Ph.D. Program FAQ

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How should I choose which of the core courses to take?

Talk to your advisor and to the faculty members in any field you are considering as a thesis area, and consult Recommended Programs of Study.

Do I have to take 2 core courses my first year?

Yes, if you want to maintain normal progress (unless you pass a prelim when you arrive). If your preparation is not sufficiently strong to allow you to take two core courses, you might choose to take one 400-level alternative course (see If I don't feel up to a core course, what should I take instead?). But since this will prevent you from making normal progress, please talk to your advisor and the Graduate Program Coordinator before doing this. If you passed a prelim when you arrived, you may use that to substitute for taking the corresponding core course, so you would not have to take 2 core courses in your first year.

May I take more than 3 courses at a time?

Some people do on occasion. But until you've been in this program for at least a quarter while taking three regular courses, you probably shouldn't try it — especially if you also have a TA job. Most people find three graduate courses plus a TA job to be more than enough to keep them extremely busy. It is a common practice,
however, to attend four courses at the start of a quarter with the intention of trying them out and dropping one of them after a week or so.

**If I don’t feel up to a core course, what should I take instead?**

Each of the core courses has one or more 400-level alternatives that you can take instead. They are as follows:

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<thead>
<tr>
<th>Instead of</th>
<th>Consider substituting</th>
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<tbody>
<tr>
<td>504/5/6</td>
<td>402/3/4 (Introduction to Modern Algebra)</td>
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<tr>
<td>524/5/6</td>
<td>424/5/6 (Fundamental Concepts of Analysis)</td>
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<tr>
<td>or 534/5/6</td>
<td>424/5/6 (Fundamental Concepts of Analysis)</td>
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<tr>
<td>or</td>
<td>427/8/9 (Topics in Applied Analysis)</td>
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<tr>
<td>544/5/6</td>
<td>424/5/6 (Fundamental Concepts of Analysis)</td>
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<tr>
<td>or</td>
<td>441/2/3 (Topology and Geometry)</td>
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You should consult your advisor or the Graduate Program Coordinator as soon as you start to seriously consider one of these substitutions. The most important prerequisite for succeeding in any of the graduate courses other than algebra is a very solid background in undergraduate real analysis, including a rigorous treatment of differentiation and integration in several variables, uniform convergence, and metric spaces. This is why 424/5/6 is listed as the primary substitute for all of the core courses except algebra. The other 400-level courses listed provide useful background and practice with the concepts, but for most people the 402 or 424 sequence will be the most important fallback. Note that Ph.D. students are only allowed to take one 400-level course at a time, unless they get special permission from the Graduate Program Coordinator.

**Besides the core courses, are there other 500-level courses that first-year graduate students can take?**

There are two other 500-level courses that are classified as entry-level courses because they are commonly taken by first-year students and have no graduate-level prerequisites: These are the Optimization sequence (Math 514/5/6) and the Numerical Analysis sequence (AMath 584/5/6). If you are interested in pursuing your studies in one of these fields, you should probably talk with your advisor about the possibility of taking the appropriate course during your first year. Of course, within the limits of the Normal Progress rules, you are welcome to take any graduate math course for which you are prepared. (Note, however, that many advanced topics courses do not list formal prerequisites, but instead rely on students having attained a certain level of that elusive substance known as "mathematical maturity" by taking graduate courses for several years. If you are at all unsure whether you have sufficient background to take a particular course, talk with the instructor!)

**I plan to register for three courses that amount to only 9 credits. How can I meet the 10-credit requirement?**

If you take three 3-credit courses, you will need to sign up for at least one extra credit to bring the total up to 10. The easiest way to do so is to register for the Current Problems Seminar. Other options are to sign up for one or more credits of 600B in conjunction with a three-credit course (see [What is Math 600B?](#)) or to register for a research seminar for credit.

**What is Math 600B?**

This course number is for supplemental reading in connection with a math course. If you need additional credits to bring your total up to 10 credits, one easy way to get them is to sign up for two credits of 600B in conjunction with one of your 3-credit courses. You should reach an understanding with the instructor of that course at the beginning of the quarter about what work will be required for the extra credits. It could involve outside reading, doing extra problems, or regular discussions with the instructor, for example.

**Am I allowed to take courses outside the Math Department?**
Yes, provided you are otherwise meeting the Normal Progress and registration requirements, and your advisor approves. Otherwise you'll need the permission of the Graduate Program Coordinator.

**What do grades mean in graduate courses?**

Passing grades for graduate students are in the range 2.7 - 4.0. Grades below 2.7 do not count for graduate credit in the Mathematics Department, and may not be used in fulfillment of any math graduate degree requirements. In core courses, a grade of 4.0 means you have attained a superior mastery of the material, while a grade of 3.0 means you are just barely performing at the level expected of a graduate student. For core courses, grades of 3.8 or higher have special significance; see *What is the 3.8 rule?*

**What are prelims and what are they for?**

Preliminary exams, or "prelims" as they are commonly called, are four-hour written exams in the core graduate mathematics subjects. There is one prelim for each of the four current designated core courses. Each Ph.D. student must pass two of them (or pass one and get a 3.8 course pass in a second). The purpose of prelims is to assess whether you have mastered basic graduate course material sufficiently well to warrant being allowed to continue in the Ph.D. program. These exams are the main hurdle that Ph.D. students must cross, other than actually doing original research and writing a dissertation. Anyone who passes prelims is almost certainly capable of completing a Ph.D. degree.

**Who writes the prelims?**

Each exam is written by two faculty members with expertise in the field, usually not including the faculty member who last taught the corresponding course. The identities of the prelim examiners in any given year are kept confidential.

**How are prelims graded?**

Typically, each of the two examiners reads all of the papers independently and arrives at a tentative score for each problem on each exam. Then the examiners discuss the exams until they reach a consensus on a final score for each problem. They submit a report to the Graduate Program Committee, including a "raw" overall numerical score on each exam; a count of the total number of problems each student got "substantially correct"; and a tentative recommendation for each student's result (High Pass, Pass, Low Pass, High Fail, Fail, or Low Fail). Then the Graduate Program Committee discusses each exam with at least one of the examiners, and arrives at a final result for each student, taking into consideration the overall difficulty of the exams and the student's overall record.

**What does a "high fail" mean?**

The Graduate Program Committee decides on a grade of "high fail" when a student does not quite show the level of mastery needed to pass a prelim, but demonstrates enough knowledge and command of the material that passing would probably not require a huge amount of extra work. It is meant to encourage the student to try the same prelim again after further study.

**When will I learn the results of my prelims?**

The Graduate Program Committee usually meets to determine prelim results on the Thursday the week after prelims are offered. After that the Graduate Program Coordinator will write you a letter describing the results. These letters are usually delivered to students early in the following week, a few days before the start of Autumn quarter.

**Can I see my prelim after it is graded? How?**

Yes, you may. You must first choose a faculty member with whom you would like to discuss your work on the prelim. Often this will be the faculty member who taught the corresponding core course when you took it, but it doesn't have to be. When you have told the Graduate Program Coordinator who your chosen faculty member is, the exam will be released to that faculty member, together with a summary of your results on that exam. You can then sit down with the faculty member and look through your work on each problem.
What should I do if I think my prelim was graded incorrectly?

If, after looking through your prelim with a faculty member of your choice (see Can I see my prelim after it is graded?), you believe your exam was graded incorrectly, you may appeal the grade to the Graduate Program Committee. You will be asked to explain your position (either orally or in writing) to the Graduate Program Coordinator, who will then take your request to the committee, together with reports from the two examiners and the faculty member who looked through the exam with you. The final decision on prelim results rests with the Graduate Program Committee.

What is the best way to prepare for prelims?

The most important thing to do is to take the core courses corresponding to the prelims you are planning to take. After that, it is an excellent idea to spend the summer working on practice problems from old prelims. If you will be in Seattle over the summer, you can participate in the prelim prep seminars that are conducted every summer. If not, you can obtain copies of past prelims and study them on your own.

Are there past prelims that I can look at?

Yes: available here. They are also available in the Math Research Library. If you take a prelim prep seminar in the summer, you’ll be given copies of some old exams to work on in the seminar. Otherwise, you may request copies of old exams from the Student Services Office (Padelford C-36, 206-543-6830, grads@math.washington.edu).

What is the 3.8 rule?

A Ph.D. student may be exempted from one written prelim by receiving grades of 3.8 or higher in each of the three quarters of the corresponding core course.

If I retake all or part of a core course and get 3.8's the second time, does this count toward a course pass?

No. The purpose of the 3.8 rule is to enable students who have unquestionably mastered the material the first time to move on to other things, not to encourage people to take courses repeatedly just to avoid written prelims.

If I get a 3.8 course pass in a class and then fail the prelim, does the course pass still count?

Yes.

If I don't pass prelims by my second September, what options do I have, assuming I really want to get a Ph.D.?

That depends on what the Graduate Program Committee says to you. If you have passed no prelims by September of your second year, it is likely that your TA support will end at the end of your second year, and you would be expected to finish this year with a Master's degree. If you have passed one written exam or obtained at least one course pass, the committee will evaluate your graduate student record in order to make a decision. The committee may decide to end support after your second year, but this decision is not very common. It is more likely to decide to give you another chance at prelims at the start of your third year. If at that point you have still not completed prelims, it is likely that your support will end after year three, so you should finish with a Master's degree. Very rarely (perhaps once every 15 years), a student with only one prelim pass could be given special dispensation from the committee and allowed to continue in the program. You should not expect this to happen.

Occasionally, students whose support has been terminated decided to stay in the program as self-supporting students, but experience suggests that most such students would probably be better off moving on, either to another university or to a different career path.

May I change my advisor? How do I go about that?
Yes, you may change advisors any time, provided all parties agree. Get an advisor change form from the Student Services Office (C-36), fill it out and, after it has been signed by yourself, your old advisor and your new advisor, put it in the Graduate Program Coordinator’s mailbox for approval. (Your new advisor must sign to agree to be your advisor. Your old advisor must sign to indicate notification of the change.)

How does the general exam work?

The General Exam has two parts: an oral part and a written part. Its purpose is to allow the Graduate Program Committee to verify that you’ve attained enough knowledge of your chosen field to understand some open problems and methods for attacking them, and are ready to proceed with thesis research. The oral part is typically a 50-minute lecture on the background and methods in your research area. The written part is typically a 10-20 page expository account of the same material. To be making normal progress, you must pass the General Exam by the end of Winter quarter of your fourth year. For details, see the description of the General Exam.

What if I fail my general exam or don’t take it on time?

First, it must be said that it is rare for students to actually fail the general exam. Usually, if a student is not sufficiently prepared for the exam, the advisor will make arrangements to have it delayed until the student is ready. If you do fail, you can take it again. As for the deadline, if you are not ready to take it by the deadline, you and your advisor may negotiate a later time for the exam with the Graduate Program Coordinator. As long as you’re continuing to make reasonable progress toward preparing for the exam, the department is often able to be flexible about the dates.

What is a language exam like?

Typically you and the examiner agree in advance on a particular mathematical book in the given language. Then on the day of the exam, the examiner chooses a passage from that book, which you have to translate into English with the aid of a dictionary.

I've never studied language X. Should I take a course to prepare for the language exam?

Only if you want to study the language for your own reasons, for example to read Voltaire, Goethe, or Tolstoy in its original language, or to prepare yourself for spending a year in a foreign country. But for passing a Math Department language exam, all you really need to do is buy yourself a dictionary and a basic grammar book, get a couple of mathematical books in the given language from the library, and spend some time during the summer reading the math book with your reference books at hand, looking up each word or construction you don’t know and writing it down. At first, you'll have to look up almost every word. But after a while, many of the words and phrases you read will already be on your list. There may be some troublesome grammatical constructions that you won’t find in your grammar book, such as “Let X be ... ,” and you’ll have to ask for help. If you practice this way daily for a month or two, you’ll be ready to pass your language exam.

What is the computer programming exam?

It is an alternative to one of the language exams, designed to ensure that you can design, write, and debug computer programs at a basic level. There are basically two ways to pass the exam: You can pass one of a certain list of designated courses with a grade of 3.0 or better, or you can present a working computer program (either one that you have written previously, such as for a course or a job, or one that you write for this purpose). See the description of the exam.

I took course X, for which I wrote a substantial computer program. Does it fulfill the computer requirement?

Unless the course is on the current list of designated courses that automatically fulfill the requirement, you'll have to present your program for one of the examiners to evaluate. There are many courses that sometimes require computer programming assignments of varying scope, but the courses on the list are the only ones that the examiners have accepted as automatically fulfilling the requirement. If you know of a course that regularly requires a programming project whose scope is similar to or greater than that of the Ph.D. programming requirement, you may request that the examiners add it to the list of designated programming courses.
Who should take the computer programming exam?

Since computer programming is increasingly important for mathematics research and teaching, as well as being essential for using mathematics in industry, it is the belief of the Graduate Program Committee that the great majority of Ph.D. students should choose the computer programming exam. For more specific recommendations from faculty members in various fields, see [Recommended Programs of Study](https://math.washington.edu/phd-program-faq).

When should I take the computer programming exam?

Probably as early as possible. Because the summer after passing prelims is an excellent time to try out an industrial internship, it would be a good idea to learn computer programming during your first or second summer if you haven't already done so.

What is the best way to prepare for the computer programming exam?

If you think you will be using computers extensively in your own work, then it probably makes sense to take a course that requires a substantial amount of programming. Otherwise, just choose a programming project that is interesting to you (for example, something suggested by a math course or by a book or paper you're reading), choose a language (you might want to ask around to find out which language is most appropriate for your chosen problem), buy a reference book about that language, and start writing code. The computing staff or computer TAs can help you if you get stuck.

Is a Master's degree required before going on to write a Ph.D. dissertation?

No. Many Ph.D. students choose to get a Master's degree along the way, but it is not required. Since you will probably fulfill all of the course requirements for a Master's degree during your first two years in the Ph.D. program, all you have to do for a Master's degree is the final Master's exam. Thus, adding a Master's degree to your credentials takes very little extra effort and will never hurt you; it may help you (in unexpected ways) in the future.

I want to do something that isn't covered by any of the rules. Am I out of luck?

Not necessarily. Talk with your advisor first, and then talk with the Graduate Program Coordinator.

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