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Advice For Graduate Students

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Introduction

The purpose of this document is to assist graduate students in developing a mutual beneficial working relationship with me. To better understand why I do many of the things that I do, you should begin to

appreciate the academic career environment. Basically, the performance of a professor depends on the following issues:

- How much research does the professor perform? This is measured by how many journal articles, conference articles, books, etc. that the professor writes, how much research money that the professor brings in, and the quality of this research.
- How well does the professor teach? This is measured by performance in the classroom. In addition, the development and production of graduate students (especially Ph.D. students) is an important factor in indicating a successful teacher.
- How active is the professor in service to the profession? This is measured by how many committees, professional journals, and professional societies that the professor is involved with and the level of involvement. It is also measured by the amount of relevant consulting that the professor performs for the profession and the amount of service work for the department.

Now that you have an understanding of the environment that I work within, you need to understand my roles and goals in life. This will assist you in developing a good working relationship with me.

My Mission Statement

My mission is to create a working environment that supports learning and growth, values hard work, intellectual curiosity, and fosters synergistic interdependence. My work roles include educator, research, mentor, and responsible team player. As an educator, I seek to develop the capabilities of my students so that they can better achieve their educational and career objectives. As a researcher, I seek to develop new methods and techniques that can be applied within industrial engineering practice especially in the fields of logistics, manufacturing, and health-care. I do this by trying to identify and solve problems within these fields that require such techniques as simulation, statistics, probability, optimization, and software development. These problems should be of strategic and fundamental importance and require a long-term perspective for developing viable solutions. As a mentor, I seek to assist my colleagues in obtaining their career goals. As a team player, I seek to provide the service needed to ensure that my working environment continues towards its mission of becoming a nationally competitive, student-centered, Industrial Engineering program serving Arkansas and the world through undergraduate and graduate studies, and leading-edge research programs. Now that you understand my mission, you need to understand my expectations of you.

My Expectations of You

In this section, I discuss five inter-related expectations that I feel graduate students should attempt to meet.

First Expectation: Know Yourself

Naturally, you should have many goals for your career as a graduate student. My hope is that you will have taken the time to write out your own roles and goals. That is, you know what you what to achieve as a graduate student and you know how to articulate your desires. My first expectation of a graduate student is that you think hard about your roles and goals and share your thoughts with me. You must let me know why you want to be a graduate student. I expect some deep personal thought on this issue. To be blunt, I would hope that a reason for your being in graduate school is not because you could not find a job in industry or because you are hanging around to find a mate. I would hope that your reasons include that you want to learn more about your profession or that you want to improve your skills so that you can advance more quickly in your career.

Second Expectation: Work Hard

I love what I do for a living and I work hard at it. I expect no less from the people that I work with. My second expectation of a graduate student is that you understand, appreciate, and apply a superior work ethic to everything you do. You must work hard in your classes, you must work hard at your assistantship, and you must work hard at achieving your goals. I firmly believe that hard work pays off and I appreciate consistent effort. Do not expect me to reward you for meeting my minimum expectations or for doing well only part of the time or for just doing your job. If you are consistently providing good effort and producing good work then I will be happy with your progress. I do have a couple of character flaws that you must be aware of. First, I often appear dissatisfied or overly critical. I sometimes forget to say “good job”, “nice work”, etc. When I get excited about your progress you will know it. When I start indicating many new ideas for you to try and indicating how you can improve (even good work), I am most likely not dissatisfied. In fact, I’m probably happy and I feel that you can take the criticism and are capable of examining some of the new ideas. My second character flaw is that I sometimes forget that the universe does not revolve around me. Thus, my expectations and goals may conflict with yours. When this happens and you are feeling this frustration, please help me by reminding me of all your goals and the other aspects of your life that are important to you. This will enable me to remember and put things into perspective.

Third Expectation: Think Win/Win

My third expectation of a graduate student is that some of your goals must intersect with my goals. As you can see one of my goals is that of succeeding as a professor. The above discussion indicates the key metrics for evaluating a professor’s success. If some of your goals intersect with my goals then we should be able to create win/win situations that benefit each other. For example, one of the best ways to assist a professor is to have a desire to publish your work. You must think how will I prepare to publish my thesis or dissertation? How will I help my advisor publish our joint work? Publishing and presenting your work also helps you succeed within your career. Companies value engineers that can explain the value of their work and that can communicate the practical results of the work.

Fourth Expectation: Sharpen Your Saw

My fourth expectation of a graduate student is that you must work to improve your skills. You must not shy away from the "hard" classes. To work on the kinds of research that I perform, you should be taking *graduate* courses in: optimization, statistics, probability, simulation, logistics, inventory theory, manufacturing systems, decision analysis, and systems thinking. You must also broaden your perspective by understanding the "business" aspects of engineering and how the research can be applied. Take graduate level business courses in cost, finance, information systems, etc. Take some engineering management courses.

You must have better than basic skills in programming. That is, I expect a certain level of proficiency in computer programming. You should be able to take an algorithm and code it within a language. You should be able to solve engineering problems using a computer. You should be willing and able to pick up a book on computer programming and learn it on your own. You should appreciate and apply the techniques of software engineering that produce good software solutions, such as object-oriented design and analysis. Much of the research that my students and I perform must be implemented in software. The software must be in a form for others to pick up and continue your work.

Not all the skills and techniques that I expect you to develop come from inside a classroom. These additional skills that I am referring to also involve improving your written and oral communication skills, interpersonal skills, and time management skills. The best piece of advice that I can give you is to find a good couple of references on this material and use them to work on these skills. The first reference that I can most highly recommend is Steven Covey's *Seven Habits of Highly Effective People*. If there is only one supplemental book that you get during your graduate studies this should be it. The second book that I recommend is *A Guide to Writing as an Engineer* by Beer and McMurrey. If you are an international student, you should seek ways to improve your oral and written English skills. For example, you might consider joining a conversation club, visiting the UA writing center, having other students critique your presentations, or written documents. One thing that will help me is if you always proofread and spell-check your work. A good way to check your written work is to read it out-loud.

Fifth Expectation: Work Interdependently

My fifth expectation for a graduate student is that you learn to work interdependently. Notice that I did not say independently, nor did I say dependently. I believe that there is a continuum from dependence, independence, and finally interdependence. Students that are dependent require a significant amount of direction. They have not had a lot of practice solving problems and performing independent work. They need step-by-step guidance that can, at times, become burdensome. A person who can work independently needs little or no direction, can find a problem, develop a solution, and implement the solution. They are self-motivated and goal-oriented. A person who can work interdependently has all the qualities of an

independent person, but also creates a synergistic environment such that those they interact with also gain from the person's efforts. You may never be able to truly work interdependently but my expectation is that you make an effort to try. A person who works interdependently constantly thinks win/win. Through their efforts an interdependent person achieves their own goals and at the same time assists others.

The Ph.D. Qualifier

In this section, I give advice and guidance for Ph. D. students as they prepare to take their Ph. D. Qualifier prior to proposing their dissertation topic. This section is borrowed from a document given to me from my Ph. D. advisor Dr. Gordon Clark Emeritus Professor of Industrial & Systems Engineering at The Ohio State University. The successful completion of the Ph. D. Qualifier indicates a certain level of scholarship and maturity that enables you to perform independent research in your chosen field. The suggestions made in this section are meant to help you prepare for and take the Ph. D. Qualifier. The Ph. D. Qualifier is taken after completing or shortly before completing your required Ph. D. coursework.

Know the Basics Well

The most important objective is to know the basic concepts and models in your major field of study. Do not ignore advanced material but ignorance of basic concepts is much more serious than lack of knowledge of advanced material. You must have more insight than just being able to recall these basic concepts. You should know why these concepts are valid, why they are used, and how they are developed. In studying these concepts develop the capability of explaining when concepts are valid and useful and how they are developed. A common complaint made by faculty after a poor qualifier exam performance is that the candidate had only "surface knowledge." This occurs when the candidate can only recall concepts. Emphasize basic concepts in courses taught by your examining committee that are a part of your major area of study. If you have not taken recent versions of these courses, study the new subject matter that has been added to these courses.

Describe Your Research Interests

Prepare a description of your research interests for the dissertation. This description may be no longer than four to five pages. If you have a detailed dissertation proposal, give a shortened summary of that proposal to the committee. A lengthy proposal may reveal very clearly the areas where you are weak and have misconceptions. This research description will motivate questions so you must be able to answer questions concerning your research description. Your examining committee will ask questions in their respective areas as it relates to your research description. Try to anticipate their questions while studying for the exam. Your objective is to be a scholar and expert in your chosen research area, and your understanding must go beyond the courses in your major area of study.

In your research description let the committee know your research emphasis in the spectrum between applications and methodology. For example, you could do research to develop improved operations research methodology or you could use available methodologies to further our ability to improve system performance in an application area. In the former case you might describe in-depth research to improve a methodology, and in the latter case you might describe a class of system problems and list or evaluate a large number of possible approaches.

Taking the Exam

If part of your written examination questions appears vague or confusing, feel free to discuss the meaning of the question with its author. Be careful to ask questions that clarify your confusion. It is not your committee's function to teach or give you hints when taking the exam.

In answering the written questions, the first principle is to answer the question as it is written. Do this even if the question appears trivial. Frequently an examining committee member will mix basic questions with more challenging ones. If the question is difficult, do not simply ignore the challenging aspects of the question. If you cannot respond to all aspects of the question, say why the question is difficult and what you think may be done to answer the question. Summarize your answer to the question particularly if your answer is lengthy. This will serve to check whether you have answered all aspects of the question. Once you are certain you have answered the question you may add more advanced associated material only if you have time.

Once you have completed your written questions and submitted them to the committee continue to critique your answers and anticipate questions that will come up during the oral exam based upon your written answers. If you could not fully answer a question in your written response, try to complete the answer. Review your answers so that you can explain the basis for your answers in the oral exam. Be familiar with the references you have cited. If you relied heavily on references for your answers, supply your committee with copies as appropriate.

Be very careful if you ask one of your committee members just prior to the oral exam if he/she has any questions. Remember a Ph.D. should be able to do independent research and your ignorance of where your answers are weak is a serious matter. If one of your examining committee members gives you a question before the oral exam to answer during the oral exam, you may have made a serious mistake or omission on the written exam. Questions of lesser importance are not usually given prior to the oral exam.

As with any examination, you should plan your preparation well in advance and make continuous effort towards your preparation. Cramming for this examination will be both pointless and possibly backfire. The day before the exam make sure to relax and recharge yourself.

Finding a Research Topic

One of the most challenging aspects of being a graduate student is finding a research topic. There are no magic suggestions for overcoming this challenge. The first thing that I would recommend is to approach this challenge systematically and with a plan. Again, you should think carefully about what you want to achieve from graduate school. Thinking hard about your goals will set the stage for your search for a research topic.

Learn From Others

Finding a research topic is a problem that many others have considered. I strongly urge you to investigate how others have solved this dilemma. Find a good book on performing graduate level research, such as *Writing the Doctoral Dissertation A Systematic Approach* by Davis and Parker or *How to Get a Phd: A Handbook for Students and Their Supervisors* by Pugh and Phillips. There are other books of this type. I recommend looking on amazon.com. Talk to other students and faculty about how they found a topic and why they picked it. Become familiar with the research that I am performing. Read and study related research. Try to identify open topic areas and unsolved problems. To find ideas, look at the concluding chapter of a project, thesis, or dissertation document or the conclusion section of a paper. There will inevitably be a section on future research. These are ideas that the author has offered for possible exploration. Look up my previous student's documents, my previous papers/reports and study how it was done and understand what areas that I'm working on. I really appreciate students who can come up with their own ideas and pursue them. It is important that your topic be interesting and exciting to you. You are the one that must devote many hours of work on the topic.

Make It Useful

Next, it also helps if industry (or academia) thinks that the topic is interesting and useful. For Masters students, if industry can see the skills that you used on the problem and see that there are practical benefits then this will assist you in your career search. For Ph.D. students the topic should be relevant to industry but if you are planning a career in academia you must also consider whether or not the research topic has potential for future funding. This will be critical to your initial success as an assistant professor. If you can immediately translate your dissertation research into fundable projects then you will have a running start in your career.

The Project Option

A Masters Project is essentially a deliverable that will be of use to my students, practitioners, the academic community, or me. Masters projects are associated with a 3 credit hour course and should take approximately one semester to achieve after the project proposal has been approved. Masters projects are typically problem or application driven and result in a usable piece of software or a reusable model, a project report, a user's manual, and a conference paper. Often a Masters Project will be directly related to applied sponsored research.

For the project option, I am looking for you to begin to do independent work. I am looking for you to show the ability to plan a solution to a problem and then follow through. You will be evaluated on the results that you produce. This will certainly take the form of your ability to clearly write up your project results and your ability to present these results. In addition, a project typically will entail a custom solution, deliverable, or working prototype that can be built on during future work. A project does not necessarily advance the state of knowledge in the field. A project applies current knowledge to solve a problem. If a project begins to apply new and untested theoretical work to a problem then it is moving towards the area of a thesis. A minimum requirement for a project is that the work produces a conference paper for an applied research conference.

If you are associated with a research project, then you should consider making an aspect of the project your thesis. In this way, you can "kill two birds with one stone". The department offers both a project option and a thesis option. I encourage you to attempt the thesis option if at all possible, but this may not be feasible given the research project that you are assigned to or your own interest and skills.

The Thesis Option

A Masters thesis is more than a sponsored research project report. A Masters thesis should indicate more of an ability to perform independent research. Thus, a Masters Thesis is semi-independent research that will be of use to a wider audience of practitioners and the academic community. Masters Thesis' are associated with approximately 6 credit hours of Masters Thesis research and should take approximately 1-1.5 semesters to achieve after the thesis proposal has been approved. Masters Thesis' are typically research problem driven and result in a Masters Thesis document, a journal paper, and supporting reusable software/models. The topic should advance knowledge in the field of Industrial Engineering.

My general feeling on this is that a project may solve a problem for a particular client. A thesis solves a problem and investigates the general applicability of the solution to problems that are similar. For a thesis, there will generally not be a one to one mapping between a funded research project and the thesis topic. For the thesis, you should be looking to go beyond the project to make the results useful on a wider scale. There should be some theoretic interest for the topic. A thesis can take on many forms. I encourage you to

find recent thesis of good students who have graduated. You might look at those or I can lend you mine to get a feel for what it takes to perform thesis work. You will see that a thesis does not have to be a theoretical effort, but that it will have theoretical aspects. Some theses are extensions of theoretical work, involving mathematical derivations. Some theses are experimental in nature, involving simulation or statistical analysis to prove or examine the aspects of a problem. If a thesis begins to develop new and untested theoretical work and involves both theoretical derivations and experimental validation then the thesis is moving towards a dissertation. A minimum requirement for a thesis is that the work produces a refereed journal paper or multiple conference papers.

The Dissertation

A dissertation is like a thesis only more, deeper, and with more impact. With a dissertation, the ability to work interdependently should start to become apparent. A dissertation advances the knowledgebase concerning a topic of some significance within the field in a new or untested manner. In my areas of research, a dissertation will typically involve both theoretical derivations and experimental validations; however, not all dissertations involve mathematical theorem/proof formats. A dissertation may involve significant and rigorous experimental analysis. Dissertations of this type can be just as valuable, but they must be performed with great care. A dissertation will clearly frame a problem and provide a structure for future work. A dissertation will develop a methodology for solving a class of problems and if possible attempt to demonstrate the methodology on real test cases or simulated test cases. A dissertation demonstrates a profound understanding of the field. At a minimum, a dissertation should produce at least two refereed journal papers. For example, my dissertation produced three journal papers.

The Proposal

In this section, I offer some advice on preparing and defending a dissertation proposal. Some of the ideas will also be of use to students preparing a Masters Thesis or Project proposal. A possible outline for a proposal is given in Appendix 1.

My purpose here is not to tell you how to write a proposal. For that you should consult many of the available proposal writing books. Instead, my purpose is to present my opinions on how a proposal should be considered within the context of developing a successful research idea. A proposal is a plan or scheme offered for consideration, acceptance, or action. The proposal determines whether or not a Ph. D. Candidate can perform and complete original, independent research in the candidate's chosen field. A successful candidate addresses six critical questions:

1. Is the proposed research reasonable and significant?
2. Can the proposed research be accomplished?
3. Can the candidate accomplish the propose research?
4. Does the candidate understand where the proposed research fits into the "grand scheme"?

5. Can the candidate use mathematical symbols, models, etc. as a method to articulate the key ideas in the work?
6. Can the candidate explain the proposed research succinctly, in an interesting fashion, and without the aid of mathematical symbols? In other words, can the candidate make the research understandable and interesting to the layman?

A successful proposal explains what the research question or problem is, in words, and establishes the importance of the proposed research in the context of related work. The candidate must demonstrate an understanding and a synthesis of the related literature. The proposal should articulate a logical plan for proceeding with the research and summarize the anticipated contributions of the work. A proposal should be considered as a plan. It is not a "done deed". This means that you do not need to have already completed the work and have all of the results before making the proposal. Theorems and computer results are not necessary; however, it is okay to present preliminary results, especially if they help to motivate or explain the problem. Do not present a bunch of neat results instead of providing affirmative answers to the six critical questions.

You should try to make sure that your proposal is "approved" by your committee at least two weeks prior to the oral defense. In other words, make sure that you know the outcome of your oral defense prior to the event. Do not rely on your oral defense to sell your idea. The written proposal should stand by itself. During the oral defense, try not to get lost in the details. Keep focused on the goal. If you do not know the answer to a question, do not try to fake it. If you try to respond to a question to which the appropriate answer is "I don't know. Thanks for asking. I will look into that.", your committee will see through your act. Don't try to oversell your contributions. Keep it realistic.

Plan For the Future

If you are planning a career in academia, you should seek opportunities to teach classes. You learn a great deal about the material that you teach and you gain experience in the classroom. You should also try to attend teaching workshops and read books on how to teach. I recommend *Teaching Tips: Strategies, research and theory for college and university teachers* by McKeachie. When you are starting your career as a professor, you will have enough work to do getting your research funded. If you can be prepared to teach before starting your first job then you will have a running start. You should read about life in the academy. I recommend the *Academics Handbook* edited by Deneef and Goodwin. Finally, you should seek out opportunities to write proposals and develop your grantsmanship skills. There are also many books on grantsmanship. If you can help your advisor get a proposal funded, then you will be creating a win/win situation. On the issue of funding, you should proactively seek fellowships, scholarships, etc. There are many available for graduate students and I will help you pursue these to the best of my abilities.

Summary

In summary, I have high expectations of graduate students, but you will find that I am firm, fair, and helpful provided that you are willing to make the effort to articulate and achieve your goals. In order for you to be successful as a graduate student you must make the successful transition from student to scholar. You must be proactive and invest the appropriate time and energy on those things that will make you successful. One of my goals is to help you to succeed.

Appendix 1

Reviewing Papers

Paper Review Starter Questions:

1. What problem does this paper consider?
2. Why is the problem important or not important?
3. What are the main results?
4. What is the method of analysis?
5. If feasible, develop a simple example using the results of the paper.
6. What are the shortcomings of the work?
7. What open questions are suggested by the work?
8. How can the results or conclusions be used on the research under consideration?
9. What additional papers are relevant to the problem at hand?
10. (When incorporating the review into your thesis or dissertation, please answer): How will your work be different than the work in the paper?

Proposal Outline

Introduction

The key issues/questions to address in this section are:

- What area are you studying?
- Why is the area important?
- What is the basic problem that you will be working on?
- How are you going to contribute to the problem's solution?
- What should the reader expect to see in this proposal?

1) Motivation[1]
2) Overview of key topics
3) Problem statement
    a) Brief, at most a paragraph

[1] You do not need to have sub-sections for each of these areas. These outlines are simply to delineate suggested concepts for these general sections.

4) Expected contribution
    a) Brief, at most a paragraph
5) Describe what you will be discussing in the rest of the proposal

Background

The key issues/questions to address in this section are:

- What do you know about the area that you are studying?
- What are the areas that you must investigate and why?
- What has already been done in this area? On this particular problem?
- How does the work already done in this area relate to your problem area? How might you use the information that you are reviewing?
- What are some of the critical areas for further examination?
- Does the literature review indicate that you understand the key areas and that you know what the open research areas are?

Preliminary Investigation

In general this section is optional. You might not have any preliminary work or examples to show. The key issues/questions to address in this section are:

- Why did you do the preliminary work?
- What did you do? Summarize only.
- What did you learn?
- How does it apply to the problem at hand?
- Does the preliminary work show that you are capable?
- Does the preliminary work show that the problem is feasible?
- Does the preliminary work show the kinds of contributions one might expect for this problem?
- Does the preliminary work or examples make the problem clearer for the reader?

Methodology

This is the most critical part of the proposal. The key issues/questions to address in this section are:

- What are you going to do?
- How are you going to do it?

- What do you need to accomplish the work?
- What is your plan of work?

1) Re-state the problem. It must be clear what you are going to work on and why.
2) Optimization modeling - If you are planning on using optimization modeling then everything that goes into planning, developing, and analyzing optimization models must be addressed.
   a) What is your model formulation both mathematically and in plain words?
   b) Use clear, rigorous, and standard mathematical notation
   c) What are the decision variables, data requirements, and problem (size, complexity, etc) characteristics of your problem?
   d) What methods will you use to solve for optimality?
   e) If heuristics are planned, how will they be developed and how will they be tested? Why are they necessary? Be specific.
   f) Give and explain small-scale problems with detailed solutions to show your understanding of the problem, explain the problem to your committee, and illustrate problem characteristics.
3) Simulation modeling - If you are planning on using simulation modeling then everything that goes into planning, developing, and analyzing *your* simulation model must be addressed.[2]
   a) What aspects of the problem do you want the model(s) to capture?
   b) What aspects of the problem will the model(s) not capture?
   c) What will the model(s) do?
      i) Describe the system to be modeled.
      ii) How will you verify and validate your model(s)?
   d) What will the anticipated input parameters be?
      i) Why these inputs?
      ii) How will you get the necessary information?
   e) What are the anticipated outputs?
      i) Why these outputs?
      ii) How will you collect and analyze them?
   f) What parts of the modeling effort will require additional investigation?[3]
4) Analytical results
   a) What are your anticipated analytical results? What will be derived?
   b) Will you have lemmas, theorems, corollaries, etc? What is anticipated?
5) Experimental Results
   a) What are the major factors of interest?

[2] There are many general simulation methodologies. Know one. Do not cover simulation methodologies in this section. In this section you are *applying* a simulation modeling methodology to your problem.
[3] Remember this is a proposal. You do not have to have the model completed. You need to show that you will be able to make the model, i.e. that the modeling is doable (especially by you).

   b) How will you make your experiments actionable within the simulation?
      i) Will you control the experiments through parameters?
      ii) Will you have to make different models?
   c) What is the expected information to be gained from these experiments?
6) Is software development necessary?
   a) How will you perform the software development? What will be your methodology?
   b) What artifacts will be produced? How will it be documented?
   c) What is your initial design and analysis? Design and analysis is absolutely necessary for software development. You should not be ignorant of these methods if your topic involves significant software development.
7) Plan of work
   a) Tasks and time line

Summary

The key issues/questions to address in this section are:

- Re-iterate why the problem is important
- Re-iterate exactly what you expect to achieve

Qualifications

In general, this section is optional. This is your chance to tell everyone how great you are and how capable you are of solving this problem. The key issues/questions to address in this section are:

1) Does the candidate have experience related to the topic?
2) Has the candidate taken the necessary course work for performing the work?
3) Has the candidate performed other research/work that indicates a capability of performing the research?

References

The key issues/questions to address in this section are:

- Has the candidate left out any really important references?
- Are the citations complete? In other words, do the citations follow a proper referencing style?

Appendix 2

PhD Qualifying Examination

Requirements

Each member of the Ph.D. student's advisory committee will provide the student with question(s). The content of the question is left to the discretion of the committee member. The student will have 14 calendar days to develop written responses to each of these questions. Within 14 calendar days of submission of the written responses, the student will stand for an oral exam, where the committee can ask the student about their written responses or anything else they see fit. The committee votes pass/fail, with majority rules. The qualifying exam must be taken no later than one semester before the student intends to propose his or her dissertation research. The student can take the Ph.D. qualifying exam up to 2 times. If the student fails the exam twice, they must leave the Ph.D. program. After completion of the Candidacy examination, doctoral students will be considered candidates for graduation, contingent upon the successful completion of a doctoral dissertation.

Expectations

My basic expectations concerning a PhD qualifying exam are that it should check whether the student has the knowledge base necessary for PhD studies and that the student can think and frame problems at the level of a PhD candidate. With that in mind, I do think that questions involving course work are very legitimate as long as the questions are covering PhD level material or thinking processes. I would prefer that the committee attempt to frame questions that are related to the candidate's potential research area and I have instructed my PhD students to prepare a short white paper on their topic area; however, the questions do not have to be limited to the candidate's chosen research area. I also urge the committee members to remember that their questions are not the only questions that the candidate must answer and that the questions should be doable in some form during the time allotted.

Guidelines

1. The PhD student should use a word processor to prepare the response for each question. An individual committee member may permit the student to not use a word processor at their discretion. This may be the case, for example, when deriving tedious mathematical expressions. It is my feeling that the point of the exam should not be whether or not the PhD student can use the equation editor in MS Word. In all cases, the PhD student's work should be professional, well organized, and readable. Sloppy work is not to be tolerated. The PhD student should incorporate relevant tables and figures (with numbers and

titles) into their text and use appendices for supporting information such as code, computer output, etc. All text (except tables) should be double-spaced.

2. The PhD student should attempt to answer each question to the best of their ability. The PhD student is instructed to do as much work on the problems as is possible, given the time restrictions. If the questions cannot be adequately solved in the allotted time period then, the student is expected to indicate clearly the methodology that they would use to solve the problem if given enough time and to justify that methodology.
3. The PhD student is not allowed to communicate with any human being concerning the solution of these problems (except for question clarification from the committee members). The PhD student may utilize non-human sources (books, references, computer programs, etc.) unless specifically restricted within an individual committee member's question. The PhD student should clearly indicate or cite references to other persons work in their examination report. I prefer to answer questions via email if possible, so that I have a written record of the student's question and my responses. Review the university policy on academic honesty prior to completing this exam.
4. The PhD student should prepare 4 bound copies of their response to each question; each bound copy should contain 1 copy of the responses to each question. Each bound copy should include a cover page including the PhD student's name, the names of the committee members, the dates of the written submission and the oral examination, and a signed pledge indicating that they have abided by these guidelines and the university policy on academic honesty.
5. The PhD student should deliver the 4 bound copies to me by 5:00 p.m. CDT on the due date of the exam. I will distribute the copies to the other members of the committee. The oral portion of the examination should be scheduled for 1 week after the due date of the written exam. The PhD student should use that time to prepare a presentation that explains/recaps the answers from the written exam.

Appendix 3

Some Rules for Graduate Students

1. Understand what plagiarism is and never commit and act of plagiarism. If you do, I will recommend that you be removed from our graduate program. See http://www.writersmanual.com/article1002.html Understand what constitutes academic dishonesty. I will pursue acts of academic dishonesty to the fullest extent possible. See http://www.uark.edu/campus-resources/comm1313/AcDishonesty.html
2. Strongly consider using the RefWorks system available through the UA library to store and organize your literature.
3. You must use the share folder that I create for you. You don't have to keep your day to day materials in the folder, but make sure to upload and save important files to the folder and to organize the folder in a logical manner. The folder should have a "ReadMe" file that explains the organization of the folders and their contents.
4. Maintain a journal of your research activities. Keep track of when you worked and the tasks that you completed.
5. Make yourself aware of my schedule. Utilize my office hours for "drop by" visits or schedule an appointment with me for a specific time if you need to discuss something with me that cannot be handled in our regular meeting time.
6. Meetings
    a. Develop an agenda for our weekly meetings. Keep a folder in our share folder containing a record of your agendas and accomplishments.
    b. Email the agenda to me at least 1 day prior to the meeting so that I can prepare for the meeting. I prefer **not** to get the agenda as an attachment, i.e. just type the information directly into the email message.
    c. At a minimum the agenda should have:
        i. Previously Assigned Tasks
            1. List the tasks that you were assigned since the last meeting
        ii. Status of Project
            1. Indicate the status of the previously assigned tasks
            2. Indicate new issues that arose since last meeting and their status
        iii. Suggested Future Tasks
            1. Develop a to do list of tasks for the next week
            2. I will suggest additional tasks for you to do. I expect you to make an attempt at addressing the issues/tasks that I raise.
    d. Take notes during the meeting. Send me a brief message after the meeting recapping the major points of the meeting especially the tasks that you are to work on for the next meeting.

e. If for some reason you have not made progress, then I expect that your agenda will reflect that fact. If you have legitimate reasons for lack of progress (illness, multiple exams during the week, etc), then I expect to be informed of those reasons *in advance*. For example, I understand that course homework and projects may interfere with your productivity. If you have an excessive course load for a particular day/week, then let me know in advance so that I give you permission to commit less time to your research. Of course, you will be expected to make up research work time as soon as possible.

f. A missed meeting (without prior permission) will be considered as unsatisfactory progress.

7. Documents

a. If you have trouble with written reports then use the Writing Center. It is not my job to teach you how to write. Learn and use the more advanced features of MS Word (captions, equation editor, etc.)

b. Use a standard style guide, e.g. Chicago Style Manual.

c. I expect all documents to be formatted in a professional manner. If you turn in sloppy, un-proof read work, I will rate your progress as unsatisfactory.

d. If I make suggested changes to your work, I expect those changes to be made. If you return the document to me without addressing the suggested changes then I will rate your progress as unsatisfactory.