



West Virginia University®



Department of
Physics and Astronomy
Graduate Student Handbook
2021-2022

DEPARTMENT OF PHYSICS AND ASTRONOMY

Graduate Student Handbook

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WELCOME LETTER

TO: All Incoming Graduate Students

FROM: D.J. Pisano, Chair, Department of Physics and Astronomy

Welcome to the graduate program in Physics at West Virginia University. The faculty and staff are eager to meet you and help you get started in graduate studies, and I encourage you to get know your fellow students, the faculty, and the staff over the next few months. Throughout this opening letter, required information is highlighted in **red**. The first day of classes is **Wednesday, August 18, 2021**. All students are expected to be in town early enough to attend the various orientation and training sessions listed at the end of this memo. This handbook is full of important dates as well as important phone numbers, payroll processing information, links to safety training, and some helpful guides to navigating graduate school - so please read it completely.

Please remember to join the Chair for a catered lunch meeting from 12:15 to 1:15 PM on Monday, August 16, in the main department conference room (White Hall 105). In the past, some incoming graduate students have missed this meeting because they did not read this letter. It is expected that you will add this meeting to your calendar without additional reminders. This will be a chance for you to ask questions and for us to review a few bits of important information.

The faculty advisor for first year graduate students is Maura McLaughlin. Her office is G59 White Hall. Nearly all of you will be Graduate Teaching Assistants (TAs) during your first year. The Lab Manager supervises the TAs, and you should report to him/her as soon as possible. The Lab Manager's office is in White Hall. In the department office, the administrative assistant, [Ms. Viola Bryant](#), can help you navigate through payroll, hiring issues and can provide information about course-related issues. **Please supply Ms. Bryant with your local phone number as soon as possible.** Whenever I am in the Chair's office in 111 White Hall, feel free to ask questions or just say hello.

An important first challenge is to get on payroll. Everything you need to know about the payroll process is located online at WVU Shared Services. Once you have looked at this web site, if you have any questions, please contact Viola for assistance.

<https://shareservices.wvu.edu/employee-processing>

IMPORTANT PAYROLL INFORMATION - You **MUST** process for payroll by August 6, 2021. Failure to process in a timely fashion can result in pro-rated and/or late pay. Payroll information will be sent to Viola Bryant once you have processed for payroll. The college will not allow you to work until you complete the payroll process.

There are several orientation sessions that you **MUST** attend as a new graduate student. To streamline the orientation process, the Office of Graduate Education & Life provides several modules listed below. Attendance is mandatory. Please note that plans for the Fall semester remain in flux. As such, the locations for these events may change as we learn more about the schedule for the Fall semester and some activities may be moved online.

- 1) **Part 1: *Online Modules: FERPA; Academic Integrity and Dishonesty; Diversity and Accessibility; Title IX Training; Integrating School and Life.*** These modules will be available on the eCampus Learning Academy site by June 1. **New GTAs should complete these modules by the beginning of the Fall semester.** Completion will be monitored by the Office of Graduate Education and Life and reported to the department. Go to <https://tlcommons.wvu.edu/iteach/gta-orientation> for information on how to access these modules.
- 2) **Part 2: New GTAs should attend the virtual Teaching and Learning Commons GTA Orientation via Zoom on Friday August 13, 2021 from 9:00 AM to 3:00 PM and the virtual OGEL New Graduate Student Orientation (NGSO) on Monday, August 16, from 3:00-4:30 PM.** These orientations will address topics such as Graduate Academy opportunities, advice from veteran GTAs, Title IX compliance, active shooter training and student health insurance. Attendance will be monitored by the Office of Graduate Education and Life and reported to departments. You may register online at <https://tlcommons.wvu.edu/events-workshops/gta-orientation>.
- 3) **New International Student Orientation.** **The date/time of the orientation for new international students should be announced soon. Please check <https://isss.wvu.edu/students/on-boarding> for updates.** This orientation focuses on various important issues relevant to international students and the transition to study at WVU.
- 4) **International Students must demonstrate their English proficiency.** Information on English requirements and alternative testing through TrueNorth is located here: <https://elli.wvu.edu/testing-resources/english-proficiency-gtas>
- 5) **All Graduate Teaching Assistants in Physics and Astronomy must attend the departmental teaching assistant training sessions** to be held on Monday, August 16 from 8 AM to 12:00 PM and Tuesday, August 17, from 8 AM to 4 PM.
- 6) All incoming Graduate Students in Physics and Astronomy may opt-in to take the written graduate qualifying exams a few days before the start of the first semester. You will be asked before arrival whether or not you wish to take the exams. The details and content of the exams are given in the [Graduate Exam Information](#) Section.
- 7) **All graduate students must complete the [Safety Training](#) to obtain access to the teaching labs and the research labs** (see the Safety Training section of this document).

Finally, I would like to leave you with a few thoughts about my expectations for graduate students within the department. If you are a graduate teaching assistant, I expect you to act professionally at all times. This means that you should arrive early for every laboratory session you teach or exam that you proctor. You should treat the undergraduate students and your fellow graduate students with courtesy and respect. You should return graded work promptly and complete your work with care. If students in your laboratory sections are disrespectful to you, please work with the Lab Manager or myself to resolve the issue. If you

are a graduate research assistant, I expect you to document your research and uphold the highest standards of professional ethics.

I expect first-year graduate students to attend EVERY scheduled colloquium during the academic year. For the Fall, colloquia will be held on Wednesdays at 2:30 PM. Please note that the Colloquium course, PHYS 799, is graded. My hope is that by the end of your first summer here, each student will have identified a research group with whom to work. Keep in mind that in addition to the department faculty, graduate students have worked with faculty in chemistry, electrical engineering, chemical engineering, mathematics, and nuclear medicine. The Ph.D. degree is research based and the sooner you get started in your research, the sooner you can complete your degree. Every faculty member welcomes inquiries concerning their research activities, and I encourage you to speak with each professor individually about their research activities.

In terms of courses, you are expected to attend every meeting of your graduate classes. The department provides a tuition waiver to cover the cost of your graduate tuition and an assistantship to help with living expenses while you are in graduate study. Physics graduate students must obtain permission from the Graduate Advising and Studies committee (or the Chair if they do not yet have a Graduate Advising and Studies committee) to take courses outside of Physics and Astronomy unless they are on the list of “approved” outside courses (see the graduate advisor for the latest copy of this list).

I hope that you find our physics department an intellectually challenging environment that prepares you for life as a M.S. or Ph.D. physicist. Welcome aboard!

PROFESSIONAL EXPECTATIONS

TO: All Physics Graduate Students

FROM: D.J. Pisano, Chair of Physics and Astronomy

As a new academic year begins, I wanted to make sure to say “thank you” to all the Graduate Teaching Assistants who will be working to provide quality educational experiences for the students in their classes. I also want to encourage you all to continue to be vigilant about maintaining a positive and collegial work environment for the undergraduate students in your courses and your fellow graduate students. Each semester, GTAs will be evaluated by Student Evaluations of Instruction (SEIs). **The SEIs must be requested for each of your courses each year and the results printed out and submitted to the Lab Manager, every semester.** We take teaching seriously at WVU and reviewing the student feedback is something we will do for all your courses.

As you know, physics has a reputation as an intensely demanding discipline in which a not-very-diverse population works. You also know that your students and colleagues come from a range of experiences, ethnic backgrounds, religions, races, sexual orientations, and genders. Thus, it is critically important that each of us consciously work to make our department welcoming to and supportive of each and every student and colleague. Disparaging personal remarks about a student or a colleague simply have no place in this department, this institution, or our profession. Shared office space is particularly problematic when jokes or conversations get out of hand and create a hostile environment for your colleagues. **Access to office space is a privilege that will be revoked if you cannot act professionally in shared office space.** More than likely, each of you will spend 4-6 years in this department. Let us make it a welcoming work environment that all of us will enjoy coming to every day. To help you understand best practices in this area, everyone must complete Title IX training upon arrival and then every three years after that. I encourage you to participate in the activities sponsored by our department Diversity, Equity, and Inclusion committee as well. These are excellent opportunities to learn.

For more information please consult our [Diversity, Equity and Inclusivity](#) page on our website.

GRADUATION PROCESS-TIMELINE

To be accepted as a candidate for the Ph.D. within the Department of Physics and Astronomy at West Virginia University, a student must pass both written and oral examinations.

Students should plan to finish their degree program in a timely manner. Towards this end, all students must pass the written examinations by the end of your fourth (academic) semester in the program and the oral examination by the end of your sixth (academic) semester in the program in order to remain in *good academic standing*. The exam schedule and timeline for attempts is laid out in the next section.

This exam timeline should coincide with a course load that would allow students to leave the program with an M.S. degree if they do not remain in *good academic standing* or have not passed their written qualifier exams. The Graduate Advising and Studies committee is empowered to make all decisions regarding any exceptions to the above timelines.

Typically, a first-year student should choose a faculty member with whom to complete their doctoral research. The student's choice of faculty advisor must be accomplished in a timely manner in order to pass the oral examination by the end of the sixth (academic) semester in the program. Details of the oral examination are given in the next section.

In addition to the departmental requirements, West Virginia University dictates doctoral candidates are allowed no more than five years in which to complete the remaining requirements of their program after being admitted to doctoral candidacy. Passing of the oral examination starts the clock of doctoral candidacy. This is a rule mandated by WVU which cannot be appealed internally. Therefore, given the timeline for the written and oral examinations, a Ph.D. student must complete their final dissertation defense no later than the end of the Spring semester of their ninth year after entering the program, but this is an extreme example. Typically, WVU students complete their Ph.D. degree within five to six years.

GRADUATE QUALIFYING EXAMINATIONS INFORMATION

Written Qualifier

Summary: As part of their admission to the PhD program, each student must pass three separate written exams in classical mechanics (CM), electricity and magnetism (EM), and quantum mechanics (QM). These exams are designed to evaluate a student's general understanding of each subject at an advanced undergraduate level, equivalent to the most advanced upper-division undergraduate courses in CM, EM, and QM. Each exam will consist of 5 problems and the passing condition for each exam a 60% minimum grade. All problems are designed to be solved in less than 30 minutes. To pass a single question perfectly (20/20), students must clearly articulate the physical concept, thoroughly solving every part of the problem using mathematics where required. The duration of each exam is 3 hours.

Schedule: Exams will be held in White Hall G09 at 1:00 PM (subject to room availability and WVU's social-distancing policy)

	<u>Fall 2021</u>	<u>Spring 2022</u>
EM:	Tuesday August 10	Tuesday January 4
CM:	Thursday August 12	Thursday January 6
QM:	Saturday August 14	Saturday January 8

Timeline: Students must pass the written qualifier exams by the end of the fourth semester in the program. Students are not expected to take the exams on entry into the department, but you may opt-in to take the exams prior to the first semester. This may help identify weaknesses in undergraduate preparation and provides an opportunity to see the exam and the process.

This timeline is only valid for students who are in good academic standing. The graduate advising and studies committee will be empowered to make all decisions regarding any exceptions to the timeline.

Attendance, aliases and proctoring: On the day of the exam, students should arrive 10 minutes before the exam so they can be given an alias to anonymize the grading. This will not be performed by the exam proctor. The student should only use their anonymized identity on all sheets of the submitted work. A faculty member, usually from the exam sub-committee responsible for the exam, will ensure a quiet and ethical exam environment for the duration of the exam. Students are encouraged to ask clarifying questions. The proctor will answer questions related to the implementation of the exam at their discretion.

Exam committees and grading: Each exam committee is comprised of five department faculty, who write questions in accordance with the topics below and the per question time guidelines above. Anonymized exam papers are given to the committee by the proctor and two rounds of grading occur: (i) 2-person question-by-question grading and (ii) full exam committee reconciliation to consistency of individual student response and to the entire group. Grades are given to the exam coordinator and department chair to de-anonymize. The chair will announce grades, typically before the add/drop-date for new courses.

Grading guidelines: The overall grading philosophy is applied to the entire exam, including every part of exam, so it is advised that you address every detail that is being asked.

- A(80-100%): Everything correct or nearly correct. The student masters both physics concepts and math methods used in physics. Only some minor imperfections.
- B(60-80%): The student seems to master physics concepts: He/she correctly constructs equations needed to solve the problem, but misses some minor physics concepts or fails to complete math part of the problem entirely correctly. Yet, the student work does not contain any serious physics or math errors or flaws that would disqualify the student from earning PhD in exact sciences such as physics.
- C(40-60%): The student correctly writes down the key physics equations needed to solve the problem,

yet he/she does not demonstrate a complete understanding of the physics or the math skills really needed to solve the problem. The student work does contain some serious physics or math errors or flaws that would disqualify the student from earning PhD in exact sciences such as physics.

- D(20-40%): The student shows that he/she knows some physics and math related to the problem, but not enough to answer this problem correctly. Misunderstanding or misapplying at least one major concept.
- E(0-20%): The student shows that he/she does not understand the basic physics and math related to the problem.

Study aids: Example textbooks for study are given for each exam below, based on typical recommendations in the syllabi of WVU advanced undergraduate courses in CM, EM, and QM. A list of study topics is provided for each exam based on conceptual ideas from these courses.

Solutions will be created for each problem that are no longer than three pages and have sufficient detail to fairly reflect the time required to solve the problem. The department will make available solutions for the past five years of exams. These are stored in the main office, which may have limited access due to WVU's social-distancing policy. The purpose of making these solutions is available is provide students with feedback on the exams that they have taken.

The topic list below is also available at <http://physics.wvu.edu/students/graduate-students/graduate-qualifying-exam>. If you find disagreement between these two sources, please contact the chair of the department or the exams coordinator.

CM Exam

Suggested textbooks: "Classical Mechanics" by John R. Taylor, University Science Books, 2004.
"Classical Dynamics of Particles and Systems" by Stephen T. Thornton and Jerry B. Marion, Brooks Cole, 2003.

Topics:

- Newton's three laws of motion
- Inertial and non-inertial reference frames
- Projectile motion
- Energy and momentum of N-body and continuous systems
- Simple harmonic oscillation
- Damped and/or driven oscillation
- Coupled oscillators and normal mode analysis
- Central force problems
- Rigid rotation
- Variational calculus (e.g. extremal paths on parameterized surfaces)
- Lagrangian and Hamiltonian equations of motion
- Collisions and scattering

EM Exam

Suggested textbooks: "Introduction to Electrodynamics" by David J. Griffiths, Third Edition, Prentice Hall, Upper Saddle River, New Jersey, 1999.

"Electromagnetic Fields" by Ronald Wangsness, Second Edition, Wiley, 1986.

Topics:

- Vector and scalar potentials
- Coulomb's law - point charges and continuous distributions
- Gauss' law
- Conductors in electrostatic fields
- Electrostatic energy
- Laplace's equation, boundary conditions
- Method of images, electric multipoles
- Electric fields in matter
- Electric field in conducting media
- Electric currents, Magnetic Fields, Lorentz force law
- The Biot-Savart law, Ampere's law
- Magnetic fields in matter
- Magnetic Induction
- Faraday's law
- Magnetic energy
- Magnetic multipoles
- Maxwell's equations in general and isotropic homogeneous forms
- Plane waves in various medium; reflection and refraction
- Circuits and transmission lines
- Electromagnetic waves

QM Exam

Suggested textbooks: "Quantum Mechanics" by David H. McIntyre, Pearson Addison-Wesley, 2012.

"Introduction to Quantum Mechanics" by David J. Griffiths, Prentice-Hall, 1995.

Topics:

- Interpretation of quantum mechanics, operator formalism
- The Generalized Uncertainty Principle
- The Bohr model
- Ehrenfest theorem
- Spin-1/2 and spin-1 particles
- Dirac and matrix representations of quantum mechanics
- Schrodinger equation and time-evolution: time-independent and time-dependent Hamiltonians
- Exact solutions to the 1-D Schrodinger equation
- 1D, 2D and 3D Quantum harmonic oscillator: ladder operator methods and coherent states
- Exact solutions to the cylindrical and spherical Schrodinger equation
- Exact solutions to the hydrogen atom Schrodinger equation
- Perturbation theory: nondegenerate and degenerate, up to second order in energy, first order in state corrections
- Angular momentum. Orbital and spin angular momentum
- Addition of angular momentum
- Identical particles: fermions and bosons
- Perturbations on the hydrogen atom: fine structure, hyperfine structure, Zeeman effect
- Symmetries and conservation laws
- Variational Principle

Oral Qualifier

Timeline: All students must pass the qualifier examinations before the end of their sixth (academic) semester in the program. The oral qualifier may only be scheduled after passing all three written qualifier exams.

Purpose and scope: Currently, the format of the oral examination is a presentation to the members on the student's doctoral committee in which the student reviews some of the published research in the chosen subfield of specialization. The exam will normally be based on a single article chosen by the candidate with guidance from the advisor. The student is expected to present the findings, place the work in context, and provide a critique of the published work. In response to the presentation, the student will be asked questions from the general audience after which time, the student will be asked additional questions from the doctoral committee in closed session. Students may be reimbursed up to \$50 for food purchased for the exam, upon submission of receipts.

Typically, the doctoral committee will ask questions that relate the research to more fundamental physics and not require the student to know the entire literature of the discipline or subfield, although some contextual knowledge will be expected.

Normally, the public portion of the oral qualifier is 40 – 50 minutes and the closed-door session with the doctoral committee is about 90-120 minutes. These are only guidelines and a particular committee may require more or less time to evaluate a prospective Ph.D. candidate.

Pass/Fail: The oral qualifier is a pass/fail exam. The student should arrange for the committee signature form for the exam to be ready for committee members to sign. This should be submitted to the main office with all committee member signatures. If a committee member participates remotely, they may sign the paperwork digitally or write a permission e-mail to have another committee member sign on their behalf.

In accordance with the graduate catalog for the Ph.D. degree, the committee will pass a student that has demonstrated the following abilities in the oral qualifier exam:

- Understand and critically evaluate the published work chosen by the candidate and its relation to the broader field of research
- Explain physics and/or astronomy principles that pertain to the published work chosen by the candidate
- Communicate effectively through oral presentation aided by slide presentations, chalk-board discussion, etc.

If a student does not meet the requirements to pass the oral qualifier, the committee can recommend the student repeat the exam in part or in full. The committee can also recommend an outright fail, such that the student will not be given another opportunity to retake the exam.

Ph.D./Doctoral Committee: Three or more members must be members of the WVU graduate faculty. Three members must be from the faculty of the Department of Physics and Astronomy. The fourth member may be internal or external to WVU. If external to WVU, the fourth member must hold a Ph.D. in a field related to the candidate's dissertation research. If internal to WVU, the fourth member must be from a department other than Physics and Astronomy. All members must have a Ph.D.

REMAINING A STUDENT IN GOOD ACADEMIC STANDING

To remain a graduate student in good academic standing, a student must:

- Maintain a GPA of 3.0 or better in graduate physics courses taken at WVU, excluding physics 797 and excluding any grades obtained by repeating a graduate course
- Pass all three written graduate qualifying exams by the end of their fourth semester
- Choose a Ph.D./doctoral committee and pass the oral qualifier exam by the end of their sixth semester.

A student who is not in good standing because of a GPA < 3.0, or failure to pass the graduate qualifying exams, or failure to pass the oral qualifier exam according to the above schedule will have his/her academic record reviewed by a faculty committee and continuation in the physics graduate program will require the committee's approval. Students admitted as M.S. degree candidates are not expected to take the graduate qualifying exams but must complete their studies by the end of the sixth semester in the program.

Students who have passed the oral qualifier examination are "doctoral candidates." Doctoral candidates are allowed no more than five years in which to defend their dissertation. The clock on doctoral candidacy starts once the oral qualifier examination is passed. After the oral examination is passed and until the Ph.D. dissertation defense, annual reviews must be completed by the student and the student's Ph.D. committee.

1. The graduate student currently must defend an oral examination to enter Ph.D. candidacy and submits a Plan of Study at the time of this defense.
2. The student's Ph.D. committee, formed at the time of the oral examination, evaluates the graduate student's progress annually before the end of March.
3. It is the student's responsibility to arrange for the annual meeting of the student's Ph.D. committee. Students who have passed their oral qualifier exam within a year of the deadline or who are planning to defend within a year after the deadline may submit the signed form (see step 8) without calling another meeting of their committee.
4. Before this annual evaluation meeting, the graduate student must prepare a written summary of their progress (in the format listed on page 19 of this document). A copy must be sent to all members of the student's Ph.D. committee.
5. During this annual evaluation meeting, the graduate student is to give an oral presentation of research progress to date. A plan on how the student intends to graduate within five years of passing the oral exam date must be part of the presentation.
6. Only a quorum (2 members plus the chair) of the committee is required to be present (either in-person or virtually) during the annual evaluation.
7. The committee deliberates and, if progress is deemed to be satisfactory, the committee chair will sign the student's report to indicate that the student is in good standing.
8. The summary is submitted to the chair of the Graduate Advising and Studies committee.
9. Students who are not in good standing must prepare a plan to bring their standing back into good standing during the next year and submit that to the Graduate Student Advisor.
10. Students who are not in good standing for two consecutive evaluation cycles may not continue in the Ph.D. program.

Appeals Process

If a student wishes to appeal a decision that may jeopardize their good academic standing, then they should consult these guidelines as well the policies of WVU (<http://catalog.wvu.edu/graduate/enrollmentandregistration/#academicrightspenaltiesappealtext>). Prior to pursuing an appeal, it is recommended that the student speak with the department chair or Graduate Advising and Studies committee chair to clarify the process and determine whether the matter should be addressed in the department or be elevated to the university.

If a student wishes to appeal a decision in the department, a written appeal must be addressed to the chair of the Graduate Advising and Studies committee. The written appeal should include the decision that is being appealed, a legitimate reason why the decision should be appealed and an account of evidence to prove the reason within **30** days of the incident being appealed.

Once the written appeal has been sent to the chair of the Graduate Advising and Studies committee, the committee will investigate the legitimacy of the claim, the evidence and the scope of any decision or change of decision. After the investigation, the Graduate Advising and Studies committee will recommend that the chair revise or stay the decision, with a recommendation course of action, if the decision is to be revised. Note that complex appeals may require consultation outside the department or even the university.

An appeal should not be directed for a single or series of course absences and should be directed to the instructor of the relevant course. Series of events, such as health, leave for work or similar should be addressed to the Graduate Advising and Studies committee in advance and therefore not considered an appeal. Programmatic decisions, (including but not limited, qualifier exams, annual doctoral committee meetings and research-related decisions that affect good academic standing) can be considered for appeal, although these could also be addressed more informally with relevant faculty.

ACCOMMODATIONS

Students may require accommodations in accordance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act, as well as other state and federal laws. Accommodations can be sought through the [Office of Accessibility Services](#) (OAS). The OAS is dedicated to enhancing the educational opportunities for students with temporary and permanent disabilities at WVU. To ensure access to university programs, accessibility specialists work individually with students to help them achieve academic success. All documentation submitted to OAS is kept separate from the academic records and is considered private under the Family Education Rights and Privacy Act (FERPA).

Accommodations may apply to classes, exams etc. In order to obtain these accommodations, you must have a documented disability (anxiety, panic attacks, etc.) and you must provide proof of this from a professional (i.e. psychiatrist, psychologist, family doctor, etc.) OAS can provide accommodations such as extra time on exams, a separate space for exams, periodic breaks, etc. For clarification, please contact the OAS with any questions or concerns.

Office of Accessibility Services, B20 Stewart Hall, 304-293-6700, Email: access2@mail.wvu.edu, Web: <https://accessibilityservices.wvu.edu/>

EXAMPLE PLAN OF STUDY FOR THE PHD DEGREE

Year 1:	4 courses	Mastering fundamental physics at the graduate level.
	self-study	Preparing for the three written Graduate Examinations
	Phys 797	Surveying choices for research advisor
Year 2:	courses	Completing core courses
	courses	Surveying subfields of specialization
	self-study	Completion of the written Graduate Examinations
	Phys 797	Intellectual contributions in research
Year 3:	courses	Surveying subfields of specialization
	courses	Advanced analysis in subfield of specialization
	self-study	Completion of the oral Graduate Candidacy Examination
	Phys 797	Intellectual contributions in research
Year 4:	Phys 797	Intellectual contributions in research
Year 5:	Phys 797	Intellectual contributions in research
		Writing and defending the dissertation
Year 6:	Phys 797	Intellectual contributions in research
		Writing and defending the dissertation

Typical Fall Courses

PHYS 611	Mathematical Methods
PHYS 651	Quantum Mechanics 1
PHYS 634	Electromagnetism 2
PHYS 710	Nonlinear Dynamics
PHYS 761	Statistical Mechanics
PHYS 771	Introduction to Solid State Physics
PHYS 774	Optical Properties of Solids
PHYS 782	Computer Simulation of Plasma
PHYS 784	Magnetohydrodynamics
PHYS 791	Advanced Topics
ASTR 701	Computational Astrophysics
ASTR 702	Stellar Structure and Evolution
ASTR 705	Interstellar Medium

Typical Spring Courses

PHYS 633	Electromagnetism 1
PHYS 631	Classical Mechanics
PHYS 652	Quantum Mechanics 2
PHYS 772	Semiconductor Physics
PHYS 773	Collective Phenomena in Solids
PHYS 781	Principles of Plasma Physics
PHYS 783	Kinetic Theory
PHYS 791	Advanced Topics
ASTR 700	Radio Astronomy
ASTR 703	Galactic Astronomy
ASTR 704	General Relativity
ASTR 791	Advanced Topics

Doctor of Philosophy requirements

Students who pass all three sections of the qualifying examination at the 60-percent level are admitted to candidacy for the Ph.D. degree. Research is the central focus of the degree and is directed by a faculty advisor. Early in the research program the student must make an oral presentation to the doctoral committee reviewing some of the published research in his or her subfield of specialization. When the student's research is completed, it is described in a written dissertation and defended before the Dissertation Committee. The average completion time for the Ph.D. is five years beyond the B.S.

The Ph.D. requires 37 credit hours at the 600 level or above. This includes eleven required courses and four hours of PHYS 797 (research credit). The eleven courses must include the five core courses 611, 631, 633, 651, and 761, one of either 634 or 652, and any two of the following: PHYS 710, 726, 763, 764, 773, 783, 784, 791, 793, ASTR 700, 701, 702, 703, 704, 791, and 793.

The three remaining elective courses may be chosen from courses in the above list and those outside of Physics and Astronomy with the constraint that:

Courses must be approved by the Graduate Advising & Studies Committee. Courses previously approved remain on a pre-approved list. The current list of approved courses is:

- EDP 613. Statistical Methods 1
- EDP 614. Statistical Methods 2
- EDP 619. Survey Research Methods
- EDP 711. Multivariate Methods 1
- EDP 712. Multivariate Methods 2
- EE 528. Biomedical microdevices
- EE 564. Digital Signal Processing for Radio Astronomy
- EE 650. Optoelectronics
- CS 691A. Machine-Learning

Courses may be added to this list provided a good reason, a copy of the syllabus, and a copy of the book are provided.

TYPICAL COURSE PLAN FOR GRADUATE STUDY

Fall #1

PHYS 611 Introduction to Mathematical Physic
 PHYS 651 Quantum Mechanics 1
 PHYS/ASTR Elective (optional)

Spring #1

PHYS 633 Electromagnetism 1
 PHYS 631 Classical Mechanics
 PHYS/ASTR Elective (optional)

Fall #2

PHYS 761 Statistical Mechanics
 PHYS/ASTR Elective
 PHYS/ASTR Elective (optional)

Spring #2

PHYS/ASTR Elective
 PHYS/ASTR Elective
 PHYS/ASTR Elective (optional)

Undergraduate courses: A student may choose to take undergraduate courses in their first year if they feel inadequately prepared for the graduate-level courses. These courses will not be counted towards the graduate degree, but they will maintain the student's good standing.

In summary,

<u>The purpose of:</u>	<u>is for:</u>
core graduate courses	<ul style="list-style-type: none"> •mastering fundamental physics at the graduate level •prerequisites for the topical graduate courses
topical graduate courses	<ul style="list-style-type: none"> •deciding upon the research specialty (600 level) •background for the advanced graduate courses
advanced graduate courses	background for the PhD dissertation (700 level)
research (PHYS 797)	making progress in research in one's specialty
teaching assistantship	instructional support of the department's teaching mission
research assistantship	personnel support of a specific professor's research program

Registering for Courses

Detailed information on registering for classes is located at on the [Registrar's web site](#). Your login is your WVU username and password.

PLAN OF STUDY FOR THE MS DEGREE

Some students enter graduate school with the goal of obtaining a master's degree and others obtain a master's (M.S.) degree on the way to their PhD degree. Because the path to a M.S. with a thesis involves research with a faculty advisor, it is important that students wishing to complete a M.S. degree in two years understand the accelerated pace at which they will have to work.

Non-thesis option: A student may earn an M.S. degree without doing thesis research by completing 30 hours of physics courses (with a $\text{GPA} \geq 2.75$) at the 600 level or above, including physics 611, 631, 633, 651, and 761.

Thesis option: Requires a $\text{GPA} \geq 2.75$ in 18 hours of physics courses at the 600 level or above, including physics 611, 631, 633, 651, and 761. To complete an MS thesis in two years the student should identify a thesis supervisor at the end of Fall #1 and begin doing research in Spring #1.

ALTERNATE WORKLOAD POLICY

Funded graduate students in the Department of Physics and Astronomy may, on occasion, require an alternate workload assignment for the birth/adoption of a child, a personal, serious health condition, or to care for an immediate family member with a serious health condition. In these rare circumstances, every effort should be made to protect the annualized lecturer's or funded graduate student's stipend and appointment.

I. Eligibility

Graduate Students: The alternate workload policy applies to full-time, enrolled graduate teaching assistants who are in good academic standing and making satisfactory progress toward completion of their degree.

II. Provisions

- An eligible funded graduate student granted an alternate workload assignment receives 100 percent of his/her stipend and other benefits associated with the appointment.
- For an eligible funded graduate student, the stipend will be maintained for up to six weeks or until the last day of the appointment, whichever comes first. The six-week alternate assignment start and end dates are coordinated among the department chair, the associate chair, and the graduate student's faculty advisor (where applicable).
- The same appointment status (with equivalent benefits, pay, and other terms) will be available after a medical/family leave of absence has been taken, provided the appointment or reappointment would normally have been available. Assigned duties, however, may be subject to change. While graduate students are expected to return to their teaching assignments at the conclusion of their alternate work assignment, the department administration will work with them during the semester in which the leave occurs to define roles and responsibilities that may provide additional flexibility (e.g., online instruction, teaching assignment may be structured to focus on grading support, preparing course materials, or less-intensive duties).

III. Extension of Time Limits to Degree or Candidacy

Because the student remains enrolled as a full time student and continues to pay tuition, this is not a leave of absence. It is instead a modification of deadlines and academic expectations to accommodate the student's situation. The student will be able to postpone completion of course assignments, examinations, and other academic requirements. The advisor and student should consult in advance about how the student will meet academic goals and requirements. The student is responsible for ensuring that this consultation takes place. The accommodation period needs to be tailored to the student's individual circumstances, and the timing of the student's academic responsibilities, but it will typically be a one-semester extension. After the end of the alternate workload period, students are expected to return to graduate study and resume progress toward completing their degrees.

Special Notice to International Students: International students should discuss the intended leave period with the Office of International Students and Scholars at the beginning of the planning period in order to identify and address proactively any individual or unique visa issues and/or to consider the latest applicable regulations.

IV. Student and Lecturer Funding During the Alternate Workload

A. Graduate Teaching Assistants

With advance planning, many assignments can be adapted for modifications of schedule during an alternate workload assignment. Eligible graduate students with GTA appointments are encouraged to work out the necessary adjustments as far in advance as practical. During the leave period, the students will continue to receive their salary or stipend, benefits, and associated tuition support.

B. Fellowship Recipients

Eligible students who are supported by WVU fellowships will experience no change in their funding arrangements during the Alternate Workload Assignment; they will continue to receive their fellowship support and benefits during the new assignment.

C. Graduate Students without Financial Support

Students who do not have an on-going commitment of financial support from the University are eligible for extension of time limits but are not entitled to funding.

D. Limitations

If partners or spouses are both full-time graduate students in Physics and Astronomy at WVU, *only one* student may receive an Alternate Workload Assignment for any given event. (The other partner or spouse may, of course, still request an unpaid leave without tuition support.)

V. Approval

At least eight weeks prior to the anticipated beginning of an Alternate Workload (*and sooner if possible*), graduate teaching assistant students should submit a written request for the workload adjustment to the department chair. The department needs sufficient time to find an appropriate replacement for teaching responsibilities and to outline expected teaching and research activities before and following the adjustment period. However, the department understands that personal and family medical emergencies are often not anticipated. The department will do everything possible to work with graduate students during their time of need. Graduate students applying for a workload adjustment must make arrangements with the relevant faculty advisor for course completion and a timeline for meeting other academic requirements such as Ph.D. qualifying examinations or other academic milestones that will be affected by the adjustment and by the one semester extension of academic requirements. A copy of this agreement should be on file with the department.

VI. Student and Lecturer Course Coverage During the Alternate Workload

The department chair, associate chair, and, if relevant, the student's graduate program supervisor, will develop a plan to cover course sections for six weeks.

Physics and Astronomy Graduate Student Report on Progress and Plans
(covering the past twelve months and the upcoming six months, for students who have been admitted to PhD candidacy)

Graduate student name/email address:

Report submission date (Day.Month.Year):

Date of committee meeting (if required):

Members present (either in person or on zoom):

Year admitted:

Estimated date of PhD defense (Month.Year):

Desk location (room/building):

Research advisor (if decided):

PhD committee members (if decided) names (include an asterisk if faculty is external):

Courses completed during past academic year (2019-2020), including research credits, with grades:

Courses planned for the next academic year (2020-2021), including research credits:

Conferences/Workshops attended during the past two years:

Name of meeting; Location/Date; Title/Authors of co-authored posters/talks

Manuscripts submitted, accepted, or published (S/A/P) during the past two years:

Title of Paper; Journal Name/Year; Author list; Choose one: S, A, P

Describe your thesis project's objective (MS or PhD) in one paragraph:

Describe your past-12-month accomplishments toward your thesis project's objective in a list or in a couple paragraphs.

Describe your upcoming-six-month goals toward your thesis project's objective in a list or in a couple paragraphs.

Describe your long-term goals, if known: (e.g., career in industry, academia, education, outreach, etc.):

Herewith I certify that the information contained in this report is correct and that the student has shared this information with the Ph.D. committee (as an oral presentation or as a written report).

Advisor Signature

PS Instead of having an actual signature, you can attach an email from your advisor confirming the content of this report.

PHYSICS AND ASTRONOMY FACULTY

Eberly Professors

McLaughlin, Maura (maura.mclaughlin@mail.wvu.edu) Astrophysics

Stewart, Gay (gay.stewart@mail.wvu.edu) Physics education

Jefimenko Professor

Scime, Earl (earl.scime@mail.wvu.edu) Experimental plasma physics.

Carroll Professor

Li, Lian (lian.li@mail.wvu.edu) Experimental condensed matter physics

Professors

Abdul-Razzaq, Wathiq (wathiq.abdul-razzaq@mail.wvu.edu) Exper. solid state; part. matter in the environment.

Cassak, Paul (paul.cassak@mail.wvu.edu) Theoretical plasma physics

Johnson, Matthew (matthew.johnson@mail.wvu.edu) Experimental condensed matter physics

Koepke, Mark E. (Mark.Koepke@mail.wvu.edu) Experimental plasma physics; nonlinear dynamics.

Lorimer, Duncan R. (Duncan.Lorimer@mail.wvu.edu) Astrophysics

Pisano, D.J. (DJPisano@mail.wvu.edu) Department Chair. Astrophysics

Romero, Aldo (Aldo.Romero@mail.wvu.edu) Computational condensed matter physics,

Stanescu, Tudor (Tudor.Stanescu@mail.wvu.edu) Theoretical condensed matter physics

Stewart, John (jcstewart1@mail.wvu.edu) Physics Education Research

Associate Professors

Anderson Loren (Loren.Anderson@mail.wvu.edu) Astrophysics

Bristow, Alan (alan.bristow@mail.wvu.edu) Associate Chair, Condensed matter physics, optics.

Cen, Cheng (Cheng.Cen@mail.wvu.edu) Experimental condensed matter physics

Etienne, Zach (ZBETIENNE@mail.wvu.edu) Numerical Relativity

Flagg, Ned (Edward.Flagg@mail.wvu.edu) Experimental quantum optics

Holcomb, Micky Barry (mikel.holcomb@mail.wvu.edu) Experimental condensed matter physics

McWilliams, Sean (Sean.Mcwilliams@mail.wvu.edu) Gravitational wave computation and theory

Miller, Paul (Paul.Miller@mail.wvu.edu) Teaching Associate Professor. Physics education.

Tu, Weichao (WETU@mail.wvu.edu) Space physics

Williamson, Kathryn (kewilliamson@mail.wvu.edu) Teaching Associate Professor. Astronomy education.

Assistant Professors

Burke-Spolaor, Sarah (sarah.spolaor@mail.wvu.edu) Astrophysics

Fonseca, Emmanuel (emmanuel.fonseca@mail.wvu.edu) Astronomy

Goodrich, Katherine (katherine.goodrich@mail.wvu.edu) Space Physics

Lee, Joonhee (joonhee.lee@mail.wvu.edu) Biophysics

Research Faculty

Fowler, Chris (christopher.fowler@mail.wvu.edu) Plasma Physics; Space Physics

Wang, Qiang (qiang.wang@mail.wvu.edu) Experimental condensed matter.

Adjunct Faculty

Bandura, Kevin (kmbandura@mail.wvu.edu) Adjunct Assistant Professor, Radio Astronomy

Ganguli, Gurudas (gang@ppd.nrl.navy.mil) Adjunct Professor. Plasma physics theory.

Keesee, Amy (Amy.Keesee@unh.edu) Plasma Physics

Raylman, Raymond R. (rraylman@hsc.wvu.edu) Adjunct Professor. Medical physics, radiology, imaging.

EPA AND OSHA FEDERALLY MANDATED HAZARDOUS WASTE SAFETY TRAINING

All graduate students in the Department of Physics and Astronomy must complete an annual course on hazardous waste and lab safety. Online training is available continuously on eCampus at: <https://www.ehs.wvu.edu/files/d/3ee2bd7b-b560-459f-8170-09a8b081bcbf/ehs-hazardous-waste-2021-instructions.pdf>

Please follow the instructions:

- Make sure you complete the EHS Hazardous Waste 2021 training (Access Code **7JQ7T8WG**).
- Go through all the required content in the training module.
- Complete the quiz at the end of the module successfully with a minimum 80% grade. The completion form will then appear at the end of the module.
- Fill out the required completion form. You must complete the Required Personal Information Form after you pass the training. If you do not complete this form, you have not completed the training and your name will not appear in the “completed” training list.
- Once you complete the training and the Required Personal Information Form, please send an email to [Viola Bryant](#). She will check the EHS training spreadsheet to make sure your name has been added to the list.
- Your name will be added to the master list maintained by the Department of Physics and Astronomy and mandated by EHS/DEP. It is critical that this list is accurate and up to date.

All graduate students are also required to review the WVU Eberly College of Arts and Sciences [Laboratory Safety Manual](#), sign Appendix G, and provide a copy to our department office.

In addition to these requirements, some labs also require specialized training. Please check with the faculty researcher prior to entering any lab. For example, an [online laser safety training guide](#) is available on the Physics and Astronomy web site.

DEPARTMENTAL INFORMATION

Administrative Support for Tasks	Please refer to our Administrative Support Guide to find the help you need with office support tasks in the department and the specific person who can help you.
Car Rental	When you are traveling by car, you can be reimbursed for mileage using your own vehicle or for expenses related to renting a vehicle, whichever you prefer. You no longer are required to take a rental based on the lower expense.
Car Rental Collision Damage Waiver	Commercial auto liability and auto physical damage insurance coverage is included in the rental vehicle rate with Enterprise/National Car Rental (coverage is not included for Alamo rentals). Employees are not to purchase any optional insurance coverage when renting a vehicle from Enterprise or National Car Rental.
Computer Equipment	The department generally does not supply computer equipment for your office. The WVU Procurement web site provides discounted computer purchasing information for Dell and Apple computers. For computer networking and other operational questions, please contact Greg Lusk .
Conference Rooms	There are conference rooms for your use in White Hall rooms. These rooms are 105, 201, 243, 301, 343, 401 and 443. To reserve a conference room, please contact Viola Bryant . You may use any conference room that is not in use. However, please note that reserved status takes precedence over unreserved use of the room.
Department Directory	Updated directories of name and office assignments can be found on each floor opposite the elevator and at most building entrances in White Hall. An updated telephone directory will be provided at the beginning of each semester.
Electronics Shop Service Requests	If you need electronics work done in the department, please contact Greg Lusk (293-0917). Please complete the Electronics Service Request and email it to Greg or place it in his mailbox in the department office.

Email Listserv	<p>There are several email listserv groups related to our department. Please use discretion in sending emails – they should be relevant and direct. Changes to the listserv should be directed to Viola Bryant</p> <p>EC_PHYSICS_GS@listserv.wvu.edu - <i>Physics Graduate Students</i></p>
Machine Shop Service Requests	<p>If you need machine shop work done for your research lab or class, please contact Doug Matthes at 304-293-4732. Please complete the Machine Shop Service Request and email it to Doug or place it in his mailbox in the department office.</p>
Office Space	<p>Office space is assigned and managed by the department. Please direct any requests for office space to Miranda Heitz. Door requests may be made through the Door Access Request Form.</p>
Office Supplies	<p>The department will provide basic office supplies (stapler, tape dispenser, paper/binder clips, etc.). You are expected to provide such things as lab notebooks or other specialty items related to your work. If you have specific needs for office supplies, contact Viola Bryant.</p>
Print/Copy/Scan/Fax	<p>There is a central copier in the department office (room 111) on which you can make copies, print from your office computer, scan and fax documents. If you need help networking your office computer with the department copier, please contact Greg Lusk.</p>
Wireless Access	<p>WVU supports wireless access around most of the campus (including White Hall). Go to Information Technology Services for more information on this service and locations where wireless service can be accessed.</p>
Useful Links	<p>WVU Physics http://physics.wvu.edu Physics Facebook Page www.facebook.com/WVUDepartmentofPhysics Eberly College of Arts and Sciences http://eberly.wvu.edu</p>
Web Site	<p>The Department Web Site is a useful resource. If you are looking for a faculty research page, news on the department or college, or other information about the department, please check this web site. To make an update to the web site or provide your photo for publication on the department directory, please use this link: Website Directory Update Form</p>

BUILDING INFORMATION

Address/Telephone

Physical Address: 135 Willey Street, Morgantown, WV 26506
Mailing Address: WVU Physics, PO Box 6315, Morgantown, WV 26506
Department Office Telephone: 304-293-3422
Department Fax: 304-293-5732

To make a campus phone call: Dial the last five digits of the person's telephone number.

To make a local call: Dial "9" and then the telephone number. You will have to include the area code even if it is local.

To make a long distance call: Dial "8" and then the area (or country) code and telephone number.

Building/Room Access

Entrances to White Hall are unlocked automatically from 7:00am-7:00pm Monday through Friday (except for university holidays) every week, including school breaks. After hours/weekend access to White Hall is approved on an as-needed basis. Access to rooms within White Hall is with your WVU ID card. Insert your ID card in the slot on the door with the magnetic stripe toward the door and to the left and remove. A steady green light indicates that you have access to that door. A blinking red light indicates that you do not have access to that door. Please see [Miranda Heitz](#) for assistance with all requests for building or room access.

Emergencies

White Hall is equipped with a sophisticated emergency alert system. There are fire alarms in all the hallways and labs. When a fire alarm is activated, the fire doors will close, an alarm will sound throughout the building and a recording will direct you to leave the building.

For medical and other emergencies, ***please dial 911 (9-911 from campus phones)*** or call the University Police at 293-2677 (COPS). You can also call the department office at 293-3422.

Please read the following [building emergency procedures](#) requiring evacuation or seeking shelter in place.

Laboratory Safety Plan

WVU Physics has a comprehensive Laboratory Safety Plan. Please review this with all students and staff working in your lab. Click here: [Laboratory Safety Plan](#).

Machine Shop Usage

For information on using the machine shop, please click here: [Machine Shop Usage](#). You can also contact [Doug Mathess](#) for information on the machine shop.

Maintenance/Repairs

Requests for repairs or maintenance in the building are filtered through the Administrative Assistant. If you notice items in your office or in common areas that need maintenance or repairs, please contact [Viola Bryant](#) who will place a work order.

PURCHASING/PROCUREMENT

Amazon Purchases	With the Amazon Tax Exemption Program (ATEP) , you may be eligible for tax exempt status for purchases from Amazon. You can get the necessary WVU certificate of tax exemption here .
Procurement Card (PCard)	Many purchases can be made with a procurement card (also called a purchasing card or Pcard). Once you are part of a research group, you may apply for a Pcard. Please refer to the Pcard User Guide for guidance on proper Pcard usage. You must complete Pcard Training prior to receiving or using a Pcard.
Purchase Orders	All purchase orders are issued through Mountaineer Marketplace . Purchase orders are created for all items not purchased with a Pcard.
Purchase Paperwork	All Pcard purchase documentation is submitted through MyExpenses . You need to retain all receipts for purchases and submit a business purpose and scanned receipts through MyExpenses.
Software License Agreements	All software purchases/license agreements must be approved by WVU Information Technology. Please complete the IT Purchase Approval Form , and you will be notified if the purchase is pre-approved or if the purchase requires an IT, security, or revenue review.
Sole Source Justification	<p>Waivers for competitive purchases over \$50,000 must be justified in writing and approved by Procurement Services before any transaction can take place. Purchase requisitions over \$50,000 that designate only one source or brand must be accompanied by documentation explaining why the specified product or source is singularly able to meet the units' needs. A listing of the unique technical specifications required of the product and the potential suppliers that were contacted in the search for alternative sources is necessary. Procurement Services will review the information submitted and make a determination on the appropriateness of a sole source purchase and either approve it or do further market research.</p> <p>Complete the sole source justification form and submit it for processing.</p>
Tax Exempt Status	WVU and WVU Research Corporation are tax exempt and should not pay tax to in-state vendors. Please remind vendors of tax exempt status before initiating a transaction. A copy of the WVU tax-exempt certificate can be found at: http://taxservices.wvu.edu/home/faq_sales_and_use_tax .

TRAVEL INFORMATION

Faculty/Staff/Student travel settlements are processed by the [Miranda Heitz](#).. **Guest/Visitor** travel settlements are processed by [Viola Bryant](#).

- Travel Support Documents** Travel support information, including travel forms, Enterprise rental information, per diem rates, a currency converter and a link to the WVU travel site can be found on the [Physics and Astronomy web site](#).
- Before Your Trip** You can make travel reservations through [My Travel](#).
- After Your Trip** You will submit all your travel information through the [My Expenses – Personal Reimbursement, Travel Settlement and Travel Related Purchases system](#).
- Travel Policies at a Glance** The following are reminders of common things that impact your travel settlement.
1. Your Pcard is the preferred method of payment for most travel expenses.
 2. Food may not be purchased with your Pcard.
 3. People who are traveling and rooming together must turn in their travel settlements at the same time for processing.
 4. Only signed, original receipts should be submitted for reimbursement.
 5. When meals are provided by a conference or seminar, those meals cannot be reimbursed.
 6. Meals are reimbursed at the per diem rate for the location of travel, unless the PI sets a limit for meal reimbursement.
 7. Persons traveling in foreign countries should report their expenditures in U.S. dollars.

GRADUATE STUDENT MENTORING PROGRAM

Our graduate student mentoring program was developed to ensure that students feel welcome in the department and have all the resources they need to be successful. Upon acceptance to WVU, every prospective student will be assigned a graduate student contact who can answer questions about the program, WVU in general, or about living in or moving to Morgantown. Upon their arrival in the fall, new graduate students will meet peer and faculty mentors at a “mentor mixer”, read statements submitted by peer and faculty mentors describing their background and mentoring style, and rank their choices for mentors. A peer and faculty mentor will then be assigned to each student based on these rankings. First-year students are expected to meet with their mentors roughly bi-weekly. While these mentoring relationships are expected to continue throughout graduate school, the expectation is that the meeting frequency will decrease with time (for example, a second-year student may meet with their mentor a few times a semester and a fifth-year student may only meet with their faculty mentor once a semester). Every year, graduate students will have the opportunity to select a new peer and/or faculty mentor.

Every spring, the Chair of the Graduate Advising and Studies Committee (currently Prof. McLaughlin) will put out a call for peer and faculty mentors. Both graduate students and faculty members who apply will receive mentorship training in order to fulfill this role. Note that not all faculty will serve as mentors, and that this relationship is meant to supplement, not replace, the role of a research advisor.

This mentoring program is a critical component of WVU’s status as an APS Bridge Program Partnership Institution. As a Partnership Institution, WVU is committed to provide a supportive environment for graduate students, with the aim of increasing the number of Physics PhDs awarded to underrepresented minority students.

How to Be a Successful Graduate Student

by Marie
desJardins

For many new graduate students, graduate school is unlike anything else they've done. Sometimes it's hard to know exactly what it is you're supposed to be learning. Yes, you have to complete a dissertation, but how do you start? What should you spend your time doing?

Graduate school is a very unstructured environment in most cases. Graduate students typically take nine hours or less of coursework per semester, especially after the second year. For many, the third year -- after coursework is largely finished and preliminary exams have been completed -- is a very difficult and stressful period. This is when you're supposed to find a dissertation topic, if you're not one of the lucky few who has already found one. Once you do find a topic, you can expect two or more years until completion, with very few landmarks or milestones in sight.

The following sections talk about the day-to-day process of doing research, criticism and feedback, working on the dissertation, and financial support for research.

The Daily Grind

Being a good researcher involves more than "merely" coming up with brilliant ideas and implementing them. Most researchers spend the majority of their time reading papers, discussing ideas with colleagues, writing and revising papers, staring blankly into space -- and, of course, having brilliant ideas and implementing them.

A later section discusses the process and importance of becoming part of a larger research community, which is a critical aspect of being a successful researcher. This section contains ideas on keeping track of where you're going, and where you've been, with your research, staying motivated, and how to spend your time wisely.

Keeping a journal of your research activities and ideas is very useful. Write down speculations, interesting problems, possible solutions, random ideas, references to look up, notes on papers you've read, outlines of papers to write, and interesting quotes. Read back through it periodically. You'll notice that the bits of random thoughts start to come together and form a pattern, often turning into a research project or even a dissertation topic. I was surprised, looking back through my journal as I was finishing up my dissertation, how early and often similar ideas had cropped up in my thinking, and how they gradually evolved into a dissertation.

You'll have to read a lot of technical papers to become familiar with any field, and to stay

current once you've caught up. You may find yourself spending over half of your time reading, especially at the beginning. This is normal. It's also normal to be overwhelmed by the amount of reading you think you "should" do. Try to remember that it's impossible to read everything that might be relevant: instead, read selectively. When you first start reading up on a new field, ask your advisor or

a fellow student what the most useful journals and conference proceedings are in your field, and ask for a list of seminal or "classic" papers that you should definitely read. Start with these papers and the last few years of journals and proceedings.

Before bothering to read *any* paper, make sure it's worth it. Scan the title, then the abstract, then -- if you haven't completely lost interest already -- glance at the introduction and conclusions. (Of course, if your advisor tells you that this is an important paper, skip this preliminary step and jump right in!) Before you try to get all of the nitty-gritty details of the paper, skim the whole thing, and try to get a feel for the most important points. If it still seems worthwhile and relevant, go back and read the whole thing. Many people find it useful to take notes while they read. Even if you don't go back later and reread them, it helps to focus your attention and forces you to summarize as you read. And if you do need to refresh your memory later, rereading your notes is much easier and faster than reading the whole paper.

A few other points to keep in mind as you read and evaluate papers:

1. Make sure the ideas described really worked (as opposed to just sounding good, or tested on a few trivial examples).
2. Try to get past buzzwords: they may sound good, but not mean much. Is there substance and an interesting idea underneath the jargon?
3. To really understand a paper, you have to understand the motivations for the problem posed, the choices made in finding a solution, the assumptions behind the solution, whether the assumptions are realistic and whether they can be removed without invalidating the approach, future directions for research, what was actually accomplished or implemented, the validity (or lack thereof) of the theoretical justifications or empirical demonstrations, and the potential for extrapolating to other systems.

Keep the papers you read filed away so you can find them again later, and set up a simple online bibliography. I find it useful to add extra fields for keywords, the location of the paper (if you borrowed the reference from the library or a friend), and a short summary of particularly interesting papers. This bibliography will be useful for later reference, for writing your dissertation, and for sharing with other graduate students (and eventually, perhaps, advisees).

Staying Motivated

At times, particularly in the "middle years," it can be very hard to maintain a positive attitude

and stay motivated. Many graduate students suffer from insecurity, anxiety, and even boredom. First of all, realize that these are normal feelings. Try to find a sympathetic ear -- another graduate student, your advisor, or a friend outside of school. Next, try to identify why you're having trouble and identify concrete steps that you can take to improve the situation. To stay focused and motivated, it often helps to have organized activities to force you to manage your time and to do something every day. Setting up regular meetings with your advisor, attending seminars, or even extracurricular activities such as sports or music can help you to maintain a regular schedule.

There are a number of "immobilizing shoulds" that can make you feel so guilty and unworthy that you stop making progress. Telling yourself that you **should** have a great topic, that you **should** finish in "n" years, that you **should** work 4, or 8, or 12 hours a day isn't helpful for most people. Be realistic about what you can accomplish, and try to concentrate on giving yourself positive feedback for tasks you do complete, instead of negative feedback for those you don't.

Setting daily, weekly, and monthly goals is a good idea, and works even better if you use a "buddy system" where you and another student meet at regular intervals to review your progress. Try to find people to work with: doing research is much easier if you have someone to bounce ideas off of and to give you feedback.

Breaking down any project into smaller pieces is always a good tactic when things seem unmanageable. At the highest level, doing a master's project before diving into a Ph.D. dissertation is generally a good idea (and is mandatory at some schools). A master's gives you a chance to learn more about an area, do a smaller research project, and establish working relationships with your advisor and fellow students.

The divide-and-conquer strategy works on a day-to-day level as well. Instead of writing an entire thesis or dissertation, focus on the goal of writing a chapter, section, or outline. Instead of implementing a large system, break off pieces and implement one module at a time. Identify tasks that you can do in an hour or less; then you can come up with a realistic daily schedule. If you have doubts, don't let them stop you from accomplishing something -- take it one day at a time. Remember, every task you complete gets you closer to finishing.

Getting to the Dissertation

The hardest part of getting a Ph.D. is, of course, writing the dissertation. The process of finding a dissertation topic, doing the research, and writing the dissertation is different from anything most students have done before. If you have a good advisor and support network, you'll be able to get advice and help in setting directions and goals. If not, you may need to be more independent. If this is the case, don't just isolate yourself from the world: try to go out and find the resources and support you need from professors, other graduate students, mailing lists, friends, and family.

Finding an Advisor

Finding the right advisor can help you immeasurably in successfully completing a dissertation. You should ideally have selected the schools you applied to by identifying faculty members you'd like to work with. If not, start looking around as early as possible. Of course, the ideal advisor will be in the area you're interested in working in, and will actively be doing high-quality research and be involved in and respected by the research community.

Read research summaries by faculty members (which are usually published by the department), go to talks they give, and attend or audit courses given by professors you might be interested in working with. Talk to other graduate students and recent graduates. Ask them how their relationships with their advisors are/were, how quickly the advisor's students graduate, and how successful (well recognized, high-quality) their research is. What kinds of relationships do they have -- frequent interactions, collaborative work, encouraging independence? handing out topics or helping students to create individual research areas, or a more hands-off style?

Other things to find out about potential advisors:

1. What is the average time their Ph.D. students take to finish their degrees? What is the dropout rate for their students?
2. How long have they been on the faculty? There are advantages and disadvantages to being one of the first members of a new research group. On the positive side, you often have more freedom to choose your research topic and to influence the direction of the group's research. On the negative side, you may be more isolated (since there won't be older graduate students in the group), and your advisor won't have as much experience.

A good advisor will serve as a mentor as well as a source of technical assistance. A mentor should provide, or help you to find, the resources you need (financial, equipment, and psychological support); introduce you and promote your work to important people in your field; encourage your own interests, rather than promoting their own; be available to give you advice on the direction of your thesis and your career; and help you to find a job when you finish. They should help you to set and achieve long-term and short-term goals.

Once you identify one or more potential advisors, get to know them. Introduce yourself and describe the area you're interested in. Attend their research group meetings if they hold them regularly. Ask whether they have any TA or RA positions available, or if there are any ongoing research projects that you could get involved with. Read their published papers, and the work of their students. Drop by during office hours and ask questions or make comments. Offer to read drafts of papers -- and do more than just proofread.

The type of relationship that each student needs with an advisor will be different. Some students prefer to be given more direction, to have frequent contact, and to be "checked up on." Others are more independent. Some may need contact but be self-conscious about asking for it.

Other things that vary include what kinds of feedback is preferred (lots of "random" ideas vs. very directed feedback (pointers)), working individually vs. in groups, working on an established research project vs. a new, independent effort; working in the same area as your advisor or doing an "outside" dissertation.

You may find that your dissertation advisor doesn't always give you all of the mentoring that you need. Multiple mentors are common and useful; they may include other faculty members in your department or elsewhere, senior graduate students; or other colleagues (see the section on networking). You may want to seriously consider changing dissertation advisors if your advisor is inaccessible or disinterested, gives you only negative feedback, doesn't have the technical background to advise you on your dissertation, or harasses.

The most important thing is to ask for (i.e., request politely) what you need.

Finding a Dissertation Topic

Doing a master's project is often a good idea (and is required by some schools). Although choosing an appropriately scaled-down topic may be difficult, having the ideal topic is also less important, since you will have the chance to move on after only a year or so. If you have a good idea of what you want to do your Ph.D. dissertation on, choosing a master's project that will lead into the dissertation is wise: you will get a head start on the Ph.D., or may decide that you're not interested in pursuing the topic after all (saving yourself a lot of work and grief farther down the road).

A good source of ideas for master's projects (and sometimes for dissertation topics) is the future work section of papers you're interested in. Try developing and implementing an extension to an existing system or technique.

Generally speaking, a good Ph.D. dissertation topic is interesting to you, to your advisor, and to the research community. As with many aspects of graduate school, the balance you find will depend at least in part on the relationship you have with your advisor. Some professors have well defined long-term research programs and expect their students to contribute directly to this program. Others have much looser, but still related ongoing projects. Be wary of the advisor who seems willing to let you pursue any research direction at all. You probably won't get the technical support you need, and they may lose interest in you when the next graduate student with a neat idea comes along.

If you pick a topic that you're not truly interested in simply because it's your advisor's pet area, it will be difficult to stay focused and motivated -- and you may be left hanging if your advisor moves on to a different research area before you finish. The same is true for choosing a topic because of its marketability: if you're not personally excited about the topic, you'll have a harder time finishing and a harder time convincing other people that your research is interesting.

Besides, markets change more quickly than most people finish dissertations.

In order to do original research, you must be aware of ongoing research in your field. Most students spend up to a year reading and studying current research to identify important open problems. However, you'll never be able to read everything that might be relevant -- and new work is always being published.

Try to become aware and stay aware of directly related research -- but if you see new work that seems to be doing exactly what you're working on, don't panic. It's common for graduate students to see a related piece of work and think that their topic is ruined. If this happens to you, reread the paper several times to get a good understanding of what they've really been accomplished. Show the paper to your advisor or someone else who's familiar with your topic and whose opinions you respect. Introduce yourself to the author at a conference or by e-mail, and tell them about your work. By starting a dialogue, you will usually find that their work isn't quite the same, and that there are still directions open to you. You may even end up collaborating with them.

Good researchers welcome the opportunity to interact and collaborate with someone who's interested in the same problems they are.

To finish quickly, it's usually best to pick a narrow, well defined topic. The downside of this approach is that it may not be as exciting to you or to the research community. If you're more of a risk-taker, choose a topic that branches out in a new direction. The danger here is that it can be difficult to carefully define the problem, and to evaluate the solution you develop. If you have a topic like this, it helps a lot to have an advisor or mentor who is good at helping you to focus and who can help you maintain a reasonably rigorous approach to the problem.

In the extreme case, if your topic is so out of the ordinary that it's unrelated to anything else, you may have difficulty convincing people it's worthwhile. Truly innovative research is, of course, exciting and often pays back in recognition from the research community -- or you could just be out in left field. If you have a far-out topic, be sure that people are actually **interested** in it, or you'll never be able to "sell" it later, and will probably have trouble getting your work published and finding a job. In addition, it will be hard to find colleagues who are interested in the same problems and who can give you advice and feedback.

In any case, a good topic will address important issues. You should be trying to solve a real problem, not a toy problem (or worse yet, no problem at all); you should have solid theoretical work, good empirical results or, preferably, both; and the topic will be connected to -- but not be a simple variation on or extension of -- existing research. It will also be significant yet manageable. Finding the right size problem can be difficult. One good way of identifying the right size is to read other dissertations. It's also useful to have a "telescoping organization" -- a central problem that's solvable and acceptable, with extensions and additions that are "successively riskier and that will make the thesis more exciting." If the gee-whiz additions don't pan out, you'll still have a solid result.

Remember that a dissertation is only a few years of your work, and that -- if all goes well -- your research career will continue for another 30 or 40. Don't be afraid to leave part of the problem for future work, and don't compare yourself to senior researchers who have years of work and publications to show for it. (On the other hand, if you identify too much future work, your dissertation won't look very exciting by comparison.) Graduate students often pick overly ambitious topics (in practice, your advisor will help you to identify a realistic size problem).

Don't overestimate what other people have done. Learn to read between the lines of grandiose claims (something else a good advisor will help you to do).

Some schools may require that you write a dissertation proposal. Even if they don't, this is a good first step to take. It forces you to define the problem, outline possible solutions, and identify evaluation criteria; and it will help you to get useful feedback from your advisor and other colleagues. Writing a good dissertation proposal will take up to several months, depending on how much background work and thinking you've already done in the process of choosing the topic.

The proposal should provide a foundation for the dissertation. First, you must circumscribe the problem and argue convincingly that it needs to be solved, and that you have a methodology for solving it. You must identify and discuss related work: has this problem been addressed before? What are the shortcomings of existing work in the area, and how will your approach differ from and be an improvement over these methods?

Present your ideas for solving the problem in as much detail as possible, and give a detailed plan of the remaining research to be done. The proposal should include, or be structured as, a rough outline of the dissertation itself. In fact, unless your final topic differs significantly from your proposed topic (which many do), you may be able to reuse parts of the proposal in the dissertation.

You will probably have to take an oral exam in which you present and/or answer questions about your proposal. Be sure that your committee members are as familiar as possible with your work beforehand. Give them copies of the proposal, and talk to them about it. During the exam, don't panic if you don't know the answer to a question. Simply say, "I'm not sure" and then do your best to analyze the question and present possible answers. Your examining committee wants to see your analytical skills, not just hear canned answers to questions you were expecting. Give a practice talk to other students and faculty members. Remember: you know more about your dissertation topic than your committee; you're teaching *them* something for a change.

Writing the Dissertation

Graduate students often think that the dissertation happens in two distinct phases: doing the research, and writing the dissertation. This may be the case for some students, but more often,

these phases overlap and interact with one another. Sometimes it's difficult to formalize an idea well enough to test and prove it until you've written it up; the results of your tests often require you to make changes that mean that you have to go back and rewrite parts of the dissertation; and the process of developing and testing your ideas is almost never complete (there's always more that you **could** do) so that many graduate students end up "doing research" right up until the day or two before the dissertation is turned in.

The divide-and-conquer approach works as well for writing as it does for research. A problem that many graduate students face is that their only goal seems to be "finish the dissertation." It is essential that you break this down into manageable stages, both in terms of doing the research and when writing the dissertation. Tasks that you can finish in a week, a day, or even as little as half an hour are much more realistic goals. Try to come up with a range of tasks, both in terms of duration and difficulty. That way, on days when you feel energetic and enthusiastic, you can sink your teeth into a solid problem, but on days when you're run-down and unmotivated, you can at least accomplish a few small tasks and get them off your queue.

It also helps to start writing at a coarse granularity and successively refine your dissertation. Don't sit down and try to start writing the entire dissertation from beginning to end. First jot down notes on what you want to cover; then organize these into an outline (which will probably change as you progress in your research and writing). Start drafting sections, beginning with those you're most confident about. Don't feel obligated to write it perfectly the first time: if you can't get a paragraph or phrase right, just write **something** (a rough cut, a note to yourself, a list of bulleted points) and move on. You can always come back to the hard parts later; the important thing is to make steady progress.

When writing a dissertation, or any technical paper, realize that your audience is almost guaranteed to be less familiar with your subject than you are. Explain your motivations, goals, and methodology clearly. Be repetitive without being boring, by presenting your ideas at several levels of abstraction, and by using examples to convey the ideas in a different way.

Having a "writing buddy" is a good idea. If they're working on their dissertation at the same time, so much the better, but the most important thing is that they be willing to give you feedback on rough drafts, meet regularly to chart your progress and give you psychological support, and preferably that they be familiar enough with your field to understand and review your writing.

Getting Feedback

To be successful at research, it is essential that you learn to cope with criticism, and even that you actively seek it out. Learn to listen to valid, constructive criticism and to ignore destructive, pointless criticism (after finding any pearls of wisdom that may be buried in it).

In order to get feedback, you have to present your ideas. Write up what you're working on, even if you're not ready to write a full conference or journal paper, and show it to people. Even for pre-publishable papers, write carefully and clearly, to maximize your chances of getting

useful comments (and of having people read what you wrote at all).

Give presentations at seminar series at your university, at conferences, and at other universities and research labs when you get the chance. Your advisor should help you find appropriate forums to present your work and ideas. Many fields have informal workshops that are ideal for presenting work in progress.

Attend conferences and talk about your research. When you meet someone new and they ask you what you're working on, seize the opportunity. Don't just say "I'm doing my dissertation on foobar applications of whats-its algorithms" -- tell them as much as they're willing to listen to. You should have 30-second, 2-minute, 5-minute and 10-minute summaries of your dissertation ready at a moment's notice (but not memorized word-for-word; nobody wants to listen to a canned speech).

Talking to other people will help you to realize which aspects of your research are truly different and innovative, how your work fits into the-current state of your field and where it's going, and which aspects of your work are harder to sell (and, therefore, which aspects you need to think more about justifying).

Giving feedback to other students and colleagues is useful for many reasons. First, it helps you to polish your critical skills, which are helpful both in understanding other people's work and in evaluating your own. Second, it helps you to build a network of people who will be your colleagues for years to come. Finally, if you give useful feedback, those people will be more likely to make an effort to do the same for you.

It will be helpful (to you and to the person whose paper you're reviewing) to organize comments on a paper in descending order of abstraction: high-level content-oriented comments, mid-level stylistic and presentation comments, and low-level nitpicky comments on syntax and grammar. Try to keep your comments constructive ("this would read better if you defined X before introducing Y") rather than destructive ("this is nonsense").

You'll want to read a paper at least twice -- once to get the basic ideas, then a second time to mark down comments. High-level comments describing your overall impression of the paper, making suggestions for organization, presentation and alternative approaches to try, potential extensions, and relevant references are generally the most useful and the hardest to give. Low-level comments are more appropriate for a paper that is being submitted for publication than for an unpublished paper such as a proposal or description of preliminary research.

Getting Financial Support

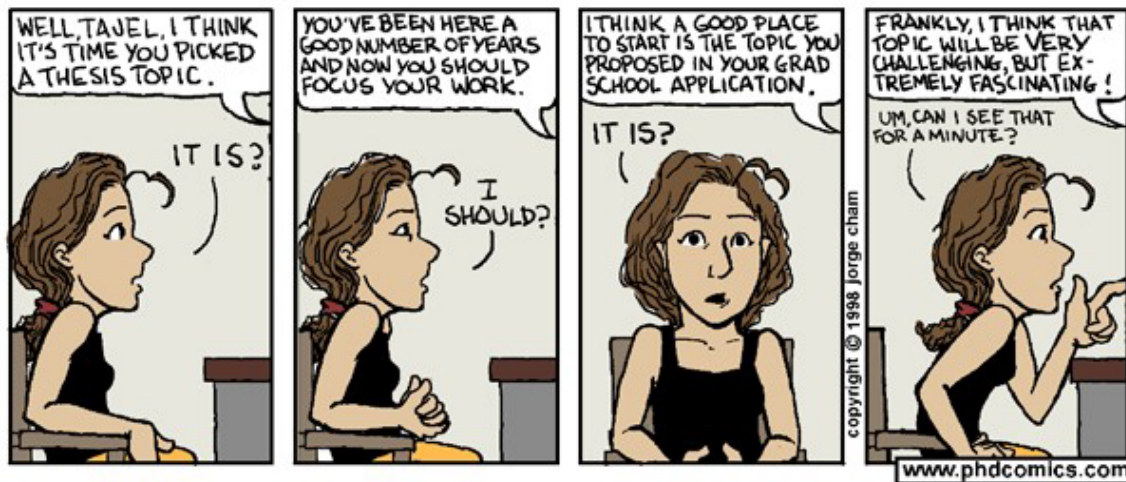
Most graduate students (at least in the natural sciences) have a source of financial support that pays their tuition and a small living stipend. Although nobody ever got rich being a graduate student, you probably won't starve either. Sources of funding include fellowships (from NSF, universities, foundations, government agencies, and industry), employer support, research

assistantships (i.e., money from a faculty member's research grant) and teaching assistantships.

Start looking for money early. Many schools arrange support in the form of an RA or TA position in the first year, but after that, you're on your own. Ask faculty members (especially your advisor, who should be helping you to find support or providing support out of his or her grant money), department administrators, and fellow graduate students about available funding.

If you haven't yet begun actively doing research, getting an RA position from a faculty member may be a good way to become involved in a research project. Working on an existing research project by maintaining or developing hardware or software, writing reports, and running experiments will give you a feel for what it's like to do research -- and you may even find a dissertation topic. Ask around to see what's available, and go talk to professors whose work you find interesting.

How to Get the Mentoring You Want: A Guide for Graduate Students



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A web version of this handbook can be obtained at
<http://www.rackham.umich.edu/>.

For further information about the handbook or other mentoring initiatives, contact Pat McCune at 734-647-2655 or phmccune@umich.edu.

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Acknowledgements

The Rackham Graduate School's mentoring guide for students, *How to Get the Mentoring You Want: A Guide for Students at a Diverse University*, has proven to be popular item for more than a decade: it has been requested, adopted, and adapted by graduate students, faculty and staff around the country. This current edition is a thorough revision of the text first produced by staff at the Graduate School in 1999. Our effort to bring this up to date is only one of the initiatives at the Graduate School to improve the quality of mentoring available to our students, and to provide resources for both students and faculty.

The impetus to revise this guide was generated by two of the Associate Deans at the Graduate School, Alec Gallimore and David Engelke. They are members of the faculty committee dedicated to a Graduate School initiative, Mentoring Others Results in Excellence (MORE). I am grateful to the members of this committee, all of whom provided valuable critique and constructive suggestions: David Engelke, Alec Gallimore, Theodore Goodson, Lorraine Gutierrez, Bobbi Low, Mahta Moghaddam, Laura Olsen, Brad Orr, Pamela Smock, and Jing Sun. This was facilitated by the support of Elaine Dowell and Ellen Meader. I am grateful, too, for the edits suggested by other Associate Deans at the Graduate School, Peggy McCracken and Abby Stewart.

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Pat McCune, Ph.D.
Director, Graduate Student Success
Rackham Graduate School

Chapter 1: What Is Mentoring and Why Is It Important?

As an undergraduate student your goal was to obtain knowledge, while in graduate school you have the additional goal of contributing to a field of knowledge. Graduate school is the professional training venue where you learn the skills you need to be successful in your chosen discipline. In order to do that, you must gain a nuanced understanding of the norms and expectations in your discipline. How can you get that?

While you will be working with a number of professors, and with one who is designated as your advisor, the mentor has the most vital role in preparing you for your future career. A faculty or research advisor is assigned by the department or program to provide advice about what courses to take, map out objectives and requirements, and generally assist with your academic plans. Although there is a close connection between mentors and advisors, those roles are not synonymous. Consider this multi-faceted definition of mentors as people who:

- take an interest in developing another person's career and well-being;
- have an interpersonal as well as a professional relationship with those whom they mentor;
- advance the person's academic and professional goals in directions most desired by the individual;
- tailor mentoring styles and content to the individual, including adjustments due to differences in culture, ethnicity, gender and so on.

Don't be discouraged at the thought of finding all this in one person. Rather than trying to identify someone who can give you everything, seek out various faculty who can provide you with at least a few of these components. As we will explain later, it is actually to your benefit to have multiple mentors.

Mentoring is important to you as a graduate student not only because of the knowledge and skills that are shared, but also because of the many other aspects of professional socialization and personal support that are needed to facilitate success in graduate school and beyond. Mentoring benefits you because:

- It supports your advancement in research activity, conference presentations, publication, pedagogical skill, and grant-writing.
- You are less likely to feel ambushed by potential bumps in the road, having been alerted to them, and provided resources for dealing with stressful or difficult periods in your graduate career.

- The experiences and networks of professional contacts your mentors help you to accrue may improve your prospects of securing professional placement.
- The knowledge that someone is committed to your progress, someone who can give you solid advice and be your advocate, can help to lower stress and build confidence.
- Constructive interaction with a mentor and participation in collective activities he or she arranges promote your engagement in the field.

As you read through this guide, bear in mind that each department and degree program has its own culture, requirements for a degree, career trajectories, and even terminology for mentorship. Because of the wide variability that exists, you will find that specific items we discuss may or may not pertain to your particular situation. For instance, in some programs students choose an advisor when they decide to come to U-M; in others they are assigned an advisor for their first year; while in still others it is possible that graduate students can progress through much of their graduate career without making formal links with faculty members.

What you need to remember is the fundamental importance of mentoring in your graduate experience. The professional socialization acquired through the mentoring relationship is essential to your success, as is the personal support and guidance that can come through mentoring.



Chapter 2: How to Find a Mentor

At a large research university like ours, you need to understand that it is your responsibility to seek out and engage the attention of faculty members. It is unrealistic to expect that a professor will come along, recognize that you would benefit from a mentor, and generously provide that interpersonal as well as professional relationship.

Academic advising for graduate students is provided a number of ways during the course of the degree program; the particular format depends upon the program. Academic advising concerns program requirements, obligations, milestones, deadlines and so on. Typical venues are at orientation shortly after arrival, in subsequent periodic cohort orientations, and in annual meetings with the Grad Chair. Often students are assigned a faculty member with common research interests. Sometimes this advisor may also become a mentor. But remember that your advisor, even your committee chair, may never have commitment and engagement with your success that is the hallmark of a mentor.

Many graduate students feel hesitant about initiating contact with a faculty member. Especially in the early stages of graduate school, students often need guidance on how to choose faculty with whom to study; so much more with those who may be possible mentors.

Start the selection process by undertaking a critical self-appraisal. You must understand what you personally need to thrive as a graduate student before you can recognize who might meet those needs. Ask yourself, and discuss with people who know you well, such questions as:

- What are my objectives in entering graduate school?
- What type of training do I desire?
- What are my strengths?
- What skills do I need to develop?
- What kinds of research or creative projects will engage me?
- How much independent versus team work do I want to do?
- What type of career do I want to pursue?

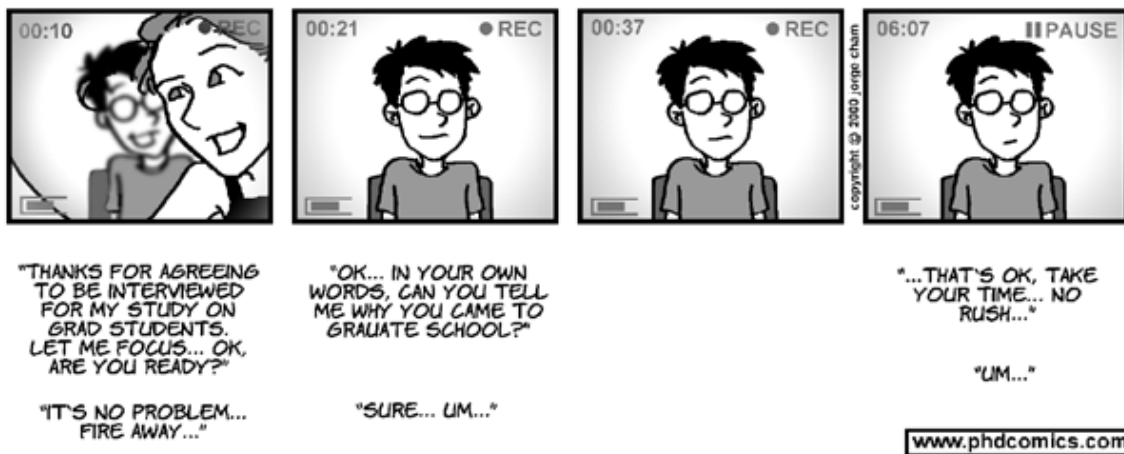
You can identify potential faculty mentors within or outside your department by using a variety of formal and informal means. For example, familiarize yourself with professors' work to gain a sense of their past and current interests and methodologies. Immerse yourself in departmental academic and social activities in order to see how faculty interact with colleagues and graduate students. Enroll in classes taught by faculty who most interest you; also be sure to attend their public presentations. Finally, ask advanced graduate students about their advisors and mentors. Share your interests and ask them for suggestions about whom you should meet.

Avoid limiting your options. Although such characteristics as race, gender, nationality and sexual orientation are significant aspects of your identity, they constitute only some of the qualities you should consider when selecting a mentor. Faculty members who are different from you can contribute valuable insights to you and your work for that very reason. Good mentoring relies not on shared identity but on mutual interests and clear communication.

Think of your task as building a mentoring team rather than finding only one mentor. While members of your team probably won't see themselves as operating as part of a mentoring group, that doesn't matter. You are the one who needs to plan for professional relationships that will promote your success. Carefully selecting a team of mentors appropriate to your needs increases the likelihood that you will find the experiences and support you desire.

You will benefit from having at least three or four faculty members who are knowledgeable about your work and can speak to its quality. A team can also serve as your safety net in case any one of the professors you work with leaves the University, or if irreconcilable issues later develop between you and a faculty member.

Be creative about whom you include on your team and look beyond those with active appointments in your program. Consider retired faculty, faculty from other departments, faculty from other universities, those outside the University and even those outside the academy as potential mentors. All of these people can help to meet your needs and serve as part of your professional network.



Chapter 3: Challenges Facing Faculty

While not all faculty may realize this, mentoring is as essential to a faculty member's success as teaching, research and publication are, and for the same reasons: it benefits both students and faculty as it ensures the quality and commitment of the next generation of scholars. Effective mentoring advances the discipline because these mentees often begin making significant contributions long before they complete their graduate degrees. Faculty know that students with good mentors are more likely to have productive, distinguished, and ethical careers that reflect credit on the mentors and enrich the discipline. Effective mentoring helps to ensure the quality of re- search, scholarship and teaching well into the future.

Remember, though, that faculty members need to balance the many demands that are made of them. A partial list of their responsibilities may include: teaching undergraduate and graduate courses; advising undergraduate and graduate students; serving on dissertation committees; researching or working on creative projects; writing grant proposals; writing books and articles; reviewing the work of their students and colleagues; serving on departmental and university committees; and fulfilling duties for professional organizations. The pace of these demands does not let up over time. Junior faculty face the pressure of preparing for tenure review, which means they have to be engaged in an active research agenda. As faculty become more senior, and their national and international prominence increases, the demands for their time and energies only grow.

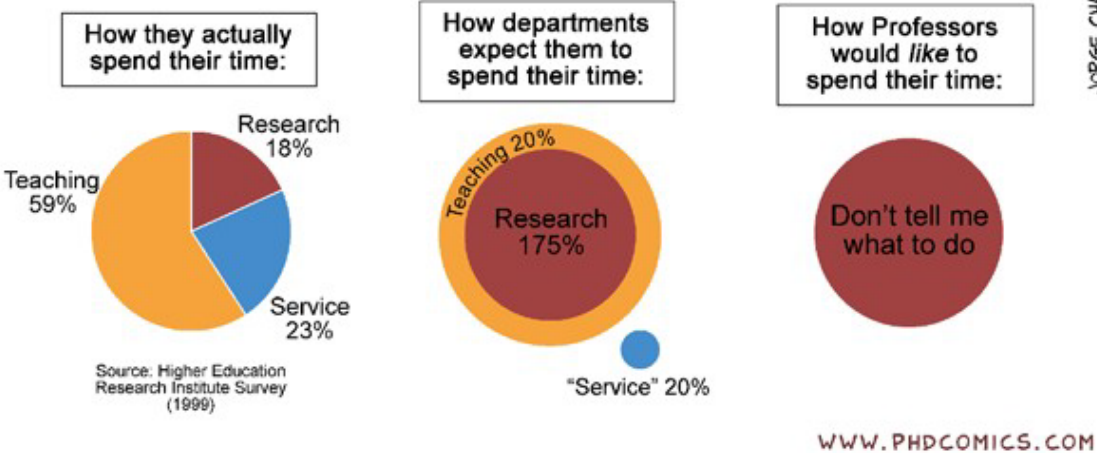
Women and minority faculty may face additional challenges. They often mentor a greater number of graduate students than their peers. Students seek them out not only because of their research and professional interests, but also because of their gender and/or race. Be sensitive to the heavy mentoring load of minority and female faculty by always being efficient with the time they give you. Accept that they may not take you on as a mentee, and be open to the fact that you may need to seek mentorship from those who seem quite different from you. Unfortunately, some people think that historically marginalized faculty members may be less effective in providing access to the resources and professional networks that graduate students need. Keep in mind that one of the reasons for having a team of mentors is to take advantage of the strengths that each one brings to your personal and professional development. In fact, by working with faculty members who have been historically marginalized in the academy, you may be helping them. Your current and future productivity may have a positive impact on your mentor's professional success.

Some female and male students expect women faculty to be more nurturing and emotionally supportive than their male counterparts. Junior female faculty are in an especially difficult situation because excessive time spent in mentoring may jeopardize the time they have to carry on the work needed for their own career success. If you feel disappointed with the way a woman faculty member responds to you, ask yourself whether you would have the same reaction if the professor was a man.

In the course of assembling your mentoring team, keep a critical eye on your own behaviors and expectations. Do you have higher esteem for certain categories of faculty than for others? If you

are being critical of a faculty member, could it be that you are reacting to a style, an accent or a speech pattern that makes you consider them in a critical light? Are you mindful of their professional obligations? Don't let unexamined assumptions stand in the way of developing successful mentoring relationships.

HOW PROFESSORS SPEND THEIR TIME



JORGE CHAM © 2008

Chapter 4: Establishing a Mentoring Relationship

In order to establish a mentoring relationship on firm footing, be prepared for your initial meetings and have realistic expectations. The objectives of these initial meetings are to make a positive impression and to establish a working rapport. You also want to assess whether a particular faculty member is a good fit for you. Keep in mind that the mentoring relationship is one that evolves over time and often begins because of a particular need. Don't approach these meetings as if you are asking someone to be your mentor – an initial conversation is simply the first step.

You are ready for an in depth conversation once you have examined your own academic and professional goals and familiarized yourself with the professor's past and current work. Come to the meeting ready to generate a conversation that will reveal what the faculty member would like to know about you.

Mutual Interests: Faculty will want to know if you have research, scholarly, academic and or creative interests similar to theirs. Make certain that you know how your prior academic, professional, or personal experiences might relate to his or her interests. Ask about current work and discuss the ways in which these intersect with your interests as a graduate student.

Goals: Faculty want to work with motivated students who are not only eager but also signal that they want to prepare to move onto the next level of their professional growth with the mentor's guidance. State your goals as you see them right now. Ask about ways you can further explore these goals through reading, coursework, research projects and professional training.

Initiative: Take action rather than wait to be told what to do. For instance, ask questions about issues recently discussed in class or about a visiting scholar's presentation. Solicit suggestions about other people and experiences that will help you develop your skills and knowledge.

Skills and Strengths: Show why this person should invest in you. Talk about what qualities you would bring to a professional relationship — research or language skills, creativity, analytical techniques, computer skills, enthusiasm, and commitment.

In addition to telling them about yourself, you need to seek further information about this faculty member. In order to assess the type of support you can expect to receive from a particular faculty member you will need to familiarize yourself with that person's expectations. It is essential to communicate clearly from the start about your respective roles and responsibilities.

Availability: To understand how much time the professor will be able to give to you, inquire about his or her other commitments. How frequently will you be able to meet? Ask about the faculty member's plans at the University. Does the professor anticipate being at the University during the entire time in which you are a student here? Will he or she be away from the department for extended periods (on sabbatical or on a research project) and if so, what arrangements could be made to stay in communication?

Expectations: Ask how often you might expect to receive an assessment of your general progress, and the nature and format of these evaluations. Determine what the professor considers to

be a normal workload. How many hours does he or she think you should be spending each week on your research or creative project? Does the professor prefer to communicate through e-mail, in person or by phone?

Potential support: Depending upon your program and funding commitments, you may have questions about opportunities for teaching or funding through grants. For example, if you are in the STEM fields, ask whether the professor has appropriate space and laboratory equipment for your needs. What is the size of the professor's research group and is this optimal for you? Will these remain available until you complete your program? If you are in the humanities ask about how many terms of teaching you might expect and at what point you might receive guidance with the grant writing process.

Drafts: Discuss the professor's expectations of what first drafts should look like before they are submitted. Find out if he or she is willing to accept rough drafts, and preferences for revisions and editing.

Publishing and Presentations: Determine to what extent the professor is willing to help you prepare your own articles for publication. Ask whether the professor co-authors articles with graduate students and make certain you understand the disciplinary standards for first authorship. Similarly, depending on the program, find out if the professor collaborates with students for conference presentations, public performances or exhibitions. Is the professor willing to devote time to prepare your research or creative work for presentation?

In any meeting with faculty who may be prospective mentors, always respect his or her time. Be sure you know how much time is available to you in this meeting, and be aware of how quickly time is passing as you try to cover these topics. If you need additional time, schedule another meeting to discuss remaining items and learn more about each other. If you decide that you would like to develop a professional relationship with a faculty member after these initial meetings, wait until you have something substantive to discuss before you schedule another meeting. Always remember to thank them for their time and let them know the progress you are making in pursuing suggestions they gave you.

How Well Do You Know Your Advisor? Take the quiz!

1. Where did your advisor go for undergrad? (1 pt.)
2. Where is your advisor's home town? (1 pt.)
3. Who was your advisor's advisor (your grandadvisor)? (1 pt.)
4. How many siblings does he/she have, and what are their professions? (1 pt.)
5. What is your advisor's middle name? (10 pt.)

Your Score:

- 4-5 - You know WAY too much about your Advisor.
- 2-3 - You Google-stalked him, didn't you?
- 0-1 - You have a normal relationship with your Advisor.

Chapter 5: Your Responsibilities as a Mentee

Having thoughtfully established a mentoring team, you must then maintain these relationships in a professional manner. It is imperative to show by your attitude and actions that you are a responsible junior colleague. As a graduate student it is your responsibility to develop and demonstrate your abilities to be an independent scholar and researcher.

At the same time, you should remember that your mentors will not all share the same perspective. For example, one may feel that her role is to assist with revising articles for publication and preparing you for conferences, but not to sympathize with your personal crises. Another may see his role as your cheerleader for the long term, ready to listen to your private concerns but not to spend hours on data analysis. So be realistic about what any single mentor can do for you and be sensitive to each person's view of your mentoring relationship.

Faculty are more likely to respond to requests for specific types of assistance that they know they can provide. Analyze what you need from an individual faculty member and explicitly ask for assistance that will help you address that need. If you ask for an excessive amount of help, you run the risk of having faculty feel they are doing your work. What is "excessive" will vary by professor and discipline. Discuss this with your mentor if you have any concerns. Keep in mind the following general guidelines for professional behavior as a graduate student.

Work Plan

- Develop a work plan that includes both short-term and long-term objectives as well as a series of deadlines for completing each step.
- When modifications seem necessary, discuss these with your mentor and agree upon a new work plan.
- Contact your mentor at regular intervals (expectations vary by discipline and stage of study) to discuss your progress.
- Pursue additional training and experiences you need in order to achieve your professional goals.

Meetings

- Show up for scheduled meetings on time.
- Meetings will be most productive when you accept responsibility for leading the meeting. Your role is to raise the issues and questions while the professor's role is to respond.
- For each meeting, be prepared with an agenda of topics that need to be discussed - and prioritize them so you are asking your most important questions first.

- At the conclusion of the meeting or through e-mail, summarize any agreements that have been reached. Also restate what you will be doing and what the mentor committed to do to assist you. Ask them to respond if they disagree with anything you have stated. Follow up on what you agree to do.
- If your mentor is facing a work emergency at the time of your meeting, offer to reschedule the meeting, shorten it, or handle the matter over e-mail. Be flexible, but remain committed to getting what you need in a timely manner.
- If you need to cancel a meeting, make sure that your message is left in a manner that reaches the professor. Do not rely solely on one form of message.

Critique and Editing

- Clarify how often the faculty member will give you feedback about your general work and your progress.
- Read the books or articles your mentors suggest, and let them know what you thought about those suggestions.
- Ask when you can expect them to return papers.
- Find out if they tend to provide a lot of comments or very few, so that you won't be taken aback later on.
- Do not submit a draft to a faculty member in its roughest form (unless otherwise instructed by the professor.) Seek the professor's input once you are confident you have a presentable draft. Be sure to proofread the document carefully. If you have doubts about the quality of your work, ask a more advanced student to read your paper first. Ideally, this person should be familiar with both the professor and the topic so s/he can make remarks about the content and style.
- Do not ask professors to re-read an entire paper if only certain sections have been revised. Instead, mark the new or edited sections by underlining them, putting them in boldface, or by using a different font.
- If you disagree with a particular criticism, demonstrate that you are willing to consider that point. If after thinking about it for some time you still disagree, demonstrate your ability to defend your ideas in a professional and well-thought-out manner.

Professional Development

- Attend departmental lectures and other activities such as job talks.
- Join professional associations and societies.

- Attend conferences and use these opportunities to network with others.
- Seek out opportunities to present your work in your department or through outside conferences, publications, performances.
- Attend teaching workshops and discipline-specific pedagogy classes.
- Take advantage of formal and informal opportunities to improve your understanding of research responsibility and professional ethics.

Portfolio and References

- Maintain a professional portfolio in both electronic and paper-based versions that serves to document your accomplishments. Bear in mind that these can be used for a variety of purposes and should always be focused and concise.
- When requesting a reference, provide updated copies of your curriculum vitae and the location or copy of your portfolio for materials that can amplify the c.v.
- Leave clear written instructions as to when the letters are due and to whom to send them. Attach a stamped and addressed envelope for each letter. If you have several letters, create a calendar for your mentor that lists application deadlines.
- Provide a short description about the fellowship, grant, or program for which you are applying.
- Provide details about how you are structuring your application and what points you would like your mentor to emphasize.
- Submit these materials with enough advance time for your mentor to write a letter.
- In case the professor misplaces the application materials, keep extra copies of all forms.
- Ask how your mentor prefers to be reminded of deadlines, if needed.

Clearly establish with your mentor a set of expectations and essential commitments. Problems in mentoring relationships most often occur because of misunderstandings and lack of explicit communication. Some people find it helpful to specify a mutual agreement about their respective roles and responsibilities. One method of doing this is the use of a written compact or set of core expectations. Mentor and student can use the written agreement as the basis of a discussion to acknowledge they have established a mentoring relationship and to review the responsibilities of both mentor and mentee.



Chapter 6: What to Do if Problems Arise

If the terms of a mentoring relationship have been clearly established at the outset, there should be few problems between you and the professor as you move through your graduate program. But occasionally situations do arise which hinder timely completion of degree work, such as the birth of a child or a family crisis. If this happens to you, be sure to take the initiative and contact your mentors. Discuss your situation with them, providing the information you feel they need to know. As soon as possible, get back to them with a new timeline for completing your degree. Be sure the revised plan is realistic and that you can meet the new deadlines.

By the same token, remember that situations occasionally arise for faculty members that could impede your work and progress. For instance, other demands on your mentor may hinder his or her ability to meet with you or provide prompt feedback about your work. If something like this happens repeatedly, you should talk about this with the faculty member involved. Do this in person, when it first becomes evident that there is a problem. Face-to-face meetings can lead to more satisfactory results than e-mail, since one's tone and message can be easily misconstrued when communicating online or even by phone.

You may find that, despite talking with your mentor, you need to develop a strategy that keeps your work on schedule while maintaining the mentoring relationship. Other students who work with this particular faculty member can tell you if the behavior is typical, and may be able to suggest some possible resolutions. Your peers can also explain the norms in your department regarding frequency of meetings, turn-around time for feedback, and general availability of faculty.

Departmental staff such as the administrative assistants or grad coordinators also can clarify departmental expectations and standards, and may be able to provide suggestions on how to resolve problems based on past experience. Administrative staff also should know about other people or offices on campus that can assist you. Sometimes other faculty members in your program can give you advice on how to deal with problematic issues that arise with one of your mentors. Here you can see one of the best reasons to develop a team of mentors to support your efforts in graduate school. If you want someone to intercede on your behalf, other faculty members can often provide guidance about how to proceed.

Finally, if you are not able to resolve issues with your mentor on your own, or with the advice of other faculty and staff, you may find it advisable to talk to the graduate chair or your department chair.

YOUR ADVISOR IS ON VACATION. HOW TO REACT:



Chapter 7: Changing Advisors

Not all advisors turn out to be mentors. You may find that the faculty member you thought would be best for advising your course selection, guiding your research and chairing your dissertation committee is not, in fact, the right one for you. Don't panic. There is no fault in discovering that the first person you thought would mentor you is not a good fit for your objectives in pursuing a graduate degree.

Changing advisors is common in some fields of study and less common in others. It is easier for students to change advisors in departments that encourage students to work with multiple faculty. In all cases, changing advisors is best accomplished if you enter the process with an attitude of respect for your advisor. Here are some basic guidelines.

- Remain professional at all times. Think through the most diplomatic way to express to your advisor – and to others – why you would like to make this change. Avoid doing or saying anything to others in the university community (including your fellow students) that would embarrass you if it were repeated to your advisor.
- Seek the advice of a trusted faculty member and other professional staff to determine whether it is in fact desirable to change your advisor. This is especially true if the relationship has a long history and/or if it occurs at the dissertation phase of your career.
- Before you make any decisions about discontinuing the relationship with your current advisor, approach another suitable faculty member and inquire about the prospect of serving as your advisor. Avoid saying anything negative about your past advisor and explain your desire to change only in professional terms.
- When you do decide to make a change, be sure to inform your advisor promptly, no matter how awkward this may be. Be sure that you try to work out any differences with your advisor before you move on. If you owe your past advisor any work, be sure to discuss this and arrange a schedule for completing all outstanding obligations.
- Be sure to complete or update any formal paperwork that contains information about your advisor (e.g., the Dissertation Committee form if your new advisor will serve on your committee).

Not all advising relationships are successful, often for appropriate reasons based in changing research interests or conflicting commitments. As in any work situation some supervisory relationships are more productive than others. It's up to you to make certain that your behavior is professional at all times if you decide to terminate that relationship and complete your degree under the direction of another faculty member.



Chapter 8: Issues for Underrepresented Students

All of us at the Graduate School know that a diverse graduate student population greatly enriches the scholarly, cultural, and social activities at the University. The Graduate School is committed to examining the issues which students from historically underrepresented or marginalized populations face, with the expectation that ultimately this will be of assistance to all of our graduate students.

If you are a student from an underrepresented group, realize that the concerns you may have, and any problems you encounter, often face others as well. If you are not from an underrepresented group, the following material should still provide you with insight into your colleagues' experiences. Such insight is crucial for all graduate students as you develop and hone your professional skills. While there is, of course, a great deal of variability in the experience of each group, many students tell us about common themes.

Need for Role Models: Students from historically underrepresented or marginalized groups have a harder time finding faculty whose background and experiences may have been similar to their own.

- Work with your faculty mentors to get names of other people in your department, across the university, or at other universities who may have had experiences similar to yours.
- Don't lose sight of the fact that you can receive very good mentoring from faculty who are of a different gender, race or culture. After all, past generations of minority scholars did just that.
- When job openings arise, you may have the opportunity to work within your department or program to identify qualified job candidates who represent diverse backgrounds. Attend the job talks and meet these potential faculty mentors.

Questioning the Canons: Students from underrepresented or marginalized groups, particularly those in the social sciences and humanities, sometimes find that their perspectives or experiences do not fit comfortably into the current academic canons. A safe environment is needed to share thoughts and values in the course of exploring and possibly challenging traditional analyses.

- Be prepared to show a faculty member the value and relevance of new lines of inquiry. Formulate a strong, reasoned argument about the importance of this question to the growth of your field. Introduce a scholarly article or essay as an example of the work you would like to do. Test your argument by talking with peers and others who could give you helpful feedback.
- Unfortunately, not all students meet with success in doing this. Some students are able to find other faculty who are receptive; others change the focus of their dissertations with plans to resume this interest after they complete their degrees; while still others change graduate programs.

- There are many interdisciplinary programs and research centers across campus that may provide you with a community of scholars with interests similar to your own, including the Center for Afro-american and African Studies, the Institute for Research on Women and Gender, the Latin American and Caribbean Studies Program, the Native American Studies Program, the Program in American Culture, and the Women's Studies Program.
- Be open to hearing other people's experiences, particularly those people whose backgrounds differ from your own. Think about the ways that race, gender, sexual orientation, ethnicity, and other characteristics help to expand the types of questions that are asked and the approaches used for answering them.

Being Categorized as a Single-Issue Scholar: Some students are concerned that by selecting dissertation topics that focus on such issues as gender, race, or sexual orientation, others will see them as being only interested in these topics for the rest of their professional careers.

- Throughout your graduate school career, demonstrate the breadth of your intellectual curiosity through your contributions in classes, seminars, brown bags and lectures.
- As you develop your mentoring relationships, be clear with the faculty about the range of your research interests.
- When you go out on the job market, be sure to talk about the full range of your research and teaching interests.
- Ask about others' research interests rather than making assumptions about them based on their personal characteristics or past work.

Feelings of Isolation: Students from historically underrepresented groups can feel particularly isolated or alienated from other students in their departments.

- Ask mentors or peers to introduce you to students and faculty with complementary interests.
- Investigate organizations within or outside the University that might provide you with a social support and a sense of belonging. Some examples are cultural and religious groups, as well as reading groups and professional associations.
- Be aware of students who seem to find it difficult to take active roles in academic or social settings and find ways to include them. Take the initiative to talk with them. Ask them about their research interests, hobbies and activities outside of school.

Burden of Being a Spokesperson: Students from underrepresented groups may expend a lot of time and energy speaking up when issues such as race, class, gender or sexual orientation arise or are being ignored. These students point out how most of their peers have an advantage in not carrying such a burden.

- Seek out support and strategies from others facing this same situation. Plug into other networks in your department or across campus. Perhaps one of the many student groups can help you.
- Don't assume your personal experiences are the norm. Question how race, gender, or other characteristics provide different perspectives from your own.
- When you see students taking on spokesperson roles, tell them and others what you have gained from their contributions to class discussion. Words of appreciation are always valued.

Work-Life Balance: Students often express the sense that faculty expect them to spend every waking minute of their day on their work. This perception of faculty expectations, accurate or not, troubles students who find it very important to maintain balance and a sense of proportion in the amount of time devoted to graduate work.

- Every semester, workshops or panel discussions exploring the topic of balancing work and home are sponsored by such units as the Graduate School, Counseling and Psychological Services, and the Center for the Education of Women. These workshops are open to all students.
- Seek out role models whom you can talk to about how they balance the differing components of their lives.
- Demonstrate through your behavior and work that you are focused and productive during the times you are in your office or lab.

Keep in mind that many factors shape people's behaviors and attitudes. You can help erase stereotypes by recognizing each student's unique strengths and scholarly promise. Think, too, about the ways you have been socialized and make efforts to increase your awareness and knowledge about these issues—for yourself and for others.

Chapter 9: From Mentee to Colleague

Effective mentoring is good for mentors, good for students, and good for the discipline. A mentor is there to support you with your challenges as well as your successes, to assist as you navigate the unfamiliar waters of a graduate degree program, and to provide a model of commitment, productivity and professional responsibility.

In most cases, the system works well: students make informed choices regarding faculty with whom they work; faculty serve as effective mentors and foster the learning and professional development of graduate students. During the graduate experience, your mentors will guide you toward becoming independent creators of knowledge or users of research, prepared to be colleagues with your mentors as you complete the degree program and move on to the next phase of professional life—career advising from colleagues in more senior positions.

We have provided here an overview and guidelines that should help you to find, and make the most of, the mentoring you need for a successful graduate experience. In order to learn more about mentoring resources at the University of Michigan, and in particular about the Graduate School initiative, Mentoring Others Results in Excellence (MORE), contact Pat McCune, Director of Graduate Student Success, at 734-647-2655 or phmccune@umich.edu.

We've also included suggestions for further reading if you'd like to explore some of the topics raised in this guide, a few samples of documents mentioned here, and a list of related resources at the University of Michigan useful for all graduate students.



Further Reading

Bloom, D. F., Karp, J. D. & Cohen, N. (1999). *The Ph.D. Process: A Student's Guide to Graduate School in the Sciences*. Oxford University Press. Ch 2: Selecting an Advisor and Ch. 5: The Absent Professor.

Cahn, S. M. & Stimpson, C.R. (2008). *From Student to Scholar: A Candid Guide to Becoming a Professor*. Columbia University Press.

Churchill, H. & Sanders, T. (2007). *Getting Your Ph.D.: A Practical Insider's Guide (Survival Skills for Scholars)*. Sage Publications Ltd.

Cohen, G., Steele, C. & Ross, D. (1999). Providing Critical Feedback Across the Racial Divide. *Personality and Social Psychology Bulletin*. Retrieved April 27, 2010 from <http://psp.sagepub.com/cgi/content/abstract/25/10/1302>

Crutcher, B. N. (2007). Mentoring across cultures. *Academe Online*. Retrieved September 5, 2008 from www.aaup.org/AAUP/pubsres/academe/2007/JA/Feat/crut.htm.

Farmer, V.L. (2006). *The Black Student's Guide to Graduate and Professional School Success*. IAP LLC. Ch 9: "Finding a Faculty Mentor to Help Guide You through the Doctoral Process."

Hawley, P. (2010). *Being Bright is Not Enough: The Unwritten Rules of Doctoral Study*. Springfield: Charles C. Thomas.

Marshall, S. & Green, N. (2010). *Your Ph.D. Companion: The Insider Guide to Mastering the Practical Realities of Getting Your Ph.D.* How To Books. Ch 3: You and Your Supervisor.

Murrell, A. J., Crosby, F. J., & Ely, R. (Eds.). (1999). *Mentoring dilemmas: Developmental relationships within multicultural organizations*. Mahwah, NJ: Erlbaum.

Nettles, M. T., & Millett, C. M. (2006). *Three magic letters: Getting to Ph.D.* Baltimore, MD: The Johns Hopkins University Press.

Paglis, L. L., Green, S. G. & Bauer, T. N. (2006, June). Does adviser mentoring add value? A longitudinal study of mentoring and doctoral student outcomes. *Research in Higher Education*, 47(4), 451-476.

Peters, R. (1997). *Getting What You Came For: The Smart Student's Guide to Earning an M.A. or a Ph.D.* Farrar, Straus and Giroux. Ch 13: Playing Politics: Building a Reputation; Ch 15: Choosing and Managing Your Thesis Committee; Ch 23: Swimming with the Mainstream: Returning Students, Women, Minorities and Foreign Students.

Rose, G. L. (2005, February). Group differences in graduate students' concepts of the ideal mentor. *Research in Higher Education*, 46(1), 53 -80.

Tenenbaum, H. R., Crosby, F. J., & Gliner, M. D. (2001). Mentoring relationships in graduate school. *Journal of Vocational Behavior*, 59, 326-341.

Walfish, S., Hess, A.K. (Eds.) (2001). *Succeeding in Graduate School: The Career Guide for Psychology Students*. Psychology Press. Ch 8: Students and Faculty; Ch 9: The Mentoring Relationship in Psychology Training Programs.

Michigan Graduate Student Mentoring Plan

An early dialogue on the advising and mentoring relationship between faculty advisors and their graduate students or postdoctoral scholars can be an essential tool for setting up expectations for the mentoring relationship. This sample mentoring agreement offers a tool for students and faculty mentors to use in defining those expectations.

It is assumed that these mentoring plans can to be modified in whatever way the individual program and advisor/advisee pair think is most appropriate to their intended relationship. These plans are not intended to serve as any kind of legal document, but rather as an agreement in principle as to the training goals of the advisor and advisee, after discussion between the two.

The following is based on a sample published by the Graduate Research, Education and Training (GREAT) group of the American Association of Medical Colleges (AAMC). Departments and Pro- grams may wish to use it to create a customized mentoring plan that sets up a statement of principles governing student/faculty mentor relationships, and to be used at the time a student commits to working with a primary faculty mentor.

Tenets of Predoctoral Training

Institutional Commitment

Institutions that train graduate students must be committed to establishing and maintaining high- quality training programs with the highest academic and ethical standards. Institutions should work to ensure that students who complete their programs are well-trained and possess the foundational skills and values that will allow them to mature into independent academic professionals of integrity. Institutions should provide oversight for the length of study, program integrity, stipend levels, benefits, grievance procedures, and other matters relevant to the education of graduate students. Additionally, they should recognize and reward their graduate training faculty.

Program Commitment

Graduate programs should endeavor to establish graduate training programs that provide students with the skills necessary to function independently in an academic or other research setting by the time they graduate. Programs should strive to maintain academically relevant course offerings and re- search opportunities. Programs should establish clear parameters for outcomes assessment and closely monitor the progress of graduate students during their course of study.

Quality Mentoring

Effective mentoring is crucial for graduate school trainees as they begin their academic careers. Faculty mentors must commit to dedicating substantial time to graduate students to ensure their academic, professional and personal development. A

relationship of mutual trust and respect should be established between mentors and graduate students to foster healthy interactions and encour-

age individual growth. Effective mentoring should include teaching research methods, providing regular feedback that recognizes contributions and insights and offers constructive criticism, teaching the “ways” of the academic research and teaching enterprise, and promoting students’ careers by providing appropriate opportunities. Additionally, good graduate school mentors should be careful listeners, actively promote and appreciate diversity, possess and consistently exemplify high ethical standards, recognize the contributions of students in publications and intellectual property, and have a strong record of research accomplishments.

Provide Skills Sets and Counseling that Support a Broad Range of Career Choices

The institution, training programs, and mentor should provide training relevant to academic and other research and policy careers that will allow their graduate students to appreciate, navigate, discuss, and develop their career choices. Effective and regular career guidance activities should be provided, including exposure to academic and non-academic career options.

Commitments of Graduate Students

- **I acknowledge that I have the primary responsibility for the successful completion of my degree.** I will be committed to my graduate education and will demonstrate this by my efforts in the classroom and in research settings. I will maintain a high level of professionalism, self-motivation, engagement, curiosity, and ethical standards.
- **I will meet regularly with my research advisor and provide him/her with updates on the progress and results of my activities and experiments.**
- **I will work with my research advisor to develop a thesis/dissertation project.** This will include establishing a timeline for each phase of my work. I will strive to meet the established deadlines.
- **I will work with my research advisor to select a thesis/dissertation committee.** I will commit to meeting with this committee at least annually (or more frequently, according to program guidelines). I will be responsive to the advice of and constructive criticism from my committee.
- **I will be knowledgeable of the policies and requirements of my graduate program, graduate school, and institution.** I will commit to meeting these requirements, including teaching responsibilities.
- **I will attend and participate in relevant group meetings and seminars that are part of my educational program.**
- **I will comply with all institutional policies, including academic program milestones.** I will comply with both the letter and spirit of all institutional research policies (e.g., safe laboratory practices and policies regarding animal-use and human-research) at my institution.

- **I will participate in my institution's Responsible Conduct of Research Training Program and practice those guidelines in conducting my thesis/dissertation research.**
- **I will be a good research citizen.** I will agree to take part in relevant shared research group responsibilities and will use research resources carefully and frugally. I will be attentive to issues of safety and courtesy, and will be respectful of, tolerant of, and work collegially with all research personnel.
- **For use in relevant fields: I will maintain a detailed, organized, and accurate records of my research, as directed by my advisor.** I am aware that my original notes and all tangible research data are the property of my institution but that I am able to take a copy of my notebooks with me after I complete my thesis/dissertation.
- **I will discuss policies on work hours, sick leave and vacation with my research advisor.** I will consult with my advisor and notify any fellow research group members in advance of any planned absences.
- **I will discuss policies on authorship and attendance at professional meetings with my research advisor.** I will work with my advisor to submit all relevant research results that are ready for publication in a timely manner.
- **I acknowledge that it is primarily my responsibility to develop my career following the completion of my doctoral degree.** I will seek guidance from my research advisor, career counseling services, thesis/dissertation committee, other mentors, and any other resources available for advice on career plans.

Commitments of Research Advisors

- **I will be committed to mentoring the graduate student.** I will be committed to the education and training of the graduate student as a future member of the scholarly community.
- **I will be committed to the research project of the graduate student.** I will help to plan and direct the graduate student's project, set reasonable and attainable goals, and establish a timeline for completion of the project. I recognize the possibility of conflicts between the interests of my own larger research program and the particular research goals of the graduate student, and will not let my larger goals interfere with the student's pursuit of his/her thesis/dissertation research.
- **I will be committed to meeting with the student on a regular basis.**
- **I will be committed to providing resources for the graduate student as appropriate or according to my institution's guidelines, in order for him/her to conduct thesis/dissertation research.**

- **I will be knowledgeable of, and guide the graduate student through, the requirements and deadlines of his/her graduate program as well as those of the institution, including teaching requirements and human resources guidelines.**
- **I will help the graduate student select a thesis/dissertation committee.** I will help assure that this committee meets at least annually (or more frequently, according to program guidelines) to review the graduate student's progress.
- **I will lead by example and facilitate the training of the graduate student in complementary skills needed to be a successful researcher; these may include oral and written communication skills, grant writing, lab management, animal and human research policies, the ethical conduct of research, and scientific professionalism.** I will encourage the student to seek additional opportunities in career development training.
- **I will expect the graduate student to share common research responsibilities in my research group and to utilize resources carefully and frugally.**
- **I will discuss authorship policies regarding papers with the graduate student.** I will acknowledge the graduate student's contributions to projects beyond his or her own, and I will work with the graduate student to publish his/her work in a timely manner.
- **I will discuss intellectual policy issues with the student with regard to disclosure, patent rights and publishing research discoveries, when they are appropriate.**
- **I will encourage the graduate student to attend professional meetings and make an effort to help him/her secure funding for such activities.**
- **I will provide career advice and assist in finding a position for the graduate student following his/her graduation.** I will provide honest letters of recommendation for his/her next phase of professional development. I will also be accessible to give advice and feedback on career goals.
- **I will try to provide for every graduate student under my supervision an environment that is intellectually stimulating, emotionally supportive, safe, and free of harassment.**
- **Throughout the graduate student's time in graduate school, I will be supportive, equitable, accessible, encouraging, and respectful.** I will foster the graduate student's professional confidence and encourage critical thinking, skepticism and creativity.

Worksheet 2: Mentee expectations

Use this worksheet to develop an understanding of what you expect to gain from your mentoring relationships. By clarifying your own expectations, you will be able to communicate them more effectively to your mentors. Add items you deem important.

The reasons I want a mentor are to:

- Receive encouragement and support
- Increase my confidence when dealing with professionals
- Challenge myself to achieve new goals and explore alternatives
- Gain a realistic perspective of the workplace
- Get advice on how to balance work and other responsibilities, and set priorities
- Gain knowledge of “dos and don’ts
- Learn how to operate in a network of talented peers
- Other _

I hope that my mentor and I will:

- Tour my mentor’s workplace/explore various teaching or work sites
- Go to formal mentoring events together
- Meet over coffee, lunch, or dinner
- Go to educational events such as lectures, conferences, talks, or other university events together
- Go to local, regional, and national professional meetings together
- Other _

I hope that my mentor and I will discuss:

- Academic subjects that will benefit my future career
- Career options and job preparation
- The realities of the workplace
- My mentor’s work
- Technical and related field issues
- How to network
- How to manage work and family life
- Personal dreams and life circumstances
- Other _

The things that I feel are off limits in my mentoring relationship include:

- Disclosing our conversations to others
- Using non-public places for meetings
- Sharing intimate aspects of our lives
- Meeting behind closed doors
- Other _

I hope that my mentor will help me with job opportunities by:

- Opening doors for me to job possibilities
- Introducing me to people who might be interested in hiring me
- Helping me practice for job interviews
- Suggesting potential work contacts for me to pursue on my own
- Teaching me about networking
- Critiquing my resume or curriculum vitae
- Other _

The amount of time I can spend with my mentor is likely to be, on average:

1 2 3 4 hours each week / every other week / per month (circle one)

Adapted from: Brainard, S.G., Harkus, D.A. and George, M.R.(1998), A curriculum for training mentors and mentees: Guide for administrators. Seattle, WA: Women in Engineering Initiative, WEPAN Western Regional Center, University of Washington.

Worksheet 3: Planning for first meetings – a mentee’s checklist

Use this checklist to plan initial meetings with your mentors in light of what you hope to achieve over the long term.

- Arrange first meeting with a prospective mentor
 - Explain your goals for meetings and ask how confidentiality should be handled
 - Discuss with your mentor what you both perceive as the boundaries of the mentoring relationship.
 - Review the current experience and qualifications. Record these on a professional development plan (see Worksheet 4).
 - Discuss and record your immediate and long-term goals. Explore useful professional development experiences in view of these goals. Discuss options and target dates.
 - Discuss and record any issues that may affect the mentoring relationship such as time, financial constraints, lack of confidence, or newness to the role, etc.
 - Arrange a meeting schedule with your mentor (try to meet at least once a quarter). Record topics discussed and feedback given at each meeting. Request that meeting records be kept confidential and in a safe place.
 - Discuss with your mentor the following activities that can form part of your mentoring relationship:
 - Getting advice on strategies for improving teaching or research
 - Organizing observation(s) of teaching and providing constructive feedback
 - Organizing a session of work shadowing (in a campus or other employment setting)
 - Getting advice on issues or concerns with colleagues in study or research groups
- Providing feedback from other sources (students, faculty, administrators, and other mentors in or outside the university)
- Create a mentoring action plan that reflects different professional development needs at different stages of your graduate program.
 - Encourage your mentor to reflect regularly with you on your goals, achievements, and areas for improvement. Compose a brief reflection essay (e.g., ½ page) prior to each meeting.
 - Amend your mentoring action plan as needed by focusing on your developing needs.

Adapted from: Mentoring towards excellence: Section 4: Handbook and guidelines for mentors and mentees. Association of Colleges and the Further Education National Training Organization, Learning and Skills Council: Coventry, England.

