

**Requirements for the Degree of  
DOCTOR OF PHILOSOPHY  
Major in Soil Science**

The Doctor of Philosophy degree, the highest degree offered by the University, is a research degree and is never conferred solely as a result of any prescribed period of study, no matter how faithful. The degree is granted solely upon evidence of general proficiency, distinctive attainment in a special field, and particularly on ability for independent investigation as demonstrated in a dissertation presenting original research or creative scholarship with a high degree of literary skill.

**Joint Ph.D. Degree:** Unless specified otherwise, candidates for a joint degree must fulfill all of the requirements for a Doctor of Philosophy Degree in Soil Science plus those of the cooperating department.

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**ADMISSION**

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Admission represents a judgment as to the probability of a student's success in graduate work. This judgment is based on the student's undergraduate and postgraduate transcripts, letters of reference, results from the Graduate Record Exam (GRE), and where appropriate, results from the Test of English as a Foreign Language (TOEFL).

Each student's application is reviewed by the Department of Soil Science as well as by Graduate School admissions examiners. Admission is ultimately determined by the Graduate School; however, no student is admitted in the absence of a favorable recommendation by the Department of Soil Science.

**Admission with Full Standing:** All candidates for a Ph.D. major in Soil Science should have a Master's degree. It is possible to be admitted to the Ph.D. major without a Master's degree, provided evidence is available of substantial independent scholarly work as judged by the Graduate Admissions Committee.

**Admission with Deficiencies:** Applicants with insufficient credits in the basic sciences may be admitted for graduate study in Soil Science at the discretion of their advisor, but a plan for making up such deficiencies must be in place by the end of the first full semester of enrollment. A student admitted with deficiencies may need to spend more time than the minimum to complete their degree requirements.

**Admission of International Students:** See Graduate School Bulletin.

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**COURSE WORK AND PROGRAM**

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The normal program is 8 to 15 credits for a semester and 2 to 8 credits for the eight-week summer session. Students may not register for more than 15 credits in the semester or 8 credits in the eight-week summer session. Courses carrying graduate credit are those numbered in the 300-999 group.

Every student who uses University facilities must be currently enrolled; minimum enrollment is 2 credits per semester. Holders of Research Assistantships, Fellowships, and Scholarships are required to carry a full program of graduate studies during their appointments. Research Assistants must register for a minimum of 8 graduate credits during the academic year and 2 graduate credits during the summer semester. A scholar, fellow, or

assistant who has passed the preliminary examination must carry a program consisting of 2 credits of research under direction of the Major Professor and 1 credit of Soil Science Graduate Seminar 728.

**Minimum Graduate Residence Requirement:** Candidates for the Ph.D. must earn a minimum of 32 credits at UW-Madison in graduate level courses (including research credits) before the preliminary warrant will be issued. Credits earned as part of a Master of Science program at UW-Madison count towards this total.

Students are not allowed to enroll in additional courses after passing the preliminary exam, except for Soil Science Graduate Seminar 728 and Research 990.

**Minimum Graduate Degree Credit Requirement:** Candidates for the Ph.D. degree in Soil Science must earn a minimum of 51 credits.

**Minimum Graduate Course Work (50%) Requirement:** Candidates for the Ph.D. degree must earn a minimum of 26 credits in graduate course work. Graduate course work are courses that are either

- 1) Numbered 700 or higher,
- 2) Numbered 300-699 and specifically designed for graduate students in Soil Science, or
- 3) Numbered 300-699 and assess graduate students separately from undergraduate students. Graduate course work includes but is not limited to online, thesis/research, independent study, and practicum/internship credits.

**Prior Course Work:** With program approval, students are allowed to count no more than 12 credits of graduate course work taken during graduate study at other institutions, no more than 7 credits of graduate course work from a UW-Madison undergraduate degree, and no more than 15 credits of course work numbered 300 or above taken as a UW-Madison special student. Courses taken as a UW-Madison university special student or undergraduate student are not allowed to count toward the 50% graduate course work minimum unless taken at the 700 level or above. Course work earned five or more years prior to admission to a master's degree is not allowed to satisfy requirements.

**Courses in Basic Sciences:** Candidates for a Ph.D. in Soil Science are required to have completed the basic science courses shown in Table 1 prior to their preliminary examination.

The list of required courses in the basic sciences reflects the Department's consensus of the minimum academic background in science needed to pursue graduate studies in Soil Science. These courses should be completed as part of the undergraduate curriculum in preparation for graduate studies, and most are prerequisites for graduate level courses in Soil Science. Prospective students are encouraged to complete these courses during their undergraduate studies. During their first semester of enrollment, new graduate students must submit evidence (normally copies of their academic transcripts) to the Certification Committee that the courses in the basic sciences have been completed, or submit a plan of course work to meet the requirements.

Courses other than those listed in the basic science requirements can be substituted if approved by the Certification Committee. When considering alternate courses, students must show evidence of having sufficient academic background to successfully complete the graduate courses in their planned graduate program. Courses in Soil Science will not be considered as suitable substitutes for basic science courses.

**Courses in Soil Science:** Ph.D. candidates must meet the minimum departmental course requirements for soils graduate degrees shown in Table 1. A minimum of 8 credits in non-research, >500-level courses, including 2 credits

of soils graduate seminar (one of which must be a prospectus seminar) must be taken at UW-Madison as a graduate student. Ph.D. candidates must enroll in a minimum of 1 credit of research (Soil Science 990) every semester.

**Seminars:** All Ph.D. candidates must present at least two Soil Science graduate seminars (Soil Sci 728) for letter grade  $\geq$ B or equivalent during their Ph.D. program. One of the seminars must be on the student's prospectus. Each candidate must enroll in a Soil Science seminar every fall and spring semester; exceptions require the approval of the Department Chair. Students should take the seminar on a Satisfactory/Unsatisfactory (S/U) basis. An S grade requires 80% attendance, and is a passing grade (B) from a Graduate School standpoint.

**Certification of Minimum Course Requirements:** A proposed program for a Ph.D. candidate satisfying the minimum course requirements must be approved by the Certification Committee before the end of the first semester of Ph.D. graduate work. It is the responsibility of the student and the Major Professor to complete the departmental Ph.D. Certification forms, arrange to be certified by the Certification Committee, and arrange for approval of revisions in the initial program if this becomes necessary.

**Grades:** Required courses in soil science must be completed with a grade of B or better (BC and C may not be offset by AB and A). For other courses, the Department of Soil Science follows the grade requirement of the Graduate School, which is an average record of B or better in all work taken as a graduate student. Courses with a grade of C or BC may be counted toward course requirements, providing they are offset by an equivalent number of credits of A or AB work in regular courses or seminars. A grade of "S" is usually given for satisfactory progress in research (Soil Sci. 990); Grades of Incomplete are considered to be unsatisfactory if they are not removed the following semester.

**Doctoral Committee:** The Doctoral Committee, chosen by the student and major professor, is a committee of four or more members representing more than one graduate program, three of whom must be UW-Madison graduate faculty or former UW-Madison graduate faculty up to one year after resignation or retirement. At least one of the four members must be from outside of the student's major program or major field (often the minor field) and approved by the Certification Committee... A minimum of two must be from the Soil Science faculty. At least three committee members must be designated as readers. Representation of the Minor Department (see Graduate Minor Requirements below) is at the option of the Minor Department, but the Department of Soil Science recommends that the Minor Professor be on the Committee.

The required 4th member of the Doctoral Committee, as well as any additional members, all retain voting rights. They may be from any of the following categories, as approved by the executive committee: graduate faculty, faculty from a department without a graduate program, academic staff (including emeritus faculty), visiting faculty, faculty from other institutions, scientists, research associates, and other individuals deemed qualified by the Executive Committee (or its equivalent) provided the individual has a Ph.D. degree or its equivalent.

It is the responsibility of the student and the Major Professor to form a Doctoral Committee and schedule a meeting before the end of the second semester (not including summer sessions) of Ph.D. graduate work

A student who does not meet deadline requirements in this document will not be allowed to register in the subsequent semester until a written plan for meeting the requirements has been approved by her/his major advisor and the department Certification Committee.

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## SOIL SCIENCE TEACHING QUALIFICATIONS

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All candidates for a Ph.D. in Soil Science shall complete a minimum of one-degree credit of Soil Sci 799 Practicum in Soil Science Teaching. A written plan for satisfying this requirement shall be prepared by the student in conjunction with his/her advisor and approved by the Certification Committee. The plan shall include the process/procedure for mentoring of the student, evaluation of their performance, and grade assignment.

The type and level of effort required to earn one or more degree credits in Soil Sci 799 shall be in accordance with the guidelines and standards set forth by the CALS Curriculum Committee and approved by the University of Wisconsin Divisional Committees in the Spring Semester 1981. The practicum should consist of four phases, these being (1) Instructional Orientation, (2) Direct Teaching Experience, (3) Experience in Testing and Evaluation of Students, and (4) Analysis of the Graduate Student's Performance.

The direct teaching experience must be under faculty or academic staff supervision and can include classroom, discussion, or laboratory instruction, preparation and grading of term papers and laboratory reports, and student consultations. The learning experience may involve either formal (degree instruction) or informal educational programs such as short course or public service and extension. The minimal level of effort expected per credit hour of the teaching practicum is 60 hours. This may include in-classroom instruction time and time devoted to pre-instruction preparation and grading of exams, laboratory reports or term papers.

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## GRADUATE MINOR REQUIREMENTS FOR THE PH.D. MAJOR IN SOIL SCIENCE

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Ph.D. candidates in Soil Science must supplement their major study with a minimum of 10 credits in graduate courses in another field. These courses must be selected according to a coherent plan under Option A or Option B as follows:

**Option A:** External - A student must offer at least 10 credits from a degree program outside the Soil Science Major. Selection of this option requires approval of the Minor department.

**Option B:** Distributed - A distributed Minor for a student studying for a Ph.D. in Soil Science shall consist of a minimum of 10 credits of graduate level courses in one or more departments. Selection of this option requires approval of the Certification Committee.

**Approval:** The Minor, whether Option A or Option B, is designed to represent a coherent body of work, and should not be simply an after-the-fact ratification of a number of courses taken outside the Major department. To ensure coherence, a Minor program must be approved by the Minor department (Option A) or by the Department of Soil Science Certification Committee (Option B) no later than the end of the second semester of Ph.D. graduate work (not including summer sessions). A copy of the completed Minor agreement form is needed to obtain the warrant for the preliminary exam. A Minor agreement form is included within the Ph.D. Certification form. However, students selecting Option A should use the Minor department's agreement form if required by the Minor department. The Minor agreement forms are available from the Minor department. It is the responsibility of the student and the Major Professor to arrange for completion of the Ph.D. Minor agreement within the time frame identified above.

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## PH.D. PROSPECTUS

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The Ph.D. Prospectus, consisting of the Prospectus Seminar and the Written Prospectus, is to aid the candidate in developing a viable research problem and to provide experience in evaluating the literature, writing, and research planning. Contact the graduate program coordinator three weeks prior to the Prospectus Seminar so required documentation can be prepared.

**Warrant:** The Preliminary Warrant is requested and issued during the last semester that courses are being completed. The student's record must be cleared of Incomplete grades before the warrant will be issued. Formal application for admission to candidacy for the Ph.D. degree is made after satisfactory completion of the Preliminary Examination by filing of the signed warrant with the Graduate School by the graduate program coordinator.

**Committee:** The Doctoral Committee is responsible for evaluating and approving the Ph.D. Prospectus.

**Documents:** The Ph.D. Student should obtain the following materials from the graduate program coordinator on the day of the exam: the prospectus examination warrant, the Soil Science Graduate Program Examination Evaluation forms, copies of the Ph.D. Certification form, copies of the current transcript for each Committee member, and any additional material that the candidate thinks is relevant and will help to familiarize the Preliminary Examination Committee with the candidate. Following the examination, return all materials to the graduate program coordinator.

The Preliminary Warrant can be issued during the last semester courses are being completed. The student's record must be cleared of Incomplete grades before the warrant will be issued. Formal application for admission to candidacy for the Ph.D. degree is made after satisfactory completion of the Preliminary Examination by filing of the signed warrant with the Graduate School by the Student Services Coordinator.

**Written Prospectus:** The Written Prospectus normally includes the following: Title Page, Table of Contents, Introduction, Objectives, Review of Literature, Plan of Proposed Research (early research data showing the feasibility of the proposal is optional) and References. The maximum length of the Written Prospectus is suggested to be 30 pages, double spaced. The bibliography is not counted as part of the 30 pages. Early approval of the Written Prospectus will reduce the chances of deficiencies in the dissertation.

**Prospectus Seminar:** The student shall present a Prospectus Seminar as one of the two credits of required graduate seminar (Soil Sci 728). The major part of the Prospectus Seminar is a critical review and synthesis of the literature, followed by statement of the objectives and plan of research. The Prospectus Seminar grade is assigned by the Graduate Seminar Committee presiding over the semester the Prospectus Seminar is given.

Within several days after the Prospectus Seminar, the Doctoral Committee should meet with the candidate to evaluate and approve or disapprove the Written Prospectus.

**Examination Results:** A copy of the Graduate School warrant, completed Soil Science Graduate Program Examination Evaluation forms, and the Ph.D. Certification forms, are retained in the student's departmental file.

If the Written Prospectus is disapproved, the Doctoral Committee must decide if the candidate may revise and resubmit the Written Prospectus. A student may, if denied the right to resubmit the Written Prospectus, appeal

to the Department Chair who may then appoint a special committee to study the case and make recommendations as to further action.

**Time requirement for the Ph.D. Prospectus completion:** The Written Prospectus and the Prospectus Seminar must be completed by the end of the third semester (not including summer sessions).

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## **PH.D. PRELIMINARY EXAMINATIONS**

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The preliminary examination is an examination of the candidate's knowledge of Soil Science. It is generally an oral examination, although written questions can be submitted as part of the examination at the option of the individual members of the Preliminary Examination Committee. The student must contact the Student Services Coordinator at least three weeks prior to the exam so required documentation can be prepared in conjunction with the Graduate School. Information needed by the Student Services Coordinator includes: date of preliminary exam, proposed minor (Option A, including minor department name; or Option B); proposed date of completion of minor.

**Committee:** The Preliminary Examination Committee, chosen by the student and major professor, is composed of four or more members representing more than one graduate program, three of whom must be UW-Madison graduate faculty or former UW-Madison graduate faculty up to one year after resignation or retirement. At least one of the four members must be from outside of the student's major program or major field (often the minor field) and approved by the Certification Committee. A minimum of two must be from the Soil Science faculty. At least three committee members must be designated as readers. Representation of the Minor Department (see Graduate Minor Requirements, below) is at the option of the Minor Department, but the Department of Soil Science recommends that the Minor Professor be on the Committee.

**Documents:** The Major Professor should obtain the following materials from the Student Services Coordinator on the day of the exam: the preliminary examination warrant, the Soil Science Graduate Program Examination Evaluation forms, copies of the Ph.D. Certification form, copies of the current transcript for each Committee member, and any additional material that the candidate thinks is relevant and will help to familiarize the Preliminary Examination Committee with the candidate. All materials are to be returned to the Student Services Coordinator after the examination. The Preliminary Warrant can be issued during the last semester courses are being completed. The student's record must be cleared of Incomplete grades before the warrant will be issued. Formal application for admission to candidacy for the Ph.D. degree is made after satisfactory completion of the Preliminary Examination by filing of the signed warrant with the Graduate School by the Student Services Coordinator.

**Examination Results:** A copy of the Graduate School warrant, completed Soil Science Graduate Program Examination Evaluation forms, and the Ph.D. Certification forms, are retained in the student's departmental file.

If the candidate fails the preliminary examination, the Preliminary Examination Committee must decide if the candidate may retake the examination. The format and extent of the second examination is determined by the Preliminary Examination Committee. A student may, if denied the right to retake an examination, appeal to the Department Chair who then may appoint a special committee to study the case and make recommendations as to further action. Whenever possible, the Preliminary Examination Committee for an examination retake should be the same as the Preliminary Examination Committee for the original examination.

**Time Requirement for Preliminary Examination Completion:** Students who obtain their M.S. degree in the Department and who continue in the Department for their doctorate must take the Preliminary Examination by the end of the fourth semester (not including summer sessions) of Ph.D. graduate work. Candidates who are approved to retake a failed examination must have passed by the end of the fifth semester.

Candidates for the Ph.D. degree who obtained an M.S. or M.A. degree elsewhere, must take the Preliminary Examination by the end of the fourth semester (not including summer sessions) of Ph.D. graduate work. Candidates who are approved to retake a failed examination must have passed by the end of the fifth semester.

Candidates who do not adhere to this deadline must show justification for the delay to the Department Certification Committee

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## PH.D. FINAL EXAMINATION

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Candidates for the Ph.D. degree are subject to a final oral examination on their dissertation and the general fields of the major and minor studies. The preliminary examination may be construed as final for certain aspects of these subject matter fields. The final examination usually consists of an exposition by the candidate of the main findings in the research. The candidate should, however, be prepared to answer questions in the major and minor fields as well. The candidate may not take the final examination until all requirements for the degree have been satisfied. Contact the graduate program coordinator at least three weeks prior to the exam so required documentation can be prepared in conjunction with the Graduate School. Information needed by the graduate program coordinator includes the date of the defense and title of the dissertation.

**Committee:** The Doctoral Committee is the dissertation reviewing committee (reading committee) that passes on the substantial merit of the Ph.D. dissertation. Their report is endorsed on the official title page of the dissertation.

**Documents:** The Ph.D. student should obtain the following materials from the graduate program coordinator on the day of the examination: the Final Oral Exam Warrant, the Soil Science Graduate Program Examination Evaluation forms, copies of the Ph.D. Certification forms, and the current transcript for each Committee member. All materials are to be returned to the graduate program coordinator after the examination.

**Ph.D. Dissertation:** The Ph.D. dissertation must be the candidate's own work. It may be the result of research enterprises in which others have collaborated, but in such cases candidates are required to present, in their own style, a substantial portion which represents their own contribution.

Detailed information concerning the current requirements for the preparation of the dissertation and abstract of the dissertation should be obtained from the Graduate School Office. The dissertation is required to be deposited with the Memorial Library following the guidelines prescribed by the Graduate School. In addition, the department requires a pdf and bound copy of the final dissertation.

**Defense:** Candidates must present an open seminar on their Ph.D. research findings, followed by oral defense of the dissertation in front of the Doctoral Committee. In addition to recording the results on the Graduate School warrant and the official title page of the dissertation, the Doctoral Committee must complete the departmental Soil Science Graduate Program Examination Evaluation form for inclusion in the student's file.

**Policy on Permission to Retake the Ph.D. Final Examination:** The decision as to whether or not a student may retake the examination is ordinarily made by the Doctoral Committee. A student may, if denied the right to retake the Final Examination, appeal to the Department Chair, who may then appoint a special committee to study the

case and make recommendations as to further action. Whenever possible, the Doctoral Committee for an examination retake should be the same as the Doctoral Committee for the original examination.

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## **EXAMINATION MATERIALS CHECKLIST**

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**You must contact the Student Services Coordinator at least three weeks prior to any of these examinations.** It is the responsibility of the Major Professor to ensure that the items listed below are brought to the respective examination.

### **Prospectus**

- Certification form (original for signatures plus 1 copy for each Committee member)
- Transcript (1 copy for each Committee member)
- Soil Science Graduate Program Examination Evaluation form (1 copy for each Committee member)

### **Preliminary Examination**

- Certification form (1 copy for each Committee member)
- Transcript (1 copy for each Committee member)
- Soil Science Graduate Program Examination Evaluation form (1 copy for each Committee member)
- Preliminary Examination Warrant

### **Final Examination**

- Certification form (1 copy for each Committee member)
- Transcript (1 copy for each Committee member)
- Soil Science Graduate Program Examination Evaluation form (1 copy for each Committee member)
- Ph.D. Final Examination Warrant
- Official title page of dissertation

Table 1

<b>MINIMUM DEPARMENTAL COURSE REQUIREMENTS FOR THE SOIL SCIENCE PHD DEGREE</b>		
<b>Courses<sup>a</sup></b>		
<b>BASIC SCIENCES – generally completed in undergraduate program</b>		<b>Minimum Cr.</b>
<b>Math</b>	Calculus - Math 221 (5 cr.); Math 222 (4 cr.)	9
<b>Statistics</b>	Introductory (3 cr.)	3
<b>Chemistry</b>	<b>Any combination of 9 credits such as:</b> Chem 109 (5 cr.) and Chem 327 (4 cr.); or Chem 103-104 (9 cr.)	9
<b>Physics</b>	General Physics – Phys 103 (4 cr.)	4
<b>Biology</b>	<b>Any 3 credits from:</b> Bot/Zoo 151 (5 cr.); Bot/Zoo 152 (5 cr.); Biocore 301 (3-4 cr.); Biocore 303 (3 cr.); Bot 350 (3 cr.); Bot 500 (3-4 cr.); Bot/F&WEcol/Zoo 460 (4 cr.); Biochem 501 (3 cr.); Biochem 507 (3-4 cr.)	3
<b>SOIL SCIENCES – generally completed at UW-Madison during graduate program</b>		<b>Minimum Cr.</b>
<b>General Soil Sci</b>	Soil Sci 301 (4 cr.)	4
<b>Grad. Seminar</b>	Soil Sci 728 <sup>c</sup> (2 cr.) (must enroll every semester)	2
<b>Soils &amp; Landscapes</b>	Soil Sci 325 (3 cr.)	3
<b>Soil Physics</b>	Soil Sci 532 <sup>c</sup> (3 cr.); Soil Sci 622 <sup>c</sup> (3 cr.)	3
<b>Soil Chemistry</b>	Soil Sci 621 <sup>c</sup> (3 cr.); Soil Sci 626 <sup>c</sup> (3 cr.)	3
<b>Soil Biology</b>	Soil Sci 523 <sup>c</sup> (3 cr.)	3
<b>Total Soil Science Area Requirement</b>		<b>18</b>
<b>Additional Requirements</b>		
Research	Soil Sci 990 required every semester	Will vary
≥500 Courses	Non-research soils in addition to 2 cr. of 728 (presentation semesters)	6
<b>MS Minimum Graduate Degree Credit Requirement</b>		<b>51<sup>bcd</sup></b>

<sup>a</sup> All of these courses include an “or equivalent” qualifier. Prerequisites for any of the courses listed above must be satisfied by the student in accordance with the course description. Individual programs may have specific requirements regarding chemistry, physics, or biology, contingent on a student’s certification plan.

<sup>b</sup> 500 or higher-level non-research soils courses taken at UW-Madison as a graduate student, including 2 credits of Soil Sci 728 (Graduate Seminar), one of which must be a prospectus seminar. These seminar courses must be completed with a grade of ≥B or equivalent. The remaining course program will be decided by the student and the Major Professor. Soil Sci 799 (Practicum in Teaching) is required for the Ph.D. degree, and must be completed with a grade of ≥B.

<sup>c</sup> See **Minimum Graduate Residence Credit Requirement**: 32 of which must be taken at UW-Madison as a graduate student.

<sup>d</sup> See **Minimum Graduate Course Work (50%) Requirement**: 26 credits must be completed in courses that are either, 1) numbered 700 or higher, 2) numbered 300-699 and specifically designed for graduate students in Soil Science, or 3) numbered 300-699 and assess graduate students separately from undergraduate students.