



OSU Graduate  
Water Resources Program

# Water Resources Engineering

Doctor of Philosophy (PhD) Degree

Graduate Information Handbook<sup>1</sup>

Water Resources Graduate Program  
Oregon State University  
Corvallis, Oregon 97331

Visit the Water Resources Graduate Program web site at  
<http://oregonstate.edu/gradwater/> and the OSU Graduate School web  
site: <http://gradschool.oregonstate.edu/>  
for current program and university information

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<sup>1</sup> Thanks to the Geography Program in the College of Earth, Ocean and Atmospheric Sciences for the Handbook template. Updated 12/01/2016

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## Schedule for Ph.D. Students<sup>2</sup> (Full-time Students)

<u>Activity</u>	<u>When</u>
1. Identify at least two faculty members you are interested in working with, and contact them prior to or during the application process.	1. Prior to application
2. Confirm major advisor.	2. After application, prior to acceptance.
3. Initial advising and selection of first term classes	3. Before first term classes begin
4. Select three additional committee members plus a graduate representative. Convene a <b>program meeting</b> to discuss coursework plan and research. File graduate program with Graduate School.	Convene committee by the end of 3 <sup>rd</sup> term; program of study must be submitted before end of 5 <sup>th</sup> term
5. Prepare research proposal in consultation with major professor. Hold a <b>proposal review meeting</b> , file copy of proposal with Water Resources Graduate Program office	1st - 9th term. Program must be on file with the Water Resources Graduate Program before completion of 5 <sup>th</sup> term.
6. Seek financial support for proposed research.	Ongoing
7. Complete courses on Graduate Program.	5th - 9th term
8. Prepare for comprehensive exams.	Ongoing
9. Complete written <b>comprehensive examination</b> and <b>oral examination</b>	After completing 3, 4, 5 & 8 above.
10. Advanced to Candidacy. ABD status ("all but dissertation").	Upon passing #9 above
11. Dissertation research and writing completed, draft submitted to committee	Within 4 years, 11 months of #10 above;
12. Submit pretext pages of dissertation to Graduate School for editing.	When scheduling final defense.
13. <b>Dissertation defense.</b>	Within 5 years of #10 above.
14. Convey one unbound final copy to the Graduate School, one electronic PDF copy to ScholarsArchive, and one bound copy to the Water Resources Graduate Program office.	Within 6 weeks of defense.
15. Participate in exit interview with program Director	Within 6 weeks of defense

<sup>2</sup> Check with Graduate School for specific deadlines for graduation

## I. Introduction

This handbook was developed to provide information to prospective and incoming doctoral students in the Water Resources Engineering program at Oregon State University. It consolidates information for students entering a degree program in 2007 or later. Please refer to the OSU Graduate School web site (<http://gradschool.oregonstate.edu/>) for the *Graduate School Guide to Success* for the most important Graduate School regulations.

The Water Resources Engineering degree program is designed to broadly train students to undertake life-long careers in water resources system design. Students in the program have the option to focus on groundwater, surface water, or watershed engineering. Students will be required to take a minimum of 12 (M.S.) or 15 (Ph.D.) credits of graduate level engineering courses, and at least 6 (M.S.) or 9 (Ph.D.) credits of water science courses to broaden their expertise in areas of the program beyond engineering. Water science courses may be selected from non-engineering departments across the campus, and are required to provide the students with the scientific context to understand the broader aspects of water resource systems. Students completing the WRE degree program will meet the coursework requirements to attain Professional Hydrologist certification through the American Institute of Hydrology (AIH). All students in WRE will be required to show competence in mathematics to the level of applied differential equations (MTH 256), have a year of calculus-based physics and chemistry prior to graduation.

Students graduating from the WRE degree program will have met three sets of requirements:

- A. **Entrance Requirements** All students entering the WRE degree program will be required to show basic competence in chemistry, physics, mathematics to integral calculus, and advanced competence (upper-division) in one science or engineering field.
- B. **Program Requirements** Students will complete a standard MS (45 cr.) or PhD (108 cr.) program based in water resources engineering but allowing for significant coursework in another field.
- C. **Exit Requirements** Students graduating from the program must show that they have a total of 37 cr. of water-related coursework based on the American Institute of Hydrology (AIH) standards <http://aih.engr.siu.edu/hydro-certification.html>

Up to 22 credits of coursework for AIH requirements may be met by coursework taken elsewhere, including courses taken as an undergraduate, though it is expected that many of the requirements will be met by OSU coursework.

Required courses within each WRE focus area are identified in Appendix A and B. Students are also expected to include fundamentals of earth science (from geosciences, atmospheric sciences, or soil science).

## II. Graduate Program Requirements and Responsibilities

### A. Responsibilities for Completing Graduate Program

**The student** will assume the major responsibility for his/her graduate program, follow program and university requirements, meet all deadlines, and initiate all steps involved in obtaining the degree. The student should meet regularly with the major advisor to discuss progress or difficulties in research, course work, or other matters. If experiencing major difficulties with the major professor, the student should discuss the matter with the Associate Director of their sub-field or the Director of the Water Resources Graduate Program.

**The major professor** will advise and guide students in their graduate programs, be informed of student progress and difficulties, edit research proposals and theses before they are given to committee members, encourage active participation in seminars, regional and national scientific meetings, and include students in other professional activities as appropriate.

**Members of the student's graduate committee** will serve as experts in certain specialized fields, as interested editorial critics of the student's writing (especially the dissertation), and as participants in the various meetings and examinations held during the student's program.

**The Associate Director of the Water Resources Engineering** degree is involved in admission of graduate students, the development and review of required courses, provides oversight of WRE program, and will advise and guide students as necessary.

**The Director of the Water Resources Graduate Program** is involved in admission of graduate students, provides general orientation to the WRGP, ensures that the graduate program is implemented and standards are maintained, and assists in the solution of any major problems that arise during a student's programs.

### B. Major Professor

Students admitted to the Water Resources Engineering degree program as regular graduate students will have a major professor who has agreed to supervise the student's work. It is the responsibility of the student to seek acceptance by a member of the Water Resources faculty as the major professor. The decision is made upon mutual agreement between the student and the professor concerned and should be reported to the Water Resources Graduate Program Director to initiate the final stage of the admission process.

### C. Student's Graduate Committee

The makeup of the graduate committees is governed by the policies of the Graduate School and the Water Resources Graduate Program. The **minimum** committee sizes are as follows:

Degree	Major Prof	Minor (if applicable)	Other	Grad Rep	Total
M.S.	1	1	1 (2 if no minor)	1	4
Ph.D.	1	1	2 (3 if no minor)	1	5

No committee is official until approved by program and Graduate School administrators. Administrative review will use the following guidelines:

1. All committee members must be Graduate Faculty. Adjunct members from other universities or organizations may also serve if approved by the WRGP and the Graduate School
2. The committee must be appropriate to represent the proposed course of study and the relevant degree authority. ***At least two members of the committee must be members of the Water Resources Engineering faculty.***

The Major Professor assumes principal responsibility for directing research activities. When the Major Professor is on a courtesy faculty appointment, a member of the Water Resources regular faculty must serve as co-chair of the graduate committee and must sign the approved dissertation.

If the student chooses an optional minor, the Minor Professor must be from outside the WRGP unless the minor area is entirely within Water Resources. Graduate School rules require students to take at least fifteen credits for the minor and at least one course from the Minor Professor's department or program.

The student's committee for the Ph.D. degree consists of a minimum of five graduate faculty members: the major professor and three faculty members with some experience in the general area of the student's research area, as well as a Graduate Council Representative (GCR). The GCR is chosen from a list provided by the Graduate School, and is a full voting member of the committee who attends all meetings, exams, and the final dissertation defense.

#### D. Grade Requirement

A grade point average of 3.0 (a B average) is required for all courses taken as a graduate student (even if they are undergraduate courses), and for courses included in a graduate program. **Neither grades below C nor S/U grades are accepted on a graduate program.**

## E. Program Requirements

Requirements for the PhD degree are tailored to reflect the diversity of backgrounds of incoming students and to assure that everyone finishes the program with a common core of water resources knowledge beyond their particular specialization. This is accomplished through program requirements that include 6 credits of core Water Resources Graduate Program courses:

- WRP 524 Sociotechnical Aspects of Water Resources (3 cr.);
- WRP 507 Seminar and WRP 505 Journal Club (offered Fall term); *or* WRE 507 Seminar and WRE 505 Journal Club (offered Winter term) *or* WRS 507 Seminar and WRS 505 Journal Club (offered Spring term), and
- two more 1 cr. seminars (WRP, WRE, or WRS 507) - these seminars do not have to be taken with journal club.

Doctoral students in the WRE degree program are required to take at least 21 credits of graduate engineering courses, including BEE 512 Physical Hydrology (3 cr), and a systems modeling course (3 cr), with the remaining 15 credits of water engineering courses selected from course options in their specialty area (surface, groundwater, or watershed engineering). They must also take 9 credits of water science coursework (see Appendix B). Doctoral students will thus include 36 credits of coursework to meet major requirements (6 cr. core courses + 21 cr. graduate engineering courses + 9 cr. water science courses) as approved by the committee, and at least 36 credits of dissertation preparation (see Program checklist and suggested courses). The remaining 36 credits required to meet the 108 credits required by the Graduate School for the PhD can be met with a combination of dissertation credits and elective coursework or transfer credits from a previous graduate program. Students will work with their advisor and committee to tailor an appropriate program.

The program of study must also satisfy the OSU Graduate School residence requirement. That is, (1) a minimum of 36 credits on the form must be courses taken at OSU after admission as a regular, degree-seeking graduate student and (2) a minimum of three terms of full-time graduate academic work (at least 9 credits/term) will be spent on site at the Corvallis campus or at an off-campus site approved by the Graduate School. Transfer courses as defined above are not counted toward this residence requirement.

See Appendix A for a checklist that will assist the student in developing the program of study.

## F. Required Meetings

Ph.D. committees must convene for the following sequence of meetings:

1. A **program meeting** to discuss the general direction of the student's research and the specific plan of coursework to be included in the graduate program to be filed with the Graduate School. This meeting is attended by only the student and committee members.
2. A **proposal meeting (also called the proposal defense)** to hear the student present the dissertation research proposal. This meeting is open to the public, although the committee may want to convene privately to advise the student after the public has been given an opportunity to ask questions about the proposal.
3. A **preliminary exam meeting** for the oral examination of the student. This meeting includes only the student and committee, and follows the completion of the written examination (see Section X. for details).
4. A **dissertation defense (final examination) meeting**. The student makes a public presentation of the dissertation. After responding to the audience questions, the committee continues the exam in closed session.

The Graduate Council Representative (GCR) is required to attend all of the above meetings except for the proposal meeting (proposal defense).

## G. Transfer Credits

Only graded, non-seminar graduate courses taken after the awarding of a Bachelor's degree from an accredited institution will be considered for transfer credit. Transfer course must carry a grade of 'B' or better. Graduate courses to be transferred to a doctoral degree program can be courses that were used to satisfy the graduate course requirements for a graduate certificate or a master's degree (or equivalent) so long as they meet the appropriate standards for use in the degree and the criteria to transfer credit as defined by the Graduate School. There is no limit on transfer credit toward the doctoral degree as long as the doctoral residence requirement is satisfied. No transfer course may serve as a replacement for a core course. Transfer credit hours are subject to the approval of the student's committee and the Director of the Water Resources Graduate Program.

## H. Residence requirements

The following residence requirement must be met:

- 1) a minimum of 36 graduate OSU credits, and
- 2) at least three terms of full-time graduate academic work (at least 9 credits/term) on site at the Corvallis campus or at an off-campus site approved by the Graduate School.

## I. Deficient Student Status

Graduate students are required to maintain a 3.0 cumulative GPA and a 3.0 program GPA. If a student earns more than any grade below "B" in any course included on the program of study, the student's academic performance will be examined by the major professor and the WRE curriculum committee to determine if the student may continue in the program or be dropped for academic deficiency. Two consecutive quarters of less than 3.0 GPA will result in immediate termination from the program, regardless of cumulative GPA.

## J. Professional Experience

Every graduate student is encouraged to include some experience of a professional nature in their program. If they have never worked in a water resources organization, it is highly encouraged that they schedule a one-term internship with an outside organization. Students interested in internships should work with their major advisor and with the Associate Director to identify available internships and expectations for academic performance.

In addition, each student should include other opportunities for professional development in their work before completion of the degree. Examples include:

1. Presentation of research results in a professional context such as:
  - a. Professional meeting
  - b. Internship report to client
  - c. A seminar open to the public
2. Preparation of a competitive grant proposal

## K. Assistantships

University regulations require all students with an assistantship to register for a minimum of 12 hours each term while employed as a Teaching Assistant (TA) or Research Assistant (RA). Graduate assistants may register for a maximum of 16 hours, but are advised to confer with their major professors or program director when registering for more than 12 credits to avoid potential overload. Students on an assistantship can maintain their full-time status, and avoid overloading their schedules by signing up for dissertation research credit hours with their major professor to "top up" their load to the 12 credit minimum.

Doctoral students must register for at least 36 credit hours of dissertation research, and can include only 15 additional credits of blanket numbered credit hours (501/601, 505/605, 507/607, 508/608) on their graduate program, but may enroll for up to 16 credits per term of dissertation research credits.

## L. Continuous Enrollment Policy

“Continuous graduate enrollment refers to the policy of requiring continuous registration of graduate students from the original matriculation until all degree requirements are met.” All graduate students in a graduate degree program must register continuously for a minimum of 3 graduate credits and pay fees, regardless of student location, if they will be using any university, department, or program resources (e.g., facilities, equipment, computing or library services, or faculty or staff time including exams) until their degree is granted or status as a graduate student is terminated, unless on authorized leave. See the Continuous Graduate Enrollment Policy on the Graduate School website for the entire description of continuous enrollment and leave of absence requirements.

#### M. Exceptions to Policy

A student may request in writing an exception to policy by petitioning the Curriculum Committee through his or her major professor or the WRGP Program Director. A copy of the request must be filed with the program office.

#### N. Grievance Procedure

The program requires that professional relationships be maintained between faculty and students. When situations arise that cause concern, the student is encouraged to discuss the problem with his or her instructor. If the student is not satisfied with the instructor's response, the student is encouraged to make written appeal through the following chain of academic administrators until a conclusion is reached: a) Associate Director – WRE; b) WRGP Director; c) Associate Dean of the Graduate School; d) Dean of the Graduate School; 3) Provost.

#### O. Study Program: Meeting with your Committee and Filing your Program

A Graduate Program – a list of proposed courses you will take – must be filed by all graduate students with the Graduate School. The program must consist of a minimum of 50% graduate “stand-alone” courses (not 400/500 “slash courses”). The Program form is available on the Graduate School website. See Appendix C for assistance in determining the required elements for a doctoral program. Dissertation credits should be taken as WRE 603 with the major advisor as the instructor of record.

Program meetings and defenses may be held during any period when school is in session. This excludes the periods between regularly scheduled quarters and during official vacation periods. Students should be aware that most faculty are on nine-month appointments and may not be available during the three-month summer period. It is the responsibility of each student to arrange the meeting and defense times and places, notify the Graduate School of scheduled defenses, and remind each committee member of the scheduled

meeting or defense. At the time you schedule your dissertation defense with the Graduate School, you should also apply for graduation if you have not already done so. Check the Graduate School web site for graduation deadlines.

Doctoral degree students must file a study program with the Graduate School before the completion of 36 hours of graduate course work. This includes hours reserved as an undergraduate student and hours earned as a post baccalaureate, graduate special student, or classified graduate student. **A student who does not file a program within the specified deadline will not be allowed to register for the next term.**

The program is worked out under the guidance of the student's committee and is signed by members of the committee and the Director of the Water Resources program before filing with the Graduate School. Each candidate's graduate program should include a substantial amount of work with at least four faculty members offering graduate instruction (e.g., teaching stand-alone courses).

Changes in the program may be made by submitting a Petition for Change in Graduate Program, available from the Graduate School. It is wise to wait and file one "change" form near the end of the student's tenure so repeated filings are not necessary.

The Major Professor shall chair the program meeting and the examination portion of the defense. The Graduate Council Representative chairs the portion of the meetings that involve the evaluation of the student's performance.

#### P. Use of Human Subjects

Federal and university policies required that all research conducted by faculty, staff, and students using human subjects must be reviewed and approved by the Institutional Review Board before initiating any portion of the project. If a research project involves human subjects, students should work with their major professors to submit their research project to the IRB for approval.

See: <http://research.oregonstate.edu/irb>

#### Q. Comprehensive or qualifying exams

The student working toward a doctoral degree must pass a comprehensive preliminary examination to determine the student's understanding of his or her major and minor fields and also to assess the student's capability for research. Students must enroll for a minimum of three credits during terms in which they undertake written or oral preliminary examinations. Students working towards a doctoral degree in Water Resources Engineering will follow the rules and structure of the examination in the written guidelines of the department of the major professor as submitted to the Graduate School.

#### *Written Comprehensive Examination*

Most programs require a written comprehensive examination to be taken before the oral preliminary examination. If a written examination is required, it must be completed prior to the oral preliminary examination. The content, length, timing, passing standard, and repeatability of this examination are at the discretion of the department of the major professor. Copies of the written examination (questions and student's answers) must be available to all members of the student's doctoral committee at least one week prior to the oral preliminary examination.

### *Oral Preliminary Examination*

The oral preliminary examination is taken near the completion of the student's course work. The oral examination is conducted by the student's doctoral committee, and should cover the student's knowledge in his or her major and minor subjects. The exam may cover the student's proposed research topic, although no more than one-half the time should be devoted to specific aspects of the proposal. The examination should be scheduled for at least two hours, and the exam date must be scheduled in the Graduate School at least one week in advance. If more than one negative vote is recorded by the examining committee, the candidate will have failed the oral examination. No more than two re-examinations are permitted by the Graduate School, although academic units may allow fewer re-examinations.

At least one complete academic term must elapse between the time of the preliminary oral examination and the final oral examination. If more than five years elapse between these two examinations, the candidate will be required to take another preliminary oral examination.

## R. Dissertation Research Requirements for the Ph.D. Degree in Water Resources Engineering

Doctoral students are required to demonstrate the ability to define researchable problems, design research approaches, analyze relevant data, synthesize results, and report research findings in a succinct and logical manner. During your research and writing, it is important to maintain rapport with your major professor and all committee members in order to gain their guidance.

According to the Graduate School regulations, "Each PhD candidate must submit a dissertation embodying the results of research and giving evidence of originality and ability in independent investigation. The dissertation must be a real contribution to knowledge, based on the candidate's own investigation." The booklet "Preparing a Thesis or Dissertation at OSU: A Graduate Student's Guide" is available on the Web at [http://oregonstate.edu/dept/grad\\_school/](http://oregonstate.edu/dept/grad_school/) . One way of meeting the requirements for a Ph.D. dissertation is to write a single narrative. An alternative is the publishable papers option. The option is three publishable papers, which must be related in their overall research theme. A publishable paper is one that is targeted to a specific journal, is in

the format and length required for submission to that journal, and is deemed publishable by the student's graduate committee. The papers option shall include an introduction and literature review that ties the papers together into a common theme, all of which shall be submitted to ScholarsArchive as a dissertation. The student's graduate committee and major professor must agree to the option before the student proceeds.

After consultation with the major professor, the student prepares a proposal, which includes a statement of the problem and the research design. Appendix D describes the components of the proposal. The student meets with the program committee to review the proposal and revise as necessary. After obtaining approval, the student carries out the research and prepares a finished draft of the dissertation.

Since the dissertation must meet the approval of a five-member committee, the major professor will insist on a high-quality product. If the work does not meet this standard, it will be redone or revised as often as necessary to meet the professor's expectation for a defensible dissertation. When the major professor is satisfied with the dissertation, the defense is scheduled and copies of the dissertation are distributed to the committee for review at least two weeks prior to the scheduled defense. The student schedules a meeting for the committee to come together to hear a defense of the dissertation and an examination to test the student's ability to integrate and interpret material learned in the program with emphasis on the work presented in the paper. Forms for scheduling the defense are available at the Graduate School website.

#### *Scheduling the Dissertation Defense*

After approval of your dissertation by your major professor and other members of your committee, schedule your final examination with the Graduate School office. At this time students must submit only the pretext pages of dissertation to the Graduate School for editing instead of the entire draft. (See guidelines for defending final draft.) If you are defending in Spring term, check the deadline dates. You should also apply for graduation with the Graduate School at this time.

A successful defense is determined by a vote of the committee. Even at the defense, committee members may insist on further revisions of the dissertation before it is accepted. The Graduate School rules provide for a maximum of six weeks for revisions after the dissertation defense. If more than six weeks elapse, a re-examination of the student may be required.

The oral defense focuses on the dissertation, although questions pertaining to coursework are allowed. See Figure 1 for a typical defense agenda. Final dissertation defense presentations are open to the public, although the examination is closed. Examinations following the defense presentation typically take about 2 hours to complete. After a successful defense, a revised copy of the dissertation is provided to the major advisor, and a revised electronic PDF copy is submitted to ScholarsArchive, the OSU Institutional Depository. See the Graduate School website for more information about electronic submittal of the dissertation.

Figure 1. Typical Agenda for Oral Defense

1. Call to order and introductions
2. Purpose and format of meeting
3. Public presentation by student (approximately 20-30 minutes)
4. Open question and answer (approximately 15 minutes)
5. Visitors asked to leave and committee break (if necessary)
6. Review and questioning of student by committee (can include questions about both the research and the coursework)
7. Student excused
8. Committee discusses student's performance
9. Committee votes on performance of student
10. Student returns and results announced to student
11. Graduate School forms signed

### *Submission of the Final Dissertation*

Regardless of option (narrative or 3 publishable papers), the dissertation must be submitted as a single, electronic PDF (portable document format) to ScholarsArchive, the OSU Institutional Repository.

See <http://gradschool.oregonstate.edu/progress/thesis-guide> or more information, especially instructions for electronic submittal of the dissertation.

### S. Application for Degree

Students intending to graduate must file an Application for Degree and pay a graduation fee before the deadline to do so. Deadline dates for filing vary from year to year; students should check on the Graduate School website to determine deadlines. Making application at the end of the term preceding the term of graduation is encouraged. Filing the application generates a final "TO DO" list from the Graduate School, which describes all program deficiencies. An early application allows the student ample time to correct any problems identified by the Graduate School. The Application for Degree is a one-time fee. If a student applies to graduate, pays the fee, but does not graduate during the term intended, the fee carries over until the student completes. However, the student must re-file the Application for Degree form with a new anticipated date of completion.

### **Exit interview**

Students are requested to participate in an exit interview with questions from the WRGP as well as a separate exit interview for the Graduate School, in order to provide feedback to help us maintain the excellence of our program and improve it over time. Students are always busy as they finish, but exit interviews are important to keeping our program strong. Please be sure to schedule your appointment before leaving Oregon State University! Similarly, we are asked by external and internal program review panels to track our graduates and their job placement. Please keep in touch during your

professional career – perhaps you'll be nominated for a distinguished alumnus award!

## **Summary**

The information presented in this handbook has been prepared with the intent of assisting students by providing them with program specific information about the degree. Students must also meet the regulations and requirements imposed by the Graduate School. Students are responsible for keeping track of those requirements and for communicating with their advisor throughout their career at OSU. We welcome you to the WRE program, and look forward to counting you among our successful alumni in a few years!

## Appendix A. Checklist 1 for WRE degree programs

<b>WATER RESOURCES ENGINEERING PROGRAM REQUIREMENTS</b>		
To be signed by WRE representative of student's committee and submitted with the student's program of study. Students must complete these requirements to receive a WRE degree.		
Student's Name : _____		
Degree (circle one):	MS	PhD
<b><u>Undergraduate Fundamentals</u></b>		
One year, Calculus Equiv. of: MTH 251, 252, (253 or 254)	<input type="checkbox"/>	<input type="checkbox"/>
Applied Differential Equations Equiv. of: MTH 256	<input type="checkbox"/>	<input type="checkbox"/>
One year Chemistry	<input type="checkbox"/>	<input type="checkbox"/>
One year Physics	<input type="checkbox"/>	<input type="checkbox"/>
<b><u>Graduate Requirements</u></b>		
<b>Water Resources Core Courses (6 cr.)</b>		
WRP 524: Socio-technical Aspects of Water Resources	<input type="checkbox"/>	<input type="checkbox"/>
WRP, WRS, or WRE 507: Water Resources Seminar MS: 2 Credits total PhD: 3 Credits total	<input type="checkbox"/>	<input type="checkbox"/>
WRP, WRS, or WRE 505 Water Resources Journal Club**	<input type="checkbox"/>	<input type="checkbox"/>
<b>Graduate Engineering Credits</b>		
BEE 512: Physical Hydrology (3 cr.)	<input type="checkbox"/>	<input type="checkbox"/>
Modeling Techniques (BEE 529 or equivalent) (highly recommended: CE 547 Intro. Fluid Mechanics)	<input type="checkbox"/>	<input type="checkbox"/>
MS, 12 Credits	<input type="checkbox"/>	
PhD, 15 Credits		<input type="checkbox"/>
<b>Water Science Courses/Credits</b>		
MS: 6 Credits	<input type="checkbox"/>	
PhD: 9 Credits		<input type="checkbox"/>
<b>Thesis/Project Credits</b>		
MS Thesis (6–12 cr.)	<input type="checkbox"/>	
MS Project (6 cr.)	<input type="checkbox"/>	
PhD Dissertation (36 – 45 cr.)		<input type="checkbox"/>
<b>Exit Requirements</b> (may be met at previous institution, incl. undergraduate)		
Professional Preparation Course (GEO 518 or equiv.)	<input type="checkbox"/>	<input type="checkbox"/>
37 cr. of AIH-required water coursework <sup>3</sup>	<input type="checkbox"/>	<input type="checkbox"/>

\*\* The journal club must be taken in the same term as one of the seminars. Students can choose to take WRP 505 and WRP 507, WRS 505 and WRS 507, or WRE 505 and WRE 507 together, and must take one additional seminar, usually (but not limited to) WRP 507.

<sup>3</sup> 15 cr. in Category I of the AIH educational criteria (<http://aih.engr.siu.edu/hydro-certification.html>) defined as courses in which 90% of the material is hydrology, hydrogeology, or water quality, 13 cr. in Category II of the AIH educational criteria, defined as courses in which 10% of the material is hydrology, hydrogeology, or water quality, and 9 cr. in Category III of the AIH educational criteria, generally other science, water, engineering, or natural resources policy coursework.

## **Appendix B: Core Curriculum for PhD in Water Resources Engineering**

### **Core Courses - Required (9 credits)**

WRP 524 Socio-technical Aspects of Water (3 cr)

WRS, WRP, or WRE 507 Water Resources Seminar (1 cr., take 2)

WRS, WRP, or WRE 507 **and** 505 Seminar and Journal Club (1 + 1 cr)

(Doctoral students must take a total of 3 seminars; one seminar must be taken concurrently with the journal club)

### **Water Resources Engineering - Required Courses**

BEE 512 Physical Hydrology (3 cr)

BEE 529 Biosystems modeling or equivalent (3) (AIH Category 2)

A course in either groundwater hydraulics or open channel hydraulics must be included in the additional 15 credits of water engineering coursework for the PhD. An additional 9 credits of water science coursework is also required. In consultation with the committee and major advisor, students select from courses offered across campus. A list of water-related courses can be found at:

<http://oregonstate.edu/gradwater/wrgp-courses>

### **Suggested Courses for a Policy and Management Minor**

**Students who wish to minor in Water Resources Policy and Management must take 15 additional credits in courses related to water policy and management (see web site above for list of potential courses).**

## Appendix C. Doctoral Program requirements

### ***Program Requirements***

A Ph.D. Program of Study form (list of proposed courses) must be filed by all Ph.D. graduate students. The form is available from the Graduate School, on their website. **A student who does not file a program within the specified deadline will not be allowed to register for the next term.**

The program is worked out under the guidance of the major and minor professors and is signed by the entire committee and the chairman of the academic unit before filing with the Graduate School. Changes in the program may be made by submitting a Petition for Change Form, available from the Graduate School. It is wise to file one Change Form near the end of the student's tenure so repeated filings are not necessary.

Students should check the following requirements when preparing the Doctoral Program:

1. Does the program show at least three years of full-time graduate work beyond the baccalaureate degree (a minimum of 108 credits is required for a WRE PhD)?
2. Does the program consist of a minimum of 50% graduate-level stand-alone courses (not 400/500 slash courses), for new programs filed Fall Term 2007 or later?
3. Does the program show at least 36 credits devoted to the Ph.D. dissertation?
4. Does the program contain at least one full-time academic year of regular non-blanket coursework (i.e., a minimum of 36 credits)?
5. Does the program guarantee that the following residence requirement will be met: a) a minimum of 36 graduate OSU credits, and b) at least three terms of full-time graduate academic work (at least 9 credits/term) on site at the Corvallis campus or at an off-campus site approved by the Graduate School?
6. If a minor is declared, does it contain at least 18 credits (15 credits for an Integrated Minor)? Has the student taken at least one course from the department or programmatic area of the Minor Professor?
7. Does the program contain not more than 15 credits of blanket-numbered courses, other than dissertation? (Excess blanket-numbered courses are allowed to the extent that the program exceeds 108 credits.)
8. Does the program guarantee that all degree program requirements will be

fulfilled? (A total of at least 108 hours are required for the WRE PhD degree at OSU.)

9. Do all transfer courses appear to fit the guidelines for transfer courses?

10. Are all transfer courses clearly identified as transfer courses?

11. Is the program meeting being held early enough in the student's academic career to permit the committee to contribute meaningful input to the program?

12. Does the program demonstrate appropriate training in the ethical conduct of research?

The Water Resources Engineering program provides substantial flexibility for tailoring programs of coursework to fit individual student backgrounds, interests and career goals. Specific requirements are listed below:

There must be a minimum of 108 graduate credits, including a minimum of 30 post-masters course credits taken at OSU and 36 hours of dissertation credits. M.S. credit hours can often be included in the calculation of the 108 credits when approved by the Program Director and Graduate Committee. In all cases, the Graduate Committee and Program Director, not the student, are responsible for deciding the type and amount of coursework required to complete the Ph.D. degree. They may conclude that coursework beyond the 108 credits is appropriate to achieve programmatic objectives.

A maximum of 15 hours of blanket number courses (501/601, 505/605, 507/607, 508/608) is allowed on a Ph.D. program.

## Appendix D: Proposal Structure

You must make a proposal to your major professor and committee about what you plan to do in your **dissertation** research. The proposal lays out the problem, tells the reader what is already known (and not known) about the problem, and describes in careful detail what you are going to do to answer the questions.

### Dissertation Proposal Structure

A dissertation proposal can include a number of sections, described below. These are just examples. Of course, the content and subheads under each section will vary depending on the problem you are researching, your theoretical framework and the methodology you envision.

- I. Introduction.** This should consist of a brief summary of the problem you are proposing to investigate, what questions or hypotheses you intend to address, and an overview of you envision doing the research.
  
- II. Review of Literature.** Here you review relevant literature that will enable you to make a case for the significance of your research. This is an interdisciplinary field. It is likely you will review more than one area of literature. Following this review, you should summarize the rationale for your research questions or hypotheses drawn from all the areas of literature you have reviewed. Finally, you should clearly state your main research questions or hypotheses
  
- III. Methodology.** Here you describe your plans for collecting data as specifically as you can. Of course, the considerations you discuss here will vary depending on the nature of your research, e.g., whether quantitative or qualitative. The following are considerations you may need to discuss in a quantitative dissertation: unit of analysis; population; sampling procedures; research instruments (questionnaire, coding categories); and reliability and validity of the methodology you plan to use. Some discussion of the limitations of your chosen approaches may be appropriate.
  
- IV.** Timetable of significant events in the research project, including period during which data will be gathered, duration of field season for field projects, period during which data analysis will be conducted, period devoted to writing of the dissertation, and expected data of completion.
  
- V.** A proposed budget and budget justification should be attached if funds are needed

## Appendix E: Graduate School Forms and Other Sources

Graduate Program forms and all other necessary forms are available on the web at <http://gradschool.oregonstate.edu/forms>

The OSU Graduate School Guide to Success, a step-by-step guide to getting through your graduate program can be found at <http://gradschool.oregonstate.edu/graduate-student-success>

OSU Graduate diploma and commencement deadlines: <http://gradschool.oregonstate.edu/progress/deadlines>

Information about graduate degrees can be found at <http://gradschool.oregonstate.edu/>

The Graduate School is available to answer any questions on degree requirements. Call 541-737-4881, stop by the Graduate School on the 3<sup>rd</sup> floor of Kerr Administration Building, or e-mail at [graduate.school@oregonstate.edu](mailto:graduate.school@oregonstate.edu)

The OSU Center for Writing and Learning: writing assistants are available to help with brainstorming, organization, grammar and usage, and all aspects of writing. There is also an online writing lab for assessment of writing problems (24-48 hour turnaround.) You can call 541-737-5640, visit at Waldo 123, or check the website at <http://cwl.oregonstate.edu>.

The OSU Academic Success Center: provides assistance with goal setting, study skills, listening habits, time management, and wellness. You can visit MU 203 or on the web go to: <http://gradschool.oregonstate.edu/graduate-student-success/grad-student-success-center>