human relations and helping skills: self-awareness and self-examination of the interpersonal communication process; emphasis on understanding self and understanding others.

630 Learning Disorders of Children 3(3,0) SSU

Examination of the nature, causation and assessment of learning difficulties in children. Designed to assist educators in mainstreaming students. Emphasis placed on diagnosing, remediating and designing Individual Education Plans in compliance with Public Law 94-142.

661 Theories of Counseling 3(3,0) FSSu

Theories, methods and application of the counseling process at all levels. An examination of how counseling philosophy is applicable to a variety of occupations and to daily living.

681 Workshop in Guidance and Counseling 1-3 Cr.

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

Advanced courses taught upon demand covering such topics as crisis intervention, consulting, multi-cultural counseling, stress and depression, mid-life, etc.

713 Administration and Operation of Guidance and Personnel Services 3(3,) SSu

Developing and managing a comprehensive guidance program; emphasis on needs assessment, counselor role and function, and program evaluation.

736 Appraisal of the Individual 2(2,0) Su

Assessment methods used in studying individuals. Emphasis on the use of records, case study techniques, sociometric devices, and other non-standardized assessment instruments. Recording, analyzing, compiling and interpreting data in relationship to counseling uses.

742 Career Education and Occupational Information 3(3,0) F Su

Examination of the career development process as it relates to persons of all ages. Factors influencing career choice. Methods for implementing career development programs. Theories of vocational development.

766 Group Counseling 2(2,0) FSSu

Principles and processes used in group counseling. Emphasis on experiencing group process and developing group facilitation styles and procedures.

787 Counseling Laboratory and Supervised Practicum 3-5 FSSu

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

788 Group Counseling Practicum 2-4 Cr.

Supervised practicum in conducting small group counseling sessions. P, CGPS 766, CGPS 787, consent.

789 Internship in Guidance and Counseling 1-6 Cr.

Practical experience in a counseling and guidance setting.

791 Problems 1-3 Cr.

Directed reading and research in selected individual guidance and counseling topics. Designed to meet needs of graduate students in guidance and counseling.

792 Research Problem in Counseling and Guidance 2

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 A. Can be elected under Option B if desired P, consent.

Driver's Education Courses (DrEd)

650 Safety Education 3(3,0) FSSu

Philosophy, content and methods requisite to teachers participation in accident prevention activities and school safety education program.

670 Advanced Driver Education 3(3,1) S Su

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) Su

Philosophy, organization and procedures in the use of simulators to teach Driver Education

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

The effects of alcohol and drugs in relation to the individual's ability to drive. Organization of course content and materials to be used in High School Driver Education.

Education, Evaluation and Research Courses (EdER)

611 Group Testing 3(3,0) F 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.

761 Introduction to Graduate Studies 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 education research. Required of most graduate majors in education.

Educational Administration Courses (EdAd)

700 Public School Administration 3

A broad overview of administration. Will examine administration as an applied science and anlayze 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 Organization and Administration of Elementary Education 2(2,0) Su

Principles and modern practices of organizing and administering work of elementary schools. Required by State Department of Public Instruction of school superintendents and elementary school principals.

711 Secondary School Administration 3 S Su

Problems and practices in organizing and administering the secondary school. Emphasis is on the principalship with topics focusing on staff recruitment, supervision and evaluation, student rights and responsibilities, parent-community relationships, curriculum, budget, plant management.

715 Elementary and Secondary School 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) SSu

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 Buildings and Grounds 2(2,0) Su

Management, care and operation of school plant. Needs and evaluation of existing facilities, new buildings and remodeling. Emphasis on facility planning at school system and building levels. Not a technical course in design and materials. Alternates with EdAd 735.

735 School Law 3(3,0) FSu

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

781 Workshop in Education Administration 1-3

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.

791 Problems 1-3 FSSu

Directed reading and research in selected education administration topics.

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 A. Can be elected under Option B if desired. P, consent.

Educational Foundations Courses (EdFn)

620 Philosophy of Education 2(2,0) FSu

Comparison of historic and current philosophies of education, their major emphasis and effects upon educational goals and practices today.

630 Issues and Innovations in Education 3 F

Selected current issues confronting educators across the U.S. Issues for study are selected from the broad categories affecting school organization patterns, changing teaching techniques and curriculum patterns, and administrative procedures. May be repeated-maximum of 6 credits.

Educational Psychology Courses (EPsy)

623 Adolescent Psychology 3(3,0) SSu

Physical, ocial, emotional, intellectual and vocatior al aspects of adolescent development. Emphasis is upon increasing understanding of adolescents and their problems.

651 Mental Health and Personality Development 3(3,0) FSu

Nature of personality; mental and emotional health of children and adults. Emphasis on mental health problems and positive programs for personal mental health.

740 Advanced Educational Psychology 3(3,0) FSu

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.

761 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 CGPS. Class limited.

Elementary Education Courses (ElEd)

673 Elementary School Curriculum 2(2,0) SSu

A study of the nature and principles of curriculum and 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.

681 Workshop in Elementary Education 1-3 FSSu

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

Secondary Education Courses (SeEd)

608 Humanistic Approaches to Teacher Effectiveness 2(2,0) SSu

Skills in human relationships, developing potentials, resolving differences, active listening, avoiding roadblocks, developing congruency, using "no lose" methods of resolving classroom conflicts. Developing learner responsibility, accepting others, communicating acceptance to others, "I Messages," changing the environment.

640 Secondary School Curriculum 2(2,0) FSu

A study of the nature and principles of curriculum and curriculum development in the secondary schools. Process of curriculum change, development and evaluation will be examined. Roles of teachers, administrators, students and the public in curriculum change will be studied.

645 Advanced Instructional Techniques 2 SSu

This course will provide opportunities for participants to learn additional techniques for use in classroom teaching. The theory underlying the techniques and their uses will also be explored. Emphasis will be on techniques which allow students to gain skills in processing and manipulating information and for participation in social model skills. Opportunities will be provided for participants to analyze, practice, and create the various techniques under study.

672 Motivation and Discipline 2 F Su

Deals with varying 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.

681 Workshop in Education 1-3(1-3,0) Su

Special areas in secondary education are comprehensively explored in an intensive time framework. Designed to increase specific skills and understanding in a current area.

682 Seminar 1-3(1-3,0) FSSu

Study in selected areas of education including special investigation, reports, and discussion.

690 Special Topics 1-3

Advanced courses will be taught upon demand covering such topics as questioning techniques, classroom mangagement, systematic observations of teaching, school policy making, changing roles in education, content reading, computers in education, etc.

691 Problems 1-3(1-3,0) FSSu

Directed reading and research in selected education topics.

752 Foundations of Reading 2(2,0) F 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 2(2,0) 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.

792 Research Problem in Education 2

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

789 Internship in Education 1-6(0,1-6) FSSu

On-the-job participation in teaching in the public schools under the supervision of local school instructor and a staff member from the Division of Education.

Vocational Teacher Training Education Courses (VTTE)

625 Development of Vocational Education Thought and Practice 3(3,0) FSSu

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.

731 Administration and Supervision of Vocational Education 3 Cr. 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

J.O. Storry, Dean

Two programs are offered in engineering:

Master of Science in Engineering

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

Option B requires a minimum of 32 semester credits including a 2-credit design or research paper (of thesis quality and style) and a comprehensive oral examination.

Master of Science in Industrial Management

This degree requires a minimum of 30 semester credits including a thesis and a comprehensive oral examination.

Master of Science in Engineering

The purpose of the Graduate Program in engineering is to provide an interdisciplinary education for engineers who will become leaders and experts in fields related to:

I. The development and control of land, water and energy resources.

II. The development and promotion of industrial development.

III. The application of engineering principles to biological and ecological problems.

IV. The control of pollution and preservation of the environment.

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

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

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

The core consists of the following courses:

Statistics 641—Statistical Methods II
Mechanical Eng. 661—Introduction to Operations Research
Agricultural Eng. 663— Instrumentation
General Eng. 600-601—Seminar

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

The secondary core consists of the following courses:

AgE 772—Similitude
CE 624—Industrial Waste Treatment
CE 623—Environmental Engineering
CE 646—Advanced Soils Engineering
CE 626—Water Quality Analysis
ECom 620—Communications Systems
ECom 625/CSCI 625—Digital Systems Hardware Design
ECom 626—Digital Logic
EPow 631—Computer Analysis of Power Systems
Elec 620—Integrated Circuit Engineering
EBio 671—Biomedical Systems Analysis
EBio 672—Biomedical Instrumentation and Safety for Health Facilities
Math 671—Numerical Analysis
Math 623, 624-Advanced Calculus
ME 612—Thermo-Fluid Energy Systems
ME 621—Modeling and Simulation of f Dynamic Systems
ME 622—Applied Stress Analysis in Mechanical Design
ME 751—Computer-Aided Design
Phy 635—Reactor Physics
Phy 637—Science of Solids

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

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

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

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

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

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

DEPARTMENT OF ELECTRICAL ENGINEERING

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

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

Bioengineering Courses (EBio)

670 Biomedical Electronics 2(2,0)

Design and operation of basic biomedical electronic instrumentation. Measurement and continuous monitoring of physiological variables; ECG, body temperature, blood pressure, etc. Data acquisition, telemetry data and reduction techniques. P, EBio 300 or Elec 320 or consent.

671 Biomedical Systems Analysis 3(3,0)

Engineering concepts applied to the study of biological systems. Modeling of representative biological systems and analysis using techniques developed in engineering disciplines. P, EE 316 or equivalent.

672 Biomedical Instrumentation and Safety Health Facilities 3(3,0)

Methods for designing instrumentation for measurement and safety, analysis of instru-

ment dynamics, interpretation of electrical codes and facility safety. The course provides background material for engineers working with architects. consultants, and contractors. P, EPow 430, Elec 321.

Communication Engineering Courses (ECom)

620 Communication Systems 3(3,0) S

Information transmission, modulation, sampling theory, noise sources, introduction to statistical theory of communication. P, ECom 420 or consent.

625 Digital Systems Hardware Design 3(3,0)

Design and organization of digital systems with strong emphasis on systems hardware and its function in a digital computer. Translation of high level computer instruction into hardware designs for digital computers P, EE 445 or consent.

626 Digital Logic 3(3,0) or 3(2,3)

Logic functions design of combinational and sequential digital circuits; circuit races and hazards. P, EE 445.

720 Statistical Communication Theory 3(3,0)

Synchronization methods, signal analysis, detection and estimation theory. P, ECom 620.

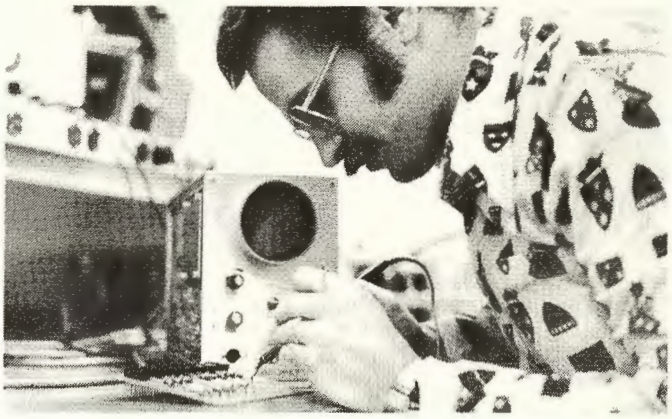
Electrical Engineering Courses (EE)

615 Linear Network Theory 3(3,0)

State variables. Laplace transform theory, matrix analysis and complex variable theory as applied to problems in circuit analysis. Topology, network theorems and network functions. P, consent.

616 Nonlinear Analysis 2(2,0)

Numerical, graphical and analytical methods of analysis. Singularities; systems with varying coefficients, stability of



nonlinear systems, describing function methods. P, consent. Alternate years.

657 Special Topics in Electrical Engineering 1-3

Special topics in the field of Electrical Engineering are included. P, consent.

685 Microwave Theory 3(3,0)

Theory of transmission lines, resonant cavities, waveguide junctions, and components. Active devices, lasers, masers. P, EE 386. Alternate years.

690 Special Electrical Problems 1-3 (On sufficient demand)

Special problem assigned in the field of electrical engineering. P, consent.

790 Thesis in Electrical Engineering 5-7

Electronics Courses (Elec)

620 Integrated Circuit Engineering 3(3,0)

Analysis and design of modern intergrated circuits. New devices and design concepts. P, Elec 320 or equivalent.

720 Advanced Electronics 3(3,0)

Electronics systems engineering, communication theory.

Power Systems Courses (EPow)

630 Power System Stability 3(3,0)

Inertia constant, swing-curves, equal area criterion, as applied to transient stability studies. P, EPow 430; EPow 432 or consent.

631 Computer Analysis of Power Systems 3(3,0)

Concept used in formulating load flow and fault study problems for computer solution. P, EPow 430; EPow 432 or consent.

632 Symmetrical Components 2(2,0)

Application of symmetrical components to simple three phase circuit, unloaded systems, loaded systems, Symmetrical component impedances. P, EPow 430; EPow 432 or consent.

633 Alternate Energy Conversion 2(2,0)

Basic principles and design equations of thermoelectric and thermionic devices, magnetohydrodynamic converters, solar cells, and fuel cells. P, EPow 430; ME 313. Alternate years.

ENGINEERING MECHANICS (EM)

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

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

Engineering Mechanics Courses (EM)

621 Introduction to Mechanics of a Continuous Medium 3(3,0) (On sufficient demand)

The general theory of a continuous medium. Kinematics of deformation and flow; stress tensors: conservation of mass, momentum, and energy; invariance requirements; constitutive equations for solids and fluids; applications for special problems. P, Math 331; EM 331.

622 Theory of Elasticity 3(3,0)

Analysis of stress and strain; equilibrium and compatibility equations; Hooke's law; fundamental problems in the theory of elasticity; plane-stress and plane-strain problems of the narrow beam, rotating discs, and 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.

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

Small-deflection theory of plates. Laterally-loaded rectangular plates. Navier and Levy solutions. Plates of various shapes, boundary conditions, and loading systems. Basic equations of the theory of shells. Design problems in cylindrical shells. P, EM 321, Math 321, Math 331, or consent.

631 Advanced Fluid Mechanics 3(3,0)

Fundamental notions of continuum, stress at a point, velocity field, and vorticity. General principles of kinematics and dynamics of a fluid. Potential flow and vortex motion. P, EM 331, Math 331 or equivalent.

DEPARTMENT OF ENGLISH

Professor Ruth Alexander, Head
Professors Giddings (Emeritus), Marken, Walz (Emeritus), West, Williams, Witherington, Yarbrough
Associate Professors Brown, Jackson, Kildahl, Nagle (Emeritus)

Graduate majors offered:

Master of Arts degree with a major in English.

Graduate minor offered:

English

Prerequisites for Graduate study:

For the graduate major a minimum of 24 semester hours of undergraduate credit in English or consent of Department Chairman. For the graduate minor a minimum of

16 semester hours of undergraduate credit in English or consent of the department chairman.

Degree requirement:

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

Option A:

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

Option C:

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

Note:

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

English Courses (Engl)

606 Workshop in English and Speech 2 Su

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

619 Comparative Novel 3(3,0) F

Selected European novels from Fielding to Camus.

620 Advanced Studies in Early English Literature 2-3(2-3,0)

Intensive study of a phase of English literature of the era before 1550.

623 Advanced Studies in Neo-Classical Literature 2-3(2-3,0)

Intensive study of an important writer or group of writers or of a significant aspect of English neoclassical literature.

624 Victorian Literature 2-3(2-3,0)

Intensive study of the chief writers of British poetry and prose from 1840 to 1900

626 Advanced Studies in Seventeenth Century Literature 2-3(2-3,0)

Intensive study of the literature of an important writer or group of writers with consideration of the relationships between the literature and the historical and social events between 1600 and 1700.

627 Advanced Studies in Elizabethan Literature 2-3(2-3,0) F

Intensive study of an area of Elizabethan literature chosen to meet the needs and interests of the students. Alternate years.

630 The English Romantic Movement 3(3,0)F

The chief writers of English Romantic poetry and prose from 1789 to 1832, with emphasis on intellectual trends.

634 Advanced Shakespeare 3(3,0) S

Intensive study of selected plays of Shakespeare and significant Shakespearean criticism.

635 Chaucer 2-3(2-3,0) F

A study of the works of Chaucer, with some attention to his sources and his language. Alternate years.

647 Pre-Civil War American Writers 3(3,0) F

A selection of writers from American transcendentalism and Romanticism.

648 The American Realists and Naturalists 3(3,0)

An examination of Post Civil War realistic and naturalistic writers.

650 Modern American Novel 3(3,0) F

Intensive study of selected American novelists after 1920 and through the post World War II novel, particularly emphasizing twentieth century themes and forms in the novel.

665 Contemporary Drama 2-3(2-3,0) F

A study of representative British and American plays from the time of Shaw to the present; some attention may be given to significant Continental plays of this era.

684 Literary Criticism 2(2,0)

The tradition of literary criticism from Plato to the present.

690 Research Tools in the Humanities 2(2,0)

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.

692 Seminar in American Indian Literature 2-3(2-3,0)

Intensive study of the American Indian literature of the past or present with concentration on the Plains Indians.

693 Seminar in English Literature 2-3(2-3,0)

Intensive study of a selected type, author, or period of English literature.

694 Seminar in American Literature 3(3,0)

Intensive study of a selected type, author, or period of American Literature.

697 Special Studies in Composition and Literature 1-3(1-3,0) FSSu

Special Studies in various areas of writing, grammar, and literature. May be repeated to total 4 credits. Given only with the permission of the Chairman of the Department of English.

705 Problems in Teaching Composition and Literature 3(3,0) SSu

Analysis of problems encountered in teaching composition and literature, and examination of teaching techniques.

758 Modern American Thought 3(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.

790 Thesis 5 Cr.

P, 690.

Linguistics Courses (Ling)

620 The New English 2(2,0) FSSu

Theory of transformational grammar and its approach to phonology, grammar, and semantics. Transformational grammar applied to language acquisition, English teaching, and second language teaching. Brief attention to stratification grammar.

643 Development of the English Language 2(2,0) 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 GENERAL ENGINEERING (GE)

Professor L. G. Skubic, Coordinator
Administrative Committee: Dean of Engineering. J. O. Storry;
Professors Ellerbruch, Rollag, Moe, Hooks, Skubic

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

600 Seminar 0(1,0) FS

601 Seminar 1(1,0) FS

770 Engineering Design Paper 1-2 cr.

DEPARTMENT OF GEOGRAPHY

Professor Edward P. Hogan, Head
Professors Gritzner, Johnson, Reeves;
Associate Professor Opheim

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 also 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 would be 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: an interdisciplinary Planning minor; the Annual Classroom on Wheels Field Experience; the Futurology Institute; the Industrial Development Workshop; and the Workshop on Teaching South Dakota 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 programs with the EROS Data Center and Remote Sensing Institute. Internships are available with planning districts, governmental agencies and business and industry.

Graduate minor offered:

Geography, Planning

Prerequisites for graduate study:

A Bachelor's degree with 24 credits in social science of which 12 credits must be in Geography. If the student is deficient in these areas the deficiency must be removed as early as possible.

Credit Requirements

A minimum of thirty (30) semester credits are required 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 from 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.

Geography Courses (Geo)

603 Evolution of Geographic Thought 2(2,0) F

The history and development of geography and its theories, schools of thought and current ideas.

606 Seminar in Systematic Geography (Topical) 1-4 FS

Selected topics in systematic geography. The seminars will deal with one or more aspects of human geography, economic geography, 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 1-4

Studies in selected geography fields.

760 Advanced Demographic Theories and Techniques 3(3,0) S 1983

(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.

788 Advanced Geographic Technique (Topical) 1-4(1,4,0) FS

Selected geographic techniques such as cartography, aerial photograph interpretation, remote sensing, information systems and map interpretation. This course may be repeated for credit. The specific topic to be studied will change each semester.

790 Thesis in Geography MS 1-6

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

792 Special Problems in Geography (Topical) 1-4

Selected studies in geography to meet the needs of advanced students.

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION AND RECREATION

Professor Harry Forsyth, Head
Professors Blazey, Huether, Williamson,
Associate Professors Booher, McKeown

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, and prerequisites to the courses to be pursued.

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

Thesis Option:

Option A requires a minimum of 30 semester credits, including a thesis.

The thesis may be completed in an area of specialization of Health, Physical Education and/or Recreation.

Non-thesis Options:

Option B requires a minimum of 32 semester credits, including HPER 792 (Individual Research), and a comprehensive oral examination.

Option C requires a minimum of 35 semester credits and comprehensive written and oral examinations.

Obtain further details from the Health, Physical Education and Recreation Department.

Health Education Courses (Hlth)

760 Advanced Administration of School Health Programs 2(2,0) FSu

Methods of health instruction; problems of health service; problems in supervision of health environment; recent trends and problems in safety education. P, permission of staff.

Health, Physical Education and Recreation Courses (HPER)

681 Workshop in Health, Physical Education, and Recreation 1-3 Cr.

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) Su

Courses designed to offer current information on subjects of interest in field.

741 Philosophy of Physical Education and Recreation 3(3,0) F Su

Discussion and analysis of major philosophic 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) SSu

Psychological principles, theories and laws applied to physical education and athletic situations. Interpretation of behavior in sports. P, consent.

743 Basic Issues in Health, Physical Education and Recreation 2(2,0) Su

Directed reading in recent literature in field; discussion of current problems; critical analysis of recent research. P, consent.

760 Motor Learning and Development 3(2,2) SSu

Analysis of various teaching methods. Survey of research in motor learning. Demonstrations and study of methods applied to various activities. P, consent.

783 Research Methods in Health, Physical Education and Recreation 3(3,0) FSu

Methods and techniques of research in field, critical analysis of masters and doctors thesis, practice of research techniques. P, consent.

792 Individual Research and Study in Health, Physical Education and Recreation 1-4 credits FSSu

Special problems by individuals. Results of study presented in special reports and term papers. P, major in this field.

790 Thesis in Health, Physical Education and Recreation 5-7 Cr.

Physical Education (PE)

660 Methods and Materials for Elementary Physical Education 2(2,0) Su

Analysis of activities, materials, techniques, and methods used in conduct of physical education for elementary grades. Progression in curriculum planning in areas of rhythm, games, self-testing, and tumbling. P, consent.

744 Supervision of Health and Physical Education 2(2,0) Su

Techniques, principles, organization and philosophy of supervision in this field. P, consent.

750 Scientific Basis of Physical Education 2(2,0) Su

Investigation of the latest developments in the sciences which relate to the field of physical education. P, consent.

751 Advanced Evaluation in Health, Physical Education, and Recreation 3(3,0) SSu

Advanced techniques for evaluating outcomes of physical education. Practice in test performance and administration. Some laboratory work may be required. P, consent.

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 only

For men who are experienced in the coaching profession. Lectures, demonstrations, and visual aids will be used to give students the latest developments in the field of football, basketball, wrestling, baseball, and track coaching. P, one year coaching experience.

Recreation Courses (Recr)

740 Recreation and Leisure in American Society 2(2,0) S Su

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 Sweeney, Volstorff (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 Courses (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.

671-672 Cultural History of the United States 3(3,0)

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)

A detailed 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 Cr.

Selected studies for advanced students.

793 Seminar in History 1-3 Cr.

Studies in selected history, arranged according to demand.

COLLEGE OF HOME ECONOMICS

Ardyce Gilbert, Dean

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

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

The degree granted is the Master of Science in Home Economics. This degree gives the student an opportunity to acquire a broad education with a measure of specialization within the field of Home Economics.

Students will take course work not only from the home economics departments but from departments throughout the University which are related to the student's research area, such as Psychology, Rural Sociology, Education, Microbiology, Chemistry, Economics, Guidance and Counseling, etc.

The formal course offerings for the Master of Science in Home Economics are divided into three groups; research requirements,

subject-matter specialization and supporting courses.

The research requirements involve 9-10 credits and consist of the following courses:

Statistics 341—Statistical Methods

Home Economics 701—Seminar in Home Economics

Home Economics 791 — Research Methods in Home Economics.

Home Economics 790 — Thesis in Home Economics

or, 793 — Individual Research and Study

or, 794 — Internship

At least three courses in the area of specialization are required.

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

600 Practicum in Home Economics Related Occupations 2-6 Cr.

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

601 Seminar 2 Cr.

673 Special Problems 1-4 Cr.

701 Seminar in Home Economics .5-1 Cr. (On sufficient demand)

Reports and discussion of research in various areas of home economics. Required of graduate majors.

790 Thesis in Home Economics 5-7 Cr.

791 Research Methods in Home Economics 3

Empirical methods of solving problems in Home Economics. Formulation of a research problem and plan. Evaluation of research reports. P, Stat 211 or equivalent and consent.

792 Problems in Home Economics 2 Cr. (On sufficient demand)

Investigation of problems selected from Home Economics fields. P, consent.

793 Individual Research and Study 5-7 Cr.

794 Internship 5-7 Cr.

DEPARTMENT OF HOME ECONOMICS EDUCATION

Professor Edna Page Anderson, Head
Professor Gilbert

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 Courses (HEd)

701 Trends in Home Economics Education 2(2,0) (On sufficient demand)

Trends in family life education, with emphasis on their effect on teaching in high school classes or youth groups.

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 Education 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.

751 Curriculum in Home Economics Education 2(2,0) (On sufficient demand)

Curriculum in secondary schools of South Dakota and other states. New ideas developed. P, 412 or equivalent.

761 Evaluation in Home Economics Education 2(2,0) (On sufficient demand)

Methods and techniques used in evaluating programs in homemaking. Evaluation instruments developed. P, 412 or equivalent.

DEPARTMENT OF JOURNALISM AND MASS COMMUNICATION

Professor Richard W. Lee, Head
Associate Professors Laird (Emeritus), Wentzy (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) those who teach communications courses in high school, who have school public relations responsibilities, or who supervise school publications; and (3) individuals with undergraduate degrees in non-journalism specialties who wish to improve their mass communications skills.

Courses outside the department of journalism are accepted toward the degree with consent of the department head and adviser.

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

Graduate minor offered:

Journalism.

Prerequisites for graduate study:

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

General Communication (GCom)

605 Theories of Communication 3(3,0) S

Examination of major theories of communication including the mass media and interpersonal communication.

606 Public Opinion and Propaganda 3(3,0) F

Formation and measurement of public opinion; the role of the mass media; propaganda techniques, agencies, theories.

Mass Communication (MCom)

610 Seminar in Mass Communication 2(2,0) F

Work in selected areas of journalism and mass communication including special investigation, reports and discussion.

615 Editorial Writing and Policy 2(2,0) F

Opinion function of periodicals; great editorials 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 Cr. FSSu

Individual research and study in communcation. May be repeated to a total of four credits in problems courses. P, consent.

653 Workshop in Communication 1-4 cr. Su

Understanding the mass media; using media in the classroom, supervising school publications. For high school or college instructors and publication advisers.

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

Directed research. May be repeated to a total of 4 credits in problems courses. P, consent.

664 Film Studies 3(3,0) F

See MCom 664 under Department of Speech

672 The 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) S

Interpreting institutional and industrial policies and programs to the public.

790 Thesis in Journalism 1-6 Cr. FSSu

791 Research Methods in Communication 3(3,0) F

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, Engebretson (Emeritus), Kranzler, Richards, Walder (Emeritus), Wente (Emeritus);
Associate Professor Lacher

Graduate majors offered:

Master of Science with a major in Mathematics.

Graduate minor offered:

Mathematics.

Prerequisites for graduate study:

For the graduate major a Bachelor's degree with a major in mathematics or the equivalent.

For the graduate minor a Bachelor's degree with prerequisites to the subjects elected for graduate study.

Three options for Master of Science degree:

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

Option B requires a minimum of 32 semester credits including a research paper (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 Courses (Math)

621 Complex Variables 4(4,0) On demand

Algebra of complex numbers, classifications of functions, differentiation, integration, mapping, transformations, infinite series. P, 225.

623-624 Advanced Calculus 3(3,0) FS

Set theory, real number system, topology of Cartesian n-space, convergence, continuous functions; differentiation, integration, and infinite series. P, 225 or equivalent.

627 Vector Analysis 3(3,0) (On demand)

Vector algebra, vector functions, vector calculus with emphasis on various physical applications. P, 225.

631 Partial Differential Equations 3(3,0) On demand

Series, solutions, total differential equations, simultaneous equations, approximate solutions, partial differential equations of first and second orders, application. P, 321.

666 Projective Geometry 3(3,0) S

Synthetic and/or analytic approach to geometric properties invariant under projective transformations: theorems of Desargues, Pascal, Brianchon and applications. P, 224 or consent.

671 Numerical Analysis 3(3,0) S

Survey of numerical methods including methods of interpolation, curve fitting, integration, solving equations (including differential equations with initial or boundary values). Errors of the methods analyzed and digital computer is used to apply methods. P, 321.

683 Applied Probability Theory 3(3,0) F

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

790 Thesis in Mathematics 5-7

793-794 Advanced Topics in Mathematics 1-3(1-3,0) FS

DEPARTMENT OF MECHANICAL ENGINEERING

Professor L.E. Hooks, Head
Professor Christianson

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 Courses (ME)

611 Statistical Thermodynamics 3(3,0)

Review of classical thermodynamics. Principles of kinetic theory and classical statistical mechanics. Principles of quantum mechanics, quantum statistics, partition functions, and thermodynamic properties. P, 312, Math 321, Phy 331 or consent.

612 Thermo-Fluid Energy Systems 3(3,0)

Review of viscous fluid flow, basic modes of heat transfer, and thermodynamic energy conversion. Discussion of energy sources, uses, conversion, transmission and economics. Analysis of conventional energy generation, storage and transmission systems, criteria for design and analysis of energy systems such as nuclear, wind, solar, geothermal, ets. P, 312, 415; Math 331 or equivalent.

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

Application of physical laws, mathematical methods, and computers to the development and analysis of models of advanced dynamic systems of engineering interest. Analog simulation by using analog/hybrid EAI 380 computer. Digital logic, and parallel hybrid simulation. Digital simulation by using FORTRAN and IBM System/370 digital computer. Continuous system simulation languages. Emphasis is on the methods of modeling and simulation rather than the systems modeled. P, Math 321 and consent.

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

Advanced solutions of practical stress-analysis problems related to mechanical structures and machine components. Elasticity equations and energy theorems. Stresses in thin-walled structures, and stability analysis. Discrete structures by matrix-force and matrix-displacement methods. Continuous structures by finite-element methods. Application to mechanical design problems. P, 421, Math 331 or consent.

631 Gas Dynamics I 3(3,0)

Objectives, applications, and scope of the subject. Methods of fluid dynamics and thermodynamics. Compressible flow in ducts, nozzles, and diffusers. Propagation of plane waves; shock dynamics, characteristics, interaction of waves. General theorems of gas dynamics. P, 312, EM 331, Math 331.

632 Viscous Flow Theory I 3(3,0)

Fundamental laws and equations of motion for a viscous fluid; exact and approximate solutions for the laminar boundary layer; creeping flow; flow in internal passages; secondary flow; compressible boundary layers; thermal boundary layers in laminar flow. P, EM 631.

641 Advanced Metallurgy 3(3,0)
Crystal lattices and diffraction by crystals. Structure determination, defects, registration by microscopic methods, single crystal orientation and analysis of stress caused by phase transformation. P, 341, Math 321.

651 Advanced Analytical Methods 3(3,0)
Practical engineering differential systems are examples for developing solution techniques. Functional approximations, coordinate changes, numerical methods, integral solutions, orthogonal functions, and Green's functions are discussed. Solutions are related to the original engineering systems. P, Math 331 or permission.

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

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

663 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. P, 662 or consent.

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

695 Special Topics 1-3

711 Advanced Heat Transfer I 3(3,0)
Derivation of the heat-conduction equation and basic relations. Advanced analytical methods of solutions of boundary-value problems of steady and unsteady heat conduction, and multidimensional heat conduction in several orthogonal coordinate systems. Nonlinear problems including heat flow in anisotropic solids. P, 415, Math 331 or equivalent.

728 Topics in Advanced Machine Design 3(3,0)
Stress analysis, elastic energy theory, photoelasticity, curved beams, thin plates and shells, torsion, fatigue, and stress concentration. Criteria of fail-safe design based upon fracture-mechanics approach. P, 421, EM 622.

731 Gas Dynamics II 3(3,0)
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, 631.

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

761 Decision Theory 3(3,0)
Examination and evaluation of modern techniques of decision making. Mathematical models and measurement theory. Certainly, risk, and uncertainty. Prediction and optimal decisions. Game theory. Simulated decision making. P, consent.

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

790 Thesis 5-7

794 Special Problems 1-3 Cr.

DEPARTMENT OF MICROBIOLOGY

Professor Robert Pengra, Acting Head
Professors Baker, Semeniuk (Emeritus), Sword, Westby;
Associate Professors Hillam, Kirkbride, McAdaragh

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 Courses (Micr)

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

624 Virology 3(2,3) S
Viral characterization, structure and replication. Pathogenesis and pathology of viral diseases in man and animals. Laboratory exercises in viral structure, isolation and characterization. Pathology of animal viral infections. P, 422 or consent.

636 Molecular and Microbial Genetics 4(4,0) F
Basic course in molecular genetics and DNA recombinant techniques. Examples to illustrate genetic principles are drawn from all forms of life. P, 321, Bio 371. General microbiology recommended.

637 Systematic Bacteriology 4(2,4)F
Techniques for isolation, indentification, 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) and consent.

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

713 Industrial Microbiology 4(2,4) S 1983
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. 535-635 and Chem 260 (or equivalent) are recommended.

738 Microbial Metabolism 4(2,4) S 1982
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 Courses (Mus)

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

COLLEGE OF NURSING

Carol J. Peterson, Dean
Professors Blazey, Johnson, E. Peterson;
Associate Professors Gilliland, Hardin, Hofland

Program Focus

The general purpose of graduate education is to prepare professional leaders with special knowledge and skills to meet the nation's nursing needs in nursing service and nursing education. The aim of the program at South Dakota State University is to prepare nurses at an advanced level in adult nursing and in the functional roles of 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.

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.
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 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 adults 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.

Core Courses

Nurs 610 Theory and Conceptual Frameworks in Nursing
Nurs 620 Pathophysiologic 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 Roles:

1. Educator
   Nurs 710 Curriculum Development in Nursing
   Nurs 775 Nurse Role Practicum. Section 1. Nursing Education
2. Advanced Clinician
   Nurs 770 Clinical Nursing Specialization
   Nurs 775 Nurse Role Practicum. Section 3; Advanced Clinical Practice (required for persons seeking certification as Nurse Practitioner)
3. Patient-care Manager
   Nurs 725 Patient Care Management
   Nurs 775 Nurse Role Practicum. Section 2; Patient Care Management

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 three (3) additional elective credits.

Nursing Courses (Nurs)

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

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

630 Nursing Science 2(0,6)
Experience in systematic assessment of client/patients in the identification of nursing diagnoses with emphases 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.

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

692 Special Problems 1-3(1-3,0-3)
(On sufficient demand)
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 seniors, RN's and/or graduate students by consent. Limit of 3 credits can be applied to a degree.

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 610).

695 Special Topics 1-3(1-3,0)
(On sufficient demand)

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 seniors, RN's and/or graduate students by consent. Limit of 3 credits can be applied to a degree.

710 Curriculum Development in Nursing 2(2,0)

Principles of curriculum development and their application to the nursing school curriculum. Selection, organization and evaluation of learning experiences. (P or concurrent, Nurs 610, or consent of instructor).

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).

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).

760 Advanced Concepts in Nursing I 3(2,3)

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 620).

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 782).

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, Nurs 720).

775 Nurse Role Practicum 4-12(0,12-36)

Supervised experience in nursing role:
Section 1.

Nursing Education. Teaching in classroom and/or clinical services. (P or concurrent Nurs 710, P Nurs 765)

Section 2.

Patient Care Management. Nursing middle management in selected patient care settings. (P or concurrent, Nurs 725, P Nurs 765).

Section 3.

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

780 Advanced Seminar in Nursing 1-3(1-3,0)
(On sufficient demand)

Discussion and reports of current literature, practices, or research in nursing. (P, consent) Limit of 3 credits applied to master's degree.

782 Advanced Communication for Nursing Practice 3(2,3)

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)

790 Thesis in Nursing 5

792 Problems in Nursing Research 2(2,0)

Application of the nursing research process with particular emphasis on problems of inquiry in the health care system. (Non-thesis option)

DEPARTMENT OF NUTRITION AND FOOD SCIENCE

Professor Thomas Beattie, Acting Head
Associate Professors Johnson, Wills (Emeritus)

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

Nutrition and Food Science Courses (NFS)

603 Seminar in Food and Nutrition 1-2
(On sufficient demand)

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

661 Special Problems 1-3 Cr. as arranged

Special study in food and nutrition. P, consent.

724 Recent Developments and New Approaches in Human Nutrition 3(3,0) (on sufficient demand)

Emphasis on new concepts in nutrition and resultant impact of changing dietary patterns on health and behavior. Insights essential for recognition of dietary needs and practical educational techniques to evoke favorable changes in food consumption patterns.

734 Techniques in Nutrition Research 3(1,6) (on sufficient demand)

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

743 Current Topics in Foods 3 Cr. (on sufficient demand)

Continuing changes in food processing and preparation techniques, modes of food distribution and food consumption patterns. Recent legislation regulating food labeling and food additives. Changes in food marketing practices resulting from increasing consumer demands for convenience packaging and prepared foods.

DEPARTMENT OF PHYSICS

Professor J. Tunheim, Head
Professors Duffey, Graetzer, Miller;
Associate Professor Leisure;
Assistant Professor Sippel

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

Physics Courses (Phys)

625 Plasma Physics 3(3,0)

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

635 Reactor Physics 3(3,0) S

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

637 Science of Solids 3(3,0) on demand

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

643 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.

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 Schwarzchild solution. P, 351.

695 Special Topics 1-3

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

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

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

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

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

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

790 Thesis 5-7 as arranged. FS

PLANNING

Professor E. Hogan
Chairman and Coordinator

Graduate Minor

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

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

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

Planning Courses (Plan)

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

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

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

DEPARTMENT OF PLANT SCIENCE

Professor Maurice L. Horton, Head
Professors Arnold, Brage, Buchenau, P. Carson, Dybing (USDA), Fine, Gardner, Kahler (USDA), Kantack, Kenefick, Kieckhefer (USDA), Kinch (Emeritus), Kirk (USDA), Lay, Mankin, McDaniel, Moore, Nagel (Emeritus), Price (USDA), Reeves, Ross, Semeniuk (Emeritus), Shank (Emeritus), Shubeck, Walgenbach, Walstrom,
Wells, Westin (RSI), White, Wood;
Associate Professors Kohl, Lunden, Malo;
Assistant Professor Easton

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.

Entomology Courses (Ent)

611 Insect Ecology 3(2,2) S 1983
Comprehensive study of insects in relation to their environment. Effects of microclimate and macroclimate on predators, parasites, disease, reproduction, development and feeding habits of insects. Techniques for determining various factors important to survival and reproduction in the insect's environment. P, Biol 211. Alternate years.

621 Insect Anatomy 3(2,2) F 1982
Detailed anatomy of insects; integument, appendages, sense organs, and organ systems of representative larval, nymphal and adult forms. Consideration given to structural variation, embryology, and evolutionary relationships. Alternate years.

623 Insect Physiology 3(2,2) S 1983
Fundamental physiological process in insects. Normal and abnormal functioning of adult and immature stages, developmental physiology, physiology of behavior. P, Ch 120 and consent. Alternate years.

671 Insect Toxicology 3(2,2) S 1983
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.

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

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

790 Thesis in Entomology 5-7 Cr.

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

Plant Science Courses (PS)

604 Virus and Bacterial Diseases of Plants 4(2,4) F 1982
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.

613 Host-Plant Pathogen Interactions 3(2,2) S 1983
Physiology and genetics and host-parasite interactions. Disease resistance. P, consent. Alternate years.

633 Advanced Soil Genesis 3(2,3) S 1982
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 vears.

634 Plant Nematology 3(2,4) F 1983
Nematode diseases of plants with emphasis on collection, isolation, preservation, symptomology, identification, life histories and control of plant parasitic nematodes. P, consent. Alternate years.

643 Physical Properties of Soils 3(3,0) F 1982
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.

653 Advanced Genetics 3(3,0) S 1982

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

654 Chemical Properties of Soils 4(4,0) F 1983

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

663 Environmental and Physiological Aspects of Crop Production 3(3,0) S 1983

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

673 Cytogenetics 3(2,3) F 1981

The nature and behavior of chromosomes in relation to heredity. P, Bio 371 or 343. Alternate years.

681 Crop Breeding Techniques 1 Su

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.

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

Advanced study of one or more selected topics. 1. Biometrical Genetics, 2. Experimental Design, 3. Mycology, 4. Nematology, 5. Phytobacteriology, 6. Plant Breeding, 7. Soil Chemistry, 8. Soil Fertility, 9. Soil Genesis, 10. Soil Mineralogy, 11. Soil Physics, 12. Virology, 13. Weed Control, 14. Cytogenetic Applications, 15. Teaching Experience (2 Cr. maximun). P, consent for all Special Topics.

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, plant pathology, and soils. (2 Cr. required for M.S.; 3 Cr. for Ph.D.).

790 Thesis—M.S. 5-7

890 Thesis—Ph.D. var.

DEPARTMENT OF POLITICAL SCIENCE

Professor H. Cheever, Head
Professor J. P. Hendrickson

Graduate majors offered

None.

Graduate minor offered:

Political Science.

Prerequisites for graduate study:

For the graduate minor a Bachelor's degree with major or minor in Political Science.

Political Science Courses (PolS)

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

Individual guided research culminating in formal research paper. Consent required for those students not minoring in Political Science. May be repeated until 6 credits are earned.

DEPARTMENT OF RURAL SOCIOLOGY

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

Graduate majors offered

1. Master of Science Degree With Major in Rural Sociology. Two Options:

   Option A requires a minimum of 30 semester credits, including a thesis (5-7 credits and comprehensive oral examination.

   Option B requires a minimum of 32 semester credits, including a research paper (3 credits) and comprehensive oral examination.

   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.

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 a Bachelor's degree, including prerequisites for the graduate courses elected, or consent of the department.

Anthropology Courses (Anth)

690 Special Problems in Anthropology 1-3 F S Su

P, open to undergraduate and graduate students with sufficient background and consent.

791 Seminars in Anthropology 1-4 Cr. (On demand) F S Su

Rural Sociology Courses (Soc)

615 Social Thought 3(3,0) Su 1982

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) S 1983

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) S 1982

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) F 1983

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. Alternate years.

633 Leadership and Group Organization 3(3,0) F 1983

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) Su 1982

Structure, activities, problems, resources, and functions of the rural community; methods and techniques of community organization; institutional services and leadership with economic and social relationships of the small community to both open country and urban centers.

698 Social Deviance 2(2,0) S 1982

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 emperical investigations of social deviance.

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.

712 Sociological Theory I 3(3,0) F
Critical examination of the main schools of sociological theory beginning with the system of Auguste Comte an ending with 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.
760 Advanced Demographic Theories and Techniques 3(3,0) S 1983
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.
780 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 F S Su
P, Major and Planning option.
790 Thesis—M.S.
791 Seminars in Sociology 1-4 Cr. F S Su (On demand)
793 Research Paper in Sociology 1-3 FSSu
890 Thesis—Ph.D.

DEPARTMENT OF SPEECH

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

Graduate majors offered:

The Master of Arts degree with a major in Speech

Graduate minor offered:

Speech

Prerequisites for graduate study:

For the Master of Arts degree with a major in Speech: a minimum of 20 semester hours of undergraduate credit in Speech, Theatre, Journalism, or Communication.

For the graduate minor in Speech; a minimum of 12 semester hours of undergraduate credit in Speech, Theatre, Journalism, or Communication; or the consent of the Department Head.

Those students who do not meet the above prerequisites may consult the Head of the Department of Speech concerning arrangements for removal of deficiencies. Before registering for graduate work leading toward a master's degree with a major in speech, the student must consult the Head of the Department of Speech who will assign an 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 advisor to bring the combined total to not less than 30 semester hours; and (2) Completion and approval of a thesis based on appropriate research.

General Communication (GCom)

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

Mass Communication (MCom)

637 Educational Radio and Television 3(3,0)
Educational broadcasting with practical work in the preparation and presentation of educational and instructional materials for radio, television, and film and their use in the classroom.
660 Special Problems in Radio, Television or Film 1-2 Cr.
664 Film Studies 3(3,0)
Film art forms, artists, and critics. Viewing and making films.
791 Research Methods in Communications 3(3,0)
See MCom 791, Research Methods in Communication under Department of Journalism and Mass Communication.

Speech Communication Courses (SpCm)

616 History and Criticism of American Public Address 3(3,0)
Critical evaluation of American speakers from Colonial to contemporary period. P, consent.
624 Persuasion 2(2,0)
Audiences, motivation, principles of attention and suggestion, bases of belief and action applicable in persuasive speaking. Theory, practice. P, 315.
652 General Semantics 3(3,0)
Relations between symbols; human behavior in reaction to symbols including unconscious attitudes, linguistic assumptions; and the objective systematization of language.
666 Rhetorical Theory 3(3,0)
Historical development of rhetorical theory from classical to modern times.
676 Directing Speech Activities 3(3,0) SSu
Organizing and directing oral interpretation, dramatic, and forensic programs.
'92 Special Problems in Oral Interpretation 1 or 2 Cr.
Directed research. May be repeated to a total of 4 credits in problems courses. P, consent.
694 Special Problems in Public Address 1 or 2 Cr.
Directed research. May be repeated to a total of 4 credits in problems courses. P, consent.
696 Special Problems in Speech Education 1 or 2 Cr.
Directed research. May be repeated to a total of 4 credits in problems courses. P, consent.
790 Thesis 5-7 credits

Theatre Courses (Thea)

610 Dramatic Literature 3(3,0)
Intensive readings and study of plays.
660 History of Theatre 3(3,0)
Periods, theatres, and representative dramatic literature from primitives to present day.
690 Special Problems in Theatre 1 or 2 Cr.
Directed research. May be repeated to a total of 4 credits in problems courses. P, consent.

STATISTICS (Stat)

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

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

The teaching of statistics is governed by an administrative committee appointed by and responsible to the Vice President for Academic Affairs. The statistics faculty is appointed by the Vice President for Academic Affairs from the departments involved in this area.

641 Statistical Methods II 3(3,0) S
Analysis of variance, various types of regression, and other statistical techniques and distributions. Sections will be offered in the areas of Biological Science, Physical Science, and Social Sciences. P, 341 or Math 381.
791 Special Topics in Statistics 1-3, 6 max/student
Advanced study of one or more selected topics as student need justifies; for example, sampling, statistical genetics, multivariate statistics. P, Stat 641.

DEPARTMENT OF TEXTILES, CLOTHING & INTERIOR DESIGN

Professor Alexandra Semeniuk, Acting Head
Professors Lund (Emeritus), Lyle (Emeritus) Rosenberger (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 Courses (TCID)

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

673 Fashion, Art and Textiles Tour 3(3,0) Su
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.

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

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

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

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

VETERINARY SCIENCE (Vet)

Professor Mahlon Vorhies, Head
Professors Bergeland, Roller, Swanson;
Associate Professors Kirkbride, McAdaragh

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

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

DEPARTMENT OF WILDLIFE AND FISHERIES SCIENCE

Associate Professor Charles Scalet, Head
Professor Linder(USDI),
Associate Professors Applegate (USDI), Flake

Graduate major offered:

Master of Science degrees with majors in Wildlife and Fisheries Sciences (Wildlife) and Wildlife and Fisheries Sciences (Fisheries).

Graduate minor offered:

Wildlife Biology.

Prerequisites for graduate study:

For the graduate major in Wildlife and Fisheries Science a Bachelor's degree with at least 14 credits in the area of wildlife conservation and closely allied biological fields.

For the graduate minor in Wildlife Biology a Bachelor's degree with at least 6 credits in the wildlife area and prerequisites to the graduate courses to be taken.

Deficiencies in the prerequisites for graduate study may be made up during the first year of graduate study, but may not apply to the graduate program.

Wildlife and Fisheries Science Courses (WL)

***611 Limnology** 4(2,6) S 1982
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 Fisheries Science** 3(2,3) F 1982
Methods employed to evaluate and manage fish populations for sport and commercial fishing. Principles and techniques related to the following topics are included: fish population dynamics, population manipulation, habitat evaluation and management, fish propagation, evaluation and regulation of fish harvest. P, WL 367, 412, or consent. Alternate years.

***615 Upland Game Management** 3(2,3) S 1983
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 Management** 3(2,3) S 1982
Big game animals life histories and field techniques for research and management. Recreational, economic, and aesthetic importance of big game. Interaction between big game species and domestic livestock. P, WL 411 and consent. Alternate vears.

***619 Waterfowl Management** 3(2,3) F 1983
Analysis of ecological and socio-economic factors affecting waterfowl habitat and waterfowl populations. State and Federal programs affecting wetland drainage and wetland preservation. Techniques of wetland management. Field inspection of waterfowl production habitat in the north-central states. P, WL 411 and consent. Alternate years.

***690 Special Topics in Wildlife and Fisheries** 1-3 Cr. as arranged F S Su
(Limit of 5 credits for M.S. degree)
Graduate and senior undergraduate students may secure on demand individualized and small-group instruction in a variety of topics such as technical writing, wildlife pathology, advanced theory of population regulation, predation, animal behavior, ecology of aquatic invertebrates, water chemistry, and others. P, consent.

691 Wildlife Research Problems 1-2 Cr. as arranged F S Su
(Limit of 2 credits for M.S. degree)
Qualified students may investigate special wildlife problems under supervision of department staff. Arrangements must be made with supervising staff member prior to registration.

***711 Aquatic Ecology** 4(2,6) F 1983
Qualitative and quantitative measurements of aquatic populations including primary production and biomass. Interrelationship of biotic and abiotic components of aquatic ecosystems. Productivity and factors affecting rates of transfer of energy and matter within aquatic communities will be stressed. P, Zool 357 or WL 611 and consent. Alternate years.

***713 Animal Population Dynamics** 3(2,3) F 1982
Methods of analysis and interpretation of vital statistics of animal populations. Current theories on natural regulation of animal populations. Particular emphasis on vertebrate species of economic and/or recreational importance. Comparison of environmental controls on population in various animal groups. P, consent. Alternate years.

790 Thesis in Wildlife 5-7 credits as arranged F S Su

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

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

GRADUATE FACULTY

AANDERUD, WALLACE G., Extension Farm Management Specialist, Professor of Economics, 1963, B.S. North Dakota State University, 1950; M.S. 1960; Ph.D., Oklahoma State University, 1964.

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.

ALLEN, HERBERT R., Professor of Economics, 1967; B.S., Iowa State University, 1950, M.S., 1952; Ph.D., SDSU, 1968.

ANDERSON, EDNA P., Professor and Head of Home Economics Education, 1978; B.S., Winthrop College, 1963; M.S. 1966; Ph.D., Pennsylvania State University, 1976.

ANTONIDES, ROBERT J., Extension Marketing Specialist, Associate Professor of Economics, 1953; B.S., SDSU, 1947, M.S., 1953.

APPELGATE, RICHARD L., Associate Professor of Wildlife and Fisheries, USDI, 1967, B.A., Southern Illinois University, 1959; M.A. 1961, Ph.D., SDSU, 1974.

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

BAILEY, JR., HAROLD S., Vice President for Academic Affairs, Professor of Pharmacy, 1951, B.S., Massachusetts College of Pharmacy, 1944, M.S., 1948; Ph.D., Purdue University, 1951.

BAKER, ROSCOE J., Professor of Dairy Science, Professor of Microbiology, 1950, B.S., Iowa State University, 1942, M.S., 1947, Ph.D., 1950.

BARNES, ALLEN R., Dean of Arts and Science, Professor of Foreign Languages, 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.

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

BENNETT, LARRY E., Professor of Mathematics, 1970; B.S., University of Oklahoma, 1965, M.A., 1967, Ph.D., 1970.

BERG, SHERWOOD O., President, 1975; B.S., SDSU, 1947; M.S., Cornell University, 1948; Ph.D., University of Minnesota, 1951.

BERGELAND, MARTIN, Professor of Veterinary Science, 1973; B.S., University of Minnesota, 1957; D.V.M., 1959; Ph.D., 1965.

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

BLAZEY, CHARLES H., Professor and Head of Health Science, Professor of Health, Physical Education and Recreation, 1965; B.S., University of State of New York (Brockport), 1959, M.S., 1960, D.Ed., University of Oregon, 1971.

BOOHER, JAMES M., Associate Professor of Health, Physical Education and Recreation, Athletic Trainer, 1967; B.A., Nebraska Wesleyan, 1965; R.P.T., School of Physical Therapy, Mayo Clinic, 1967; M.S., SDSU, 1969; Ph.D., University of Utah, 1976.

BRAGE, BURTON L., Associate Dean of Agriculture and Biological Sciences, Director of Resident Instruction, Professor of Plant Science, 1950; B.S., University of Minnesota, 1946, Ph.D., 1950.

BRANDWEIN, BERNARD J., Professor of Chemistry, 1955; B.S., Purdue University, 1948. M.S., 1951, Ph.D., 1955.

BROWN, MARY MARGARET, Professor of English, 1955; B.A., Briar Cliff College, 1938; M.A., University of South Dakota, 1947, Ed. D., 1964.

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

BUSH, LEON F., Associate Professor of Animal Science, 1954; B.S., University of Kentucky, 1950, M.S., 1951; Ph.D., Cornell University, 1954.

CARLSON, C. WENDELL, Professor of Animal Science, Leader of Poultry Research and Extension Section, 1949; B.S., Colorado State University, 1942; M.S., Cornell University, 1948, Ph.D., 1949.

CARSON, PAUL L., Professor of Plant Science, 1948; B.S., Northwest Missouri State University, 1941; M.S., Iowa State University, 1947.

CHEEVER, JR., HERBERT E., Professor and Head 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.

CHISHOLM, TOM, Associate Professor of Agricultural Engineering, 1977; B.S., New Mexico State, 1964; M.S., SDSU, 1967; Ph.D., Oklahoma State University, 1970.

CHRISTIANSON, KENNETH D., Professor of Mechanical Engineering, 1955; Registered Professional Engineer (South Dakota); B.S., SDSU, 1949, M.S., 1958.

CHRISTIANSON, LESLIE L., Assistant Professor of Agriculture Engineering, 1979; B.S., SDSU, 1973; M.S., 1976: Ph.D., University of Missouri, 1978.

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

COLLINS, PAUL E., Professor of Horticulture, 1951; B.A., Gustavus Adolphus, 1939; B.S., University of Minnesota, 1948, M.S., 1949, Ph.D., 1967.

CROSSWAIT, BRUCE C., Coordinator of West River Graduate Programs in Education, 1978; B.S., Black Hills State College, 1950; M.Ed., University of Wyoming, 1956; Ed.D., University of Kansas, 1967.

DAY, RANDAL, Assistant Professor of Child Development and Family Relations, 1977; B.S., Brigham Young University, 1973; M.S., University of Wisconsin, 1975; Ph.D., Brigham Young University, 1977.

DEARBORN, DELWYN, Dean, College of Agriculture and Biological Sciences, Professor of Animal Science, 1956; B.S., SDSU, 1954; M.S., 1959; Ph.D., University of Nebraska, 1971.

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

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.

DIMIT, ROBERT M., Professor of Rural Sociology, 1952; B.A., Pennsylvania State University, 1948; M.S., 1949; Ph.D., Iowa State University, 1954.

DINKEL, C.A., Professor of Animal Science, 1951; B.S., Iowa State University, 1948; M.S., SDSU, 1949; Ph.D., Iowa State University, 1953.

DOBBS, THOMAS L., Community Resource Development Specialist, Associate Professor of Economics, 1978; B.S., SDSU, 1965; Ph.D., University of Maryland, 1969.

DORNBUSH, JAMES N., Professor of Civil Engineering, 1949; Registered Professional Engineer (Minnesota); B.S., SDSU, 1949; M.S., University of Minnesota, 1959; D.Sc., Washington University, 1952.

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

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

EASTON, EMMETT R., Assistant Professor of Plant Science, 1977; B.S., Pennsylvania State University, 1965; M.S., Texas A&M University, 1967; Ph.D., Oregon State University, 1972.

EDEBURN, CARL E., Associate Professor of Education, 1973; B.S., St. Cloud State University, 1963; M.A., University of Minnesota, 1969; Ph.D., University of North Dakota, 1973.

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

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