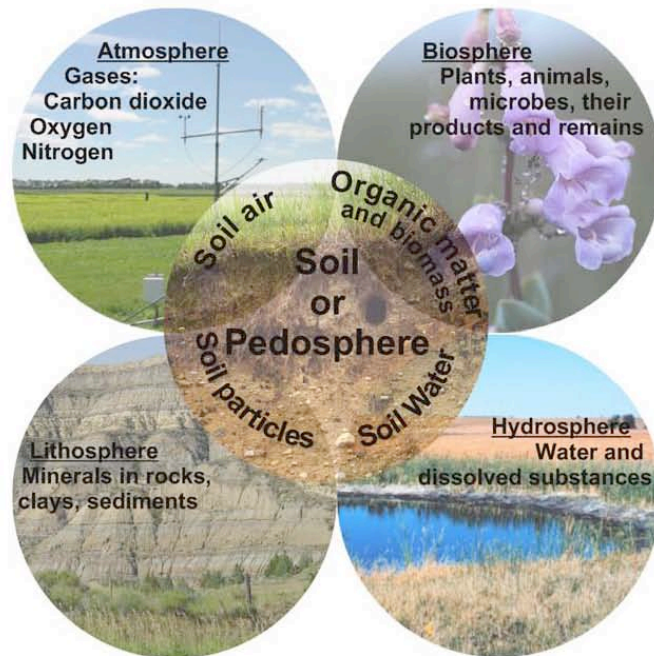


HANDBOOK FOR GRADUATE STUDENTS IN SOIL SCIENCE

North Dakota State University



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THIS HANDBOOK IS ALSO AVAILABLE ONLINE AT:
<http://www.soilsci.ndsu.nodak.edu/Students/currentstudents.htm>

I. WELCOME

DEPARTMENT OF SOIL SCIENCE

Dokuchaev's description of the Russian Chernozem in 1883, the birth of pedology, preceded North Dakota statehood (1889) and the founding of North Dakota's Agricultural College (1890) by only a few years. Yet North Dakotan's appreciation of soil is deep seated, as evidenced by the coat of arms of North Dakota bearing the motto "Strength from the Soil."

The North Dakota Agricultural College (AC) included soil as part of the subject matter of its agricultural courses from its founding in 1890. The first course name to specifically relate to soils was 'soil physics' listed in the 1899-1900 catalog. The first reported response of wheat yield to commercial fertilizer in North Dakota was in 1903 by Schollander. A 'soils emphasis' became an option for a degree in the Department of Agronomy in 1925 or 1926. Charles Kellogg brought one of the first pedology courses taught in the United States to the AC in 1932. Kellogg was on the faculty from 1930 to 1933 and left to become Chief, Division of Soil Survey, Bureau of Chemistry and Soils, USDA. There he produced the first edition of the American Soil Survey Manual. In 1950 the 'Soils Train' of six cars toured North Dakota with a variety of soils-related displays, including soil monoliths. Soil Science became an independent department in 1959 and the AC became North Dakota State University (NDSU) in December 1960. By the mid- 1960s NDSU was producing a steady stream of advanced as well as baccalaureate degrees in soils. In 1974 Soil Science became home to the office of the North Dakota State Climatologist. The Land Reclamation Research Center (LRRC) was part of the Department in the 1980s. In 2007 the Department of Soil Science joined the newly formed School of Natural Resource Sciences (SNRS). Today the School of Natural Resources includes the programs of Range Science, Entomology, and Natural Resources Management, each with its own Program Leader who are under the direction of the School's Director.

The Department offers Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Soil Science. Specialized academic and research training is available in Management and Conservation, Genesis, Chemistry, Physics and Climatology. Additional information can be obtained on our home page at the NDSU website, <http://www.soilsci.ndsu.nodak.edu/>.

UNIVERSITY

North Dakota State University is a land-grant institution with current enrollment of over 13,000 students. The University also serves several thousand people throughout the state in continuing education and extension programs. There are 41 doctoral and professional programs, 51 master's degree programs and 105 bachelor's degree programs at NDSU. The web page www.ndsu.edu/ndsu/main/directory/bldg_list.php will help you get around the NDSU campus. NDSU also participates in the Tri-College University consortium with neighboring Minnesota State University-Moorhead (more than 7,900 students) and Concordia College (about 2,900 students). NDSU has approximately 1,500 staff members and 800 faculty and academic staff.

COMMUNITY

Fargo, North Dakota's largest city, was recently named one of the most desirable places in the country to live by Money magazine. With about 188,000 people in the Fargo-Moorhead community and about 500,000 people in the service area, Fargo-Moorhead is among the largest metropolitan centers between Minneapolis and Seattle and was recently named an All-American City. Visit Fargo's Chamber of Commerce's Web page www.fmchamber.com/community/qualityoflife.html.

II. GENERAL INFORMATION

1. AUTOMOBILES

- a. **Car License** – All drivers must have state, international, or other valid driver's license.
- b. **Car Insurance** – Every driver in North Dakota must have "liability" coverage. International students must have a driver's license and "liability" insurance BEFORE driving. If no "liability" coverage is secured, you must be able to show financial responsibility, e.g., \$50,000.00.
- c. **General Operation and Safety** – <http://www.ndsu.nodak.edu/policy/515.htm>. State law specifically prohibits using a state car for private use: <http://www.ndsu.nodak.edu/policy/7003.htm>
- d. **Parking** – A permit is required for parking on campus. Graduate students are required to use student lots. See parking policies – <http://www.ndsu.nodak.edu/policy/705.htm>
A parking permit is required for use of the campus parking facilities. The permit may be purchased at the NDSU Facilities Management Campus Parking Office, Thorson Maintenance Center. Permits for motorcycle parking may also be obtained. Vehicle registration must be shown to obtain extra permits, at an additional cost for each vehicle. For Tri-College parking information refer to the NDSU Traffic Regulation brochure, available at the Campus Parking Office, to determine which lot you can park in on the Moorhead State University and Concordia College campuses while displaying your NDSU parking permit.

2. COMPUTERS

- Students will be responsible for ALL software and other content on the computer.
- All employees, students and other users of North Dakota University System computing facilities shall comply with applicable laws, policies and procedures.
- Users shall not use computing facilities for any illegal purpose or to enter or send any material that is obscene or defamatory, or to enter or send material that is intended to annoy, harass or alarm another person which serves no legitimate purpose.
- User accounts are assigned to a specific individual at a specific entity and may not be shared.

- Access or attempts to gain access to University system computing facilities for any unauthorized purpose, including attempts to obtain, modify, or destroy information or degrade performance, is forbidden.
- Users shall not infringe on the intellectual property rights of others. All users shall use software only in accordance with applicable license agreements. Users shall not make unauthorized copies of any software under any circumstances.
- Duplication of licensed software for any purpose except for backup and archival purposes or when otherwise specifically authorized is prohibited.
- All software must be lawfully purchased or acquired. Users shall not install or use software on University computing facilities in a manner contrary to law or this policy.
- Employees, students or other users who violate this policy shall be subject to discipline and/or may be denied access to University computing facilities.
- Definitions:
 - Computing facilities means computing resources and network systems, including, but not limited to, computer time, data processing or storage functions, computers, computer systems, servers, networks and their input and output and connecting devices, and related programs, software and documentation.
- Policies:
 - The complete list of all the policies governing computer use at NDSU. The complete policies may be found at: <http://www.ndsu.edu/policy/710.htm>
 - The ND University System Policy Manual is also available online: <http://www.ndus.edu/policies/sbhe-policies/policy.asp?ref=2429>
- The Industrial Agriculture Communication Center (IACC) and several computer clusters on campus provide computers, printers, and software at different locations around campus. These computer clusters are open to all students. Both personal computers and mainframe access computers are available. Hours of availability vary from cluster to cluster and are seasonal, although certain clusters are available 24 hours a day, 7 days/week. The Computer Center staff offers non-credit seminars on several topics such as programming, statistical processing and presentations. Information concerning computer cluster availability and workshop offerings can be obtained by contacting Information Technology Services (ITS) at 231-8685 or www.ndsu.nodak.edu/helpdesk.

3. CREDIT UNION/BANKING The Financial Aid Office has short-term loans available. The Northland Educators Federal Credit Union is located at 1404 12th Ave N. Graduate Research Assistants may borrow or deposit money. Many banks are located throughout Fargo.

- 4. DEPARTMENTAL LIBRARY** Agronomy Journal, Crop Science, Soil Science Society of America Journal, Dissertations, Thesis papers, and some reprints, etc., are available in the Departmental library located in Walster 104. This library is only available during normal working hours. Books and reprints should only be used in Walster, Waldron or Loftsgard Hall, signed out on the Honor System, and returned to Walster 106 promptly.
- 5. DESK ASSIGNMENT** Each graduate student will be assigned office space with a desk by the Department Administrative Assistant.

E-MAIL Each student should obtain an e-mail address as soon as they arrive. Give your address to the Department Administrative Assistant. All announcements will be posted on e-mail. Use the following Web address to register: www.ndsu.nodak.edu/helpdesk.

- 6. GREENHOUSE, PLOT LAND, AND SEED STORAGE SPACE** Your advisor is responsible for helping you obtain greenhouses space and to make arrangements for use of dryers. Any use of chemicals, e.g., insecticides, fungicides, herbicides, etc., that might affect plant material being grown by another person should be cleared with your advisor before use. These chemicals are to be applied only by a Certified Pesticide Applicator. Soil Science hires a person to apply all chemicals. Also, only certain days and evenings are designated for fumigation and other pesticide use. The School's Director should be consulted by you and your advisor regarding use of plot land. You should contact your advisor regarding possible arrangements for greenhouse, seed storage, plant dryer, or growth chamber space.
- 7. HEALTH INSURANCE** Graduate students may purchase health insurance through the Student Affairs Office (231-7701, Old Main 100). Please check with this office regarding any questions you may have, necessary dates, and other requirements. Options for family insurance plans are available. International students should also see the health insurance section on page 23.
- 8. HEALTH-MEDICAL INFORMATION** Any registered student is entitled to medical care at the Student Health Service. Office visits are free; students pay only for procedures and medications. The Student Health Service is open Monday through Friday from 8:30 a.m. - noon and 1:00 – 4:00 p.m. Limited services are provided during the summer session. Health care is available by appointment with a physician or nurse practitioner by calling 231-7331. Pharmacy services are available by calling 231-7332.

Below is a list of hospitals you can contact. For an emergency (ambulance or police) call 911

9. HOSPITALS

Sanford Health
801 N. Broadway
Fargo, ND
234-2000

Essentia Health
3000 32nd Ave S
Fargo, ND
364-8000

10. HOUSING

- a. **On Campus** Contact Residence Life (<http://www.ndsu.nodak.edu/reslife>) or (231-7700) for information on securing housing. A deposit is required to be placed on the waiting list. There may be a delay, depending upon the supply or demand for on-campus housing. Check with Residence Life for rental rates. Bison Court or University Village (for married students) has unfurnished one and two bedroom apartments. Heating, kitchen stove, and refrigerator are furnished. The student pays electricity and telephone costs.

Dormitory housing is also available for "students older than average" (25 years or older). Doubles and singles are available. You must also purchase a meal plan to live in this facility. The cost of the meal plan varies, depending on the plan.

- b. **Off Campus** If you choose to live off-campus, there is an off-campus housing list available from the Student Affairs Office (Old Main, Room 100). Other sources of apartment vacancies are: The Forum and Midweek (local newspapers), The Spectrum (campus newspaper), Apartment and FM Rentals Guide (ask at Student Affairs Office), the bulletin boards in the Memorial Union, and on the web at (www.ndsu.nodak.edu/reslife).

11. **JOB PLACEMENT** The Career Center Office located at 306 Ceres Hall is the central placement agency for NDSU. Services are available to all students and alumni. There are fees for use of their services and there are no refunds. The office offers useful information for your personal job search (http://www.ndsu.nodak.edu/career_center/).

12. **KEYS** Keys to the student's office and outside doors are obtained from the Administrative Assistant. Laboratory and greenhouse keys will be supplied if needed. Student office, study rooms, and research laboratories are available to graduate students 24 hours a day, 7 days/week. All keys must be returned to the Administrative Assistant when the student leaves.

13. **LEAVE** You must obtain approval from your advisor prior to any vacation leave.

14. **MAIL** Mailboxes are provided for graduate students in the main office. The address is Soil Science, NDSU Dept 7680, P.O. Box 6050, Fargo, ND 58108-6050. Mail arrives and departs twice daily (about 10:00 a.m. and 2:00 p.m.).

15. **OTHER FACILITIES** We often have joint projects with Biochemistry, Cereal Science, Entomology, Microbiology, Plant Pathology, Plant Sciences, Range Science, etc. Their facilities should be used with great care and consideration and the major advisor will make arrangements for use of space and replacement of all chemicals or materials used, glassware broken, etc.

16. PAYMENT For students on assistantship, payments will be dispersed every 2 weeks. Paychecks are direct-deposited and your paystubs may be picked up in the main office. Graduate students with assistantships will not ordinarily be paid by time slip for any work time in the Department. Graduate students without assistantships or equivalent stipend may be employed on an hourly basis at the discretion of the project leader and with approval of the School's Director, if funds are available, up to one-half time during the summer crop season or at busy times, i.e., seeding, harvest, pollination in the greenhouse, etc. Payment will be on an hourly basis, not to exceed the maximum hourly wage set for graduate students in the Department. Exceptions may be made to the above policies where logical and appropriate, with the approval of the project leader and School's Director. International students are expected to have financial support prior to their acceptance at NDSU.

17. PHOTOCOPYING Use of the Departmental copier by graduate students is limited to project-related materials. An access code can be obtained from your advisor. A coin operated copier is available for graduate student use in Loftsgard 480A. The Copy Shop in the Memorial Union is also available for all students.

18. PUBLIC TRANSPORTATION

NDSU students can ride any MAT bus free of charge. Simply show a current NDSU student ID card when boarding. Since all routes connect at transfer points, you can get anywhere served by Metropolitan Area Transport System (MAT) by transferring to another bus. Maps/schedules are posted in bus shelters, and are available at the Memorial Union and on all buses. View maps online at www.matbus.com. All routes are numbered and color coded to help assist you in locating the routes you need.

Taxi Service can be obtained by calling: Doyle Yellow Checker Cab Company 235-5535.

19. PURCHASES Consult your advisor regarding purchase of supplies. Certain procedures must be followed for all purchases and those involving on-campus purchases are very specific.

20. RESEARCH FACILITIES Laboratory, greenhouse, growth chamber, and field space for research or teaching purposes are available to all students within reasonable limits, although certain equipment or space may be restricted to certain work or projects. Equipment, vehicles, etc., in general are available to all. Most items are used primarily by specific projects but may be available when not in use by the project. The major advisor and project leader responsible for the equipment should be consulted regarding its use, and the equipment should be maintained in good condition. All damaged or inoperable equipment must be reported immediately to the project leader and arrangements made for repair.

21. SAFETY

- Each new student should visit Rodney Utter who is the Department's Safety Officer.

If you have any questions regarding safety, please do not hesitate to speak with him. His office is Walster Hall room 105 and his phone is 1-7561.

- All NDSU employees, which include graduate students, must attend an annual safety workshop baseline training session.

http://www.ndsu.edu/police_safety/safety/Presentations.htm

- Visit the Safety Office web page

http://www.ndsu.edu/police_safety/safety/index.shtml for information on Environmental Health, and Public Health and Safety.

- Environmental Health includes the following information: 1) Radioactive Materials, 2) Radiation, 3) Safety, 4) Handbook – 2004, 5) Lab and Chemicals, 6) Steps for chemical disposal–major chemical cleanouts, 7) Working with hydrofluoric acid (see: Chemical section), 8) MSDS, 9) Biosafety, 10) Hazardous Material Disposal, 11) Training (Lab/Chemical Safety and Radiation Safety, 12) Air Quality, 13) Integrated Indoor Air Quality Program, 14) Storm Water, and 15) Fire Safety.

- Public Health and Safety includes the following information: 1) Animal Care/Use; 2) Building Inspections; 3) Incident Reporting; 4) Risk Management Policies and FAQ's; 5) Safe Operating Procedure, Handbook and Videos; 6) Training Calendar and Online Training, and Workforce Safety and Insurance FAQ's.

22. SECRETARIAL SERVICE Graduate students in the Soil Science Department may have final copies of the following done without charge:

- Plan of Study
- Thesis Proposal
- Abstracts for Graduate Seminar
- Overheads and Slides for Graduate Seminar
- Slides/Posters for Society Meetings (ASA, CSSA, WSSA, ASHS, etc.)

The Department's printers can be used for the FINAL printed copy of a thesis. The secretary can provide the necessary computer commands for laser printing, but it is the student's responsibility to insert commands into the document. Printing must be done without interrupting the daily activities of the secretarial staff and the student must get permission before using the printer. Any printing in excess of one (1) final copy will be charged (per page) to the student.

23. SMOKING Smoking is prohibited on the North Dakota State University grounds and in University buildings, residence halls, apartments and enclosed structures (NDSU Policy Number 153).

24. SUPPLIES Notebooks, photocopying, and other materials required for course work are personal expenses. Laboratory supplies for research may be purchased through your advisor's project account, and, of course, requires permission by your advisor.

25. TRAVEL

- a. **General**– See the following Web page for the University’s policy for general travel www.ndsu.nodak.edu/policy/515.htm. Information on this page includes for the following: 1) Means of travel; 2) Travel voucher requirements; 3) Local travel; 4) Out-of-state travel authorization; 5) Foreign travel authorization; 6) Privately owned transportation; 7) In-state mileage; 8) Out-of-state mileage; 9) Commercial airlines; 10) Meal reimbursements; 11) Conference, seminar, or other meeting; and 12) Lodging reimbursements.

b.

c. **Travel to Professional Meetings**

- All travel funds for graduate students to regional or national meetings must be from Project Grant or Gift sources. Travel is dependent upon approval of NDSU administration. Travel policy interpretation or approval may vary at times, depending on the number of travel requests to a single meeting or conference, availability of funds, justification for attending, etc.
- Air travel may be approved for graduate students to national meetings during their graduate career at NDSU if the student is presenting a paper and/or interviewing for a job. Funds must come from Grant or Gift money.
- Out-of-state travel involving expense must be requested and approved at least two weeks prior to departure www.ndsu.nodak.edu/accounting/services/travel-auth.html
- Subsistence is determined by the per diem rates for a particular city (§ 6.6 in www.ndsu.nodak.edu/policy/515.htm).
- Registration fees may be paid if approval is obtained from NDSU administration on the travel request.
- Receipts are required for lodging and most other special items except food, and are reimbursed after returning from the meeting and filling out a travel expense voucher form (www.ndsu.nodak.edu/accounting/csforms/forms/NDSUtravelAug05.xls).

d. **Travel Regulations (Project Related)**

- Travel authorization forms must be completed for each trip farther than 300 miles outside of the North Dakota border. All out-of-state authorization forms must be completed at least two weeks prior to travel.
- www.ndsu.nodak.edu/accounting/services/travel-auth.html
- A travel expense voucher is completed after returning from the trip and turned in to the Soil Science main office at the end of each month you traveled. Receipts are required for lodging and most other special items except food. There is a maximum in state and out-of-state per diem for meals and lodging. Reimbursement usually is made within two weeks after the travel voucher is submitted. Fargo, Moorhead, West Fargo, Casselton, Prosper, and Northwest 22 are considered normal place of employment and, therefore, expense vouchers are not submitted for time spent at these nearby locations.
- Link for voucher
(www.ndsu.nodak.edu/accounting/csforms/forms/NDSUtravelAug09.xls)

III. ACADEMICS

1. ADMISSION REQUIREMENTS

1.1 University Admission Requirements – University admission requirements for US and International students are detailed on the Graduate School Web page:
http://www.ndsu.edu/gradschool/about_us/graduate_bulletin/admission

1.2 Departmental Admission Requirements

1.2.1 Departmental English Language Requirements – Minimum TOEFL score of 550 for international students.

1.2.2 Departmental Graduate Record Examination (GRE) – The GRE is not required for admission to the Department of Soil Science.

1.2.3 Departmental Admission Procedure – Prospective students should submit online <http://ndusndsugrad.askadmissions.net/Vip/Default.aspx> application materials to the Graduate School specifying admission to a Soil Science graduate program. After Soil Science receives the complete application from the Graduate School, a Departmental Admission Committee¹ of three faculty will make their acceptance/nonacceptance recommendation to the School's Director. A final decision regarding the application will normally be made within two weeks. The Dean of the Graduate School will officially inform the student regarding their acceptance to the Department.

Note that acceptance of an applicant can be made conditional. It can be stipulated, for instance, that certain course(s) must be completed before a student is fully admitted into the program. The Graduate School allows graduate students to take undergraduate courses with tuition remission if admission is conditional upon the completion of undergraduate course(s) listed on the acceptance letter.

2. GENERAL REQUIREMENTS FOR ALL GRADUATE STUDENTS

2.1 University Requirements –All of the research requirements are presented in the Graduate School Bulletin. The necessary information for M.S. and Ph.D. programs are provided in detail in this bulletin. Web page links are provided below for both M.S. and Ph.D. programs.

2.1.1 University Requirements for Master of Science – The general requirements for Master of Science degree at NDSU are on the following web page:
http://www.ndsu.edu/gradschool/about_us/graduate_bulletin/graduate_school_policies/masters/

¹ One new person will be placed on this Committee each year. The Committee should process all applications within 7 working days of receipt by the department, using ad hoc substitute member(s), as needed. Application materials received by the Department will then be immediately scanned and put on a shared Departmental disk drive for all faculty to view and comment on to the Committee, if so desired. Also, a memo will be placed in each Soil Science professor's mailbox to inform them of the new application.

2.1.2 . Some of the important information on this Web page is on the following: 1) Supervisory Committee; 2) Plan of Study; 3) Transfer of Credit; 4) Time Limitations; 5) Final Examination; 6) Multiple Degrees; 7) Master's Degree with Two Major Areas; 8) Master of Science Requirements; 9) Thesis Option; 10) Master's Degree IRB, IBC, and/or IACUC Approval; 11) Filing the Thesis or Paper; 12) General Summary of Procedures.

2.1.3 University Requirements for Doctor of Philosophy The general requirements for Doctor of Philosophy degree at NDSU are on the following web page:

http://www.ndsu.edu/gradschool/about_us/graduate_bulletin/graduate_school_policies/doctoral/.

Some of the important information on this Web page is on the following: 1) Supervisory Committee; 2) Plan of Study; 3) Transfer of Credit; 4) Time Limitations; 5) Residence Requirements; 6) Language Requirements; 7) Examinations; 8) Filing the Dissertation; 9) Ph.D. Degree IRB, IBC, and/or IACUC Approval; and 10) General Summary of Procedures.

2.2 General Departmental Requirements

2.2.1 Departmental Master of Science Thesis Option (Plan A) Requirements – All M.S. candidates must demonstrate substantial knowledge of subjects taught in the courses listed in Table 1. A student will also take graduate level courses from other Departments as appropriate for their program and graduate goals. The major advisor is obligated to verify attainment of this requirement by directly assessing the student and by collegial interaction with the advisory committee and the Soil Science faculty in general.

Under the guidance of the major adviser, each candidate shall prepare a thesis approved by the administrator of the major program and acceptable to the oral examination committee and to the Dean of The Graduate School. Of the 30 graduate credits required, a minimum of 16 credits must be in courses approved for graduate credit numbered 601-689, 691, 700-789, and 791 (referred to as didactic courses); thesis credits must not be fewer than 6 nor more than 10 credits. The thesis bearing the approval of the major adviser shall be in the hands of the examining committee at least seven (7) days before the final oral examination. The thesis is the basis for opening the oral examination.

Table 1. Possible courses for Soil Science M.S. degree program.

Subject	Course
Soil Ecology	Soil 351†
Soil Fertility	Soil 322†
Soil Physics	Soil 433†
Soil Chemistry and Fertility	Soil 455/655
Microclimatology	Soil 447/647
Calculus (Life or Physical Sciences)	Math 146 or 160
Statistics (Applied Reg. Models or Exper Dsgn or Field Design I or II)	Stat 461/661 or 462/662 or CWS 724 or 734
Oral Communication (Seminar and Public Speaking)	Soil 790 and SpCm 110

†300-400 level courses are background or base courses that may be required for a Soil Science MS, but cannot be used for graduate credit.

2.2.1.1 Departmental M.S. Seminar Requirement – All graduate students should present a graduate seminar including the thesis proposal and plan of study. The thesis proposal should be done during or before the second semester.

2.2.1.2 Departmental M.S. Examination Requirements

- Immediately prior to the oral examination the student will present a Departmental seminar on his or her thesis results. Members of the candidates examining committee will be present for this seminar. This seminar is considered a part of the oral examination.
- The final examination will be an oral examination and should be scheduled to last 3+ hours. It will cover course work and the thesis as required by the Graduate School.

2.2.2 Departmental Master of Science Comprehensive Study Option (Plan B)

Requirements – All M.S. candidates must demonstrate substantial knowledge of subjects taught in the courses listed in Table 1. The major advisor is obligated to verify attainment of this requirement by directly assessing the student and by collegial interaction with the Advisory Committee and the Soil Science faculty in general.

This Plan B option is offered for the M.S. candidate who may benefit more from a broader range of knowledge in Soil Science than from the preparation of a thesis. Of the 30 graduate credits required, a minimum of 21 credits must be in courses approved for graduate credit numbered 601-689, 691, 700-789, and 791 (referred to as didactic courses). The research credits (797) must not be fewer than 2 nor more than 4.

The creative component (paper, portfolio, etc.) bearing the approval of the major adviser shall be in the hands of the examining committee at least 7 days before the final oral examination. The creative component must demonstrate ability to do scholarly study appropriate to the major field and present evidence of appropriate written expression. The creative component is the basis for opening the oral examination. General instructions on the format for papers are included in the NDSU Graduate School's Guidelines for the Preparation of Dissertations, Theses, and Papers

(http://www.ndsu.edu/gradschool/current_students/dissertations_theses_and_papers/guidelines/).

Also, the Department of Soil Science requires that each Paper or Thesis must conform to the Publications Handbook and Style Manual of the ASA, CSSA, SSSA (www.asa-cssa-sssa.org/publications/style/).

2.2.3 General Departmental Ph.D. Requirements – All Ph.D. candidates must demonstrate substantial knowledge of subjects taught in the courses listed in Table 2. The major advisor is obligated to verify attainment of this requirement by directly

assessing the student and by collegial interaction with the advisory committee and the Soil Science faculty in general.

A plan of study will be prepared by the student and their major advisor, and approved by the supervisory committee, program administrator, academic Dean, and Dean of the Graduate School.

The plan of study should be submitted to The Graduate School for approval not later than the term immediately after the supervisory committee is formed and must be filed in The Graduate School prior to scheduling the comprehensive/preliminary examination.

Revisions in the program of study must be approved by the student, supervisory committee, program administrator, and Dean of The Graduate School. The Graduate Dean will officially notify the student, supervisory committee, program administrator, and the Academic Dean of all changes.

To earn a Ph.D. in Soil Science, at least 90 semester graduate credits, of which not less than 27 credits must be in courses approved for graduate credit numbered 601-689, 691, 700-789, and 791 (referred to as didactic courses). Of these 27 credits, not fewer than 15 credits must be in 700-level course work (700-789 & 791). A student matriculating with a master's degree, including a degree earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. Of these credits, not fewer than 15 credits must be NDSU courses at the 700 level (700-789 & 791).

Table 2. Possible courses for Soil Science Ph.D. degree

Subject	Course
Soil Ecology	Soil 351
Soil Fertility	Soil 322
Soil Physics	Soil 333
Soil Genesis and Survey	Soil 444/644
Soil Chemistry/Advanced Soil Fertility/Soil and Plant Analysis	Soil 755/782/665
Microclimatology	Soil 447/647
Soil Physics	Soil 763
Calculus (Life or Physical Sciences)	Math 146, 147 or 160
Statistics (Applied Reg. Models or Exper Dsgn or Field Design I or II)	Stat 461/661 or 462/662 or CWS 724 or 734
Oral Communication (Seminar)	Soil 790 (2 times)
Writing in the Technical Professions	Engl 321

†300-400 level courses are background or base courses necessary for a Soil Science Ph.D. degree, but cannot be used for graduate credit.

2.2.3.1 Departmental Ph.D. Program Seminar Requirement – All graduate students should present a graduate seminar including the dissertation proposal and plan of study. The dissertation proposal should be done in or before the second semester.

2.2.3.2 Departmental Ph.D. Comprehensive/Preliminary Examination Requirements

2.2.3.2.1 Ph.D. Written Comprehensive/Preliminary Exam

- The written portion of the exam must be scheduled and passed before a request may be sent to the Graduate School to schedule the oral exam. A range of dates should be specified when requesting to schedule the written exam. Generally, not more than two weeks should be requested unless special circumstances exist and the School's Director approves a longer period. Note that the Graduate School requires that the request to schedule be received at least two weeks prior to the proposed date.
- Each supervisory committee member will submit a set of questions to the student. Also, the major advisor is responsible for soliciting questions from professors from outside of the Department that have taught pertinent courses in the student's plan of study or who work with the student directly in research or in the student's minor. Additionally, all Soil Science faculty should have the opportunity to write a question. The questions may cover any area within the core areas of Soil Science as well as any topics covered by courses outside of Soil Science that were part of the plan of study. The Soil Science's Program Leader and the student's committee will screen the proposed written exam questions for appropriateness. It is recommended that students review the core areas of Soil Science by studying the "Soil Science Competency Areas and Performance Objectives" on the Soil Science Society of America website: (<https://www.soils.org/files/certifications/practice-exam-objectives.pdf>) .
- The student must contact each committee member to determine a time to take that member's written exam. Each committee member may specify the time allowed, up to 48 hours maximum, and conditions under which their exam is to be taken. For instance, one examiner may allow 24-hours and allow use of specified references, while another may allow four hours with no reference materials allowed.
- Student answers will be graded separately by the submitter and one or more faculty member based on the answer provided by the submitter. Grading will be on a 0 to 100 percent basis. The candidate's score on a particular question will be the average of all graded scores.
- The Supervisory Committee will inspect all results and vote on pass or fail.

2.2.3.2.2 Ph.D. Oral Comprehensive/Preliminary Exam

- After the written exam has been passed and the Graduate School has posted the results to the committee, the request to schedule the oral examination may be submitted. Note that the Graduate School requires that the request to schedule be received at least two weeks prior to the proposed date. This examination should be scheduled to last 3+ hours.

- The oral comprehensive/preliminary examination is intended to test the student's knowledge about soil science generally, the particular area of soil science in which the student is concentrating, and also broader aspects of science and technology. Some questions could relate to research methods or fundamental background in the topic of the student's dissertation, but should not be based on specific dissertation research results. Follow-up questions from the written comprehensive/preliminary examination may be asked.

2.2.3.3 Departmental Ph.D. Teaching Requirements – Two teaching credits are required for Ph.D. students for graduation, but are not necessary for M.S. students.

2.2.3.4 Departmental Ph.D. Program Final Examination Requirements – A request for permission to schedule the final oral examinations must be sent to the Graduate School at least two weeks prior to the examination. Also, the student should personally meet with the Graduate School to verify that all courses on the plan of study have been completed and that the required grade point average has been attained. The Dean of the Graduate School will formally notify the committee and the student when and where the examination has been scheduled.

Immediately prior to the final oral examination the student will present a Departmental seminar on his or her thesis results. This seminar is separate from and in addition to the required seminar courses that are taken for credit. Also, this defense seminar should be advertised to the Department, College, and other interested parties one week prior to the defense date. Members of the candidates examining committee will be present for this seminar. This seminar is considered a part of the oral examination.

The final examination will be an oral examination and should be scheduled to last 3+ hours. It will cover course work and the thesis as required by the Graduate School.

2.2.4 Other Departmental Graduate Student Requirements for Both Ph.D. and M.S.

2.2.4.1 Participation in Research Project of Major Advisor Requirement – Each graduate student position will have written and on file a description of the time commitment and duties assigned for that position and the individual in it. The descriptions are subject to review by the School's Director.

2.2.4.2 Departmental Thesis/Dissertation Proposal Requirements – The student must prepare a thesis proposal for his/her advisor and for the graduate committee. The proposal must be approved prior to commencing research. The student must write a research progress report each semester that research credits are taken. The report is to be submitted to the major professor and made available to all faculty.

The thesis proposal normally will require about 5 pages of narrative, etc., and should not exceed 10 pages. A good format for the thesis proposal includes the following:

1. TITLE

2. OBJECTIVES
3. INTRODUCTION AND JUSTIFICATION
4. LITERATURE REVIEW
5. MATERIALS AND METHODS
6. LITERATURE CITATION

The thesis/dissertation proposal is due the second semester of a M.S. or Ph.D. student's term.

2.2.4.3 Departmental Thesis/ Dissertation Presentation Requirements – It is best to present draft sections of the thesis (M.S. or Ph.D.) to the major professor as they are completed, obtain suggested revisions and prepare subsequent drafts. Generally, all sections of the thesis should have drafts completed several months before the final examination is planned. The major professor has the authority to require a satisfactory, completed draft of the thesis before approving the request to schedule the final examination. The student may work with and seek advice of others in preparing the thesis.

- Guidelines for the Preparation of Dissertation, Theses, and Papers http://www.ndsu.edu/gradschool/current_students/dissertations_theses_and_papers/guidelines/ should be followed in preparing Thesis/Dissertations.
- The Department of Soil Science also requires that each Thesis/Dissertations must conform to the Publications Handbook and style Manual of the ASA, CSSA, SSSA (<https://www.soils.org/publications/style>).

3. GENERAL EXPECTATIONS OF SOIL SCIENCE GRADUATE STUDENTS

- Meet all formal requirements of Department and Graduate School.
- Regularly attend seminars, especially those given by other Soil Science graduate students. Include seminars given by other departments as appropriate.
- Attend all classes, provide notice beforehand if absence is anticipated, or provide explanation after if absence was not anticipated.
- Prepare for classes and participate in discussions.
- If a student has submitted a dissertation or thesis to his/her graduate committee prior to his/her final oral examination (M.S. or Ph.D.) and this thesis/dissertation is deemed by any graduate committee member to not be in acceptable form (as far as format and content), then the exam will be delayed until satisfactory changes have been made. Examples that may result in an exam delay are excessive grammatical errors, the ASA style manual was not followed (with regards to tables and citations), obvious issues with data integrity, and/or if any of the other departmental “milestones” were not met (see checklist on page 18).
- Observe University and Department computer use rules.
 - <http://www.ndsu.edu/policy/710.htm>

- <http://www.ndus.edu/policies/sbhe-policies/policy.asp?ref=2429>
- Notify the Soil Science main office of illness or other reason you will not be in office or field on any given day.
 - <http://www.ndsu.edu/policy/143.htm>
- Complete all required safety training and other training listed on the "milestones list" and follow safety and other procedures as presented in the training.
 - http://www.ndsu.edu/ndsu/police_safety/safety/safetyoffice.htm
- Required Baseline Safety Training :
 - http://www.ndsu.edu/police_safety/safety/Presentations.htm
- Have knowledge of and adhere to generally accepted high principles of academic and research conduct as, for instance, proper acknowledgment of sources.
- NDSU Honor System (<http://www.ag.ndsu.edu/academics/honor.htm>)
 - All situations that involve academic dishonesty will be presented to the Honor Commission. The commission will deliberate and their recommendation will be used.

4. SOIL SCIENCE GRADUATE STUDENT STANDARDS FOR PROGRESS – MILESTONES CHECKLIST

First semester:

- Get desk assignment and office/building keys. See your major advisor and/or Departmental Administrative Assistant.
- Safety training (laboratory, pesticide, etc. as applicable). See Rodney Utter, Departmental Safety Officer, and visit the safety office Web page to become familiar with safety requirements (www.ndsu.nodak.edu/ndsu/police_safety/safety/safetyoffice.htm).
- Obtain ITS logon and password for University computer use and Novell network. Register on the following Web page: www.ndsu.nodak.edu/helpdesk.
- State Fleet training (defensive driving) and driver licensing, as applicable. State Fleet Motor Vehicle Safety http://www.ndsu.nodak.edu/ndsu/police_safety/safety/Loss%20Prevention/SOP/State%20Fleet%20Motor%20Vehicle%20Safety.pdf
- Determine major advisor, if not already done.
- Form advisory committee.
- Work on removing any admission deficiencies and continue working each following semester until all are eliminated.
- Present seminar including the thesis/dissertation proposal and plan of study.

Second semester:

- Draft and submit plan of study and thesis/dissertation proposal. Follow up until approved.

Third semester or before:

- Submit research plans for approval by IRB* (<http://www.ndsu.nodak.edu/irb/>), IACUC* (<http://www.ndsu.nodak.edu/research/iacuc/index.php>), or IBC* (<http://www.ndsu.nodak.edu/research/ibc/index.php>), if needed.
- Submit research plans for approval by Radiation Safety Committee, if needed.

Once each year:

- Call meeting of supervisory committee to review progress.

Upon completion of applicable requirements:

- Complete final seminar requirement.
- Meet with Graduate School student services associate to verify plan of study completion and required GPA.
- Schedule exams: M.S. final oral; Ph.D. preliminary (written and oral) and Ph.D. final oral. [Follow Graduate School and Department requirements for scheduling.] Form is available at http://www.ndsu.edu/gradschool/current_students/forms/
- Submit disquisition to examining committee at least 7 days before final oral examination (M.S. and Ph.D.).

After final examination:

- Submit disquisition (dissertation) for Graduate School approval after changes resulting from final exam.
- Disquisition must be approved within one year or the final exam must be retaken.

Terminal semester:

- Submit and obtain approval of dissertation.
- Check out of Department (move out of office, return keys).
- * IRB = Institutional Review Board, IACUC = Institutional animal care and use committee, IBC = Institutional

Biosafety Committee. Usually these do not apply to Soil Science projects.