MANAGEMENT INFORMATION SYSTEMS

Doctoral Student Handbook

THE UNIVERSITY OF ARIZONA
Eller MIS

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INTRODUCTION

Welcome to the University of Arizona MIS Doctoral Program!
The University of Arizona’s Department of Management Information Systems pioneered one of the first MIS programs in the world. The Department of Management Information Systems has been ranked in the top seven since the rankings began in 1989 by US News and World Report. Since its inception in 1974, the Department has placed over 200 Ph.D. graduates in MIS, in both industry and academia. Academic placements include many prestigious universities such as Carnegie Mellon University, Harvard University, Pennsylvania State University, the University of Texas at Austin, the University of Michigan, the University of Virginia, Indiana University, the University of Minnesota, and the University of Pennsylvania. Ph.D. graduates have also been placed in Fortune 500 companies such as Google, Hewlett Packard, IBM, and important Government agencies, including the National Science Foundation, the U.S. Air Force, and the U.S. Navy. Alumni of our Ph.D. program are visible at all major MIS conferences and on all major MIS publications’ editorial boards. The Department has the largest faculty and Ph.D. program among top-ranked MIS programs. Our faculty consists of highly productive and leading scholars in various areas of MIS research. Working under faculty supervision, our Ph.D. graduates typically complete a significant number of publications in refereed conferences and well known journals prior to graduation.

Overview of IS research
The Ph.D. degree in Management with a major in Management Information Systems (MIS) is designed to prepare students for teaching and research careers involving the design, analysis, implementation, and operation of computer-based information systems and other associated organizational and economic issues. MIS involves the use of computers in organizations and the integration of computer skills with the functional areas of management. There are three broad areas of MIS research: Technical, Behavioral, and Economic.

Technical or Design Science research involves designing and developing Information Technology (IT) artifacts to solve problems. IT artifacts are broadly defined as constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices), and instantiations (implemented and prototype systems). This kind of research leverages formal and quantitative modeling, mathematical and computational techniques from computer science (e.g., machine learning and artificial intelligence) and operations research (e.g., optimization and graph theory), and cutting-edge technological advances (e.g., Internet of Things and mobile technologies), to design and implement IT artifacts. Examples of these include search and recommendation engines, models for tracking data provenance, techniques for resolving semantic interoperability among databases, web and data mining, business intelligence algorithms, and systems in areas such as team science, border security, law enforcement, and e-health.

Behavioral research in IS analyzes the interactions of people and technology (i.e., IT artifacts) by leveraging and extending theory from areas such as psychology, sociology, management, marketing, consumer behavior, and communication. In addition, behavioral research builds theory to explain and predict important phenomena. The people include individual technology users, decision makers, virtual and co-located teams, organizations, and society. Examples of research in this area include studying interactions in online environments to enhance processes and improve outcomes, examining user behavior with respect to security policies to increase awareness and compliance, or understanding
motivations for behavior (e.g., trust, sharing, deception) in mediated environments. Methodologies include laboratory and field experiments, surveys, and case studies. A wide variety of quantitative and qualitative methods are used to analyze the data including content analysis, event analysis, analysis of variance (ANOVA), multivariate analysis, regression, structural equation modeling (SEM), and social network analysis.

Economic research in IS uses principles and methods from the economics discipline to analyze how people, organizations, and society adopt and use information systems. Examples of research in this area include analysis of the competitive environment introduced by technology, understanding of consumer behavior in new economic environments brought about by technology, analysis of how economic agents inside and outside a firm interact through technology solutions, pricing and commercialization of digital goods and services. Methodologies range from microeconomic analytical models to the use of advanced econometrics with empirical data.

**REQUIREMENTS FOR A PH.D. IN MIS**

Technically, the Ph.D. in MIS is a Ph.D. in Management with a concentration in MIS. However, we usually refer to it as the MIS Ph.D. program or an MIS Ph.D. The MIS Ph.D. program starts with a solid foundation in research methodology. Building on this, it offers a unique synthesis of state of the art technologies and approaches from Computer Science, Artificial Intelligence, Economics, Operations Management, Psychology, and Sociology, to name a few. There is a mix of hands-on and theoretical work: students learn how to implement, deploy and evaluate business information systems that are of interest to academia and industry alike. The MIS Ph.D. degree requires a major in MIS plus a minor in a related discipline from another department.

**Major Requirements**

The major course work consists of a set of foundation courses (21 units), quantitative methods (9 units), specialization (6 units), and participation in the MIS research seminar (6 units). Please note that the graduate college requires a minimum of 36 credits in the major; MIS requires a minimum of 42 credits in the major. Table 1 lists the major requirements including the required courses.
Table 1: Major Requirements

<table>
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<tr>
<th>Requirements</th>
<th>Courses</th>
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| FOUNDATION (21 units required) | MIS 531: Enterprise Database Management  
MIS 611A: Design Science Research Methodologies  
MIS 611B: Behavioral Research Methodologies  
MIS 611C: Economics of Information Systems  
MIS 611D: Topics in Data and Web Mining  
MIS 696A: Readings in MIS  
MIS 696D: Models for Quantitative Analysis |
| QUANTITATIVE METHODS (9 units required) | MIS 601: Statistical Foundations of Machine Learning  
The student should consult his/her major advisor to select two additional quantitative methods courses. |
| SPECIALIZATION (6 units required) | The student should consult his/her major advisor to select two courses that contain the basic knowledge in a chosen area of specialization such as Information Technology, Information Economics, Management and Organization, Quantitative Methods and Operations Management. |
| RESEARCH WORKSHOP (6 units required) | MIS699: Research Workshop |

**Minor Requirements**

Students are required to take courses in one or more minor areas. The minor requirements are determined by the department that offers the minor. Students should consult the major advisor and the minor department for guidance. Some possibilities include cognitive science, communications, computer science, decision science, economics, industrial engineering, linguistics, management and organization, psychology, sociology, and statistics. Students must have at least one supporting minor of nine or more units for the PhD. If a doctoral student chooses two supporting minor subjects, each minor must have at least six units of coursework.

**Registration Requirements and Procedures**

PhD students should let the program coordinator know which MIS courses you want to register for each semester. The program coordinator can register you for those courses. Other courses on campus might require special approval. It is up to you to investigate the requirements to register for graduate level courses in other departments.

**NORMAL PROGRESS FOR PH.D STUDENTS IN MIS**

**First Year**

You should receive grades of B or better in all of your courses. In addition, you should receive a grade of P for the research workshop in both semesters.

Each spring, students submit an annual report that covers the previous 12 months. In the report, students discuss their teaching, research, and service from the previous year. Students are also asked to reflect on their experiences and set goals for the new year. The PhD committee reviews the reports and
offers guidance for students regarding their progress. In the first year, the report represents only one semester in the program. Adequate progress in the annual report is demonstrated by grades in the core classes, and statistics classes as their schedule permits. The goals for research in this report should focus on summer work and might include preparing a paper for conference or journal submission. Continued funding is contingent on the annual report evaluation.

In order to continue in the program, you must pass the core exam, typically held in the third week of May of the first year. This exam covers the material in the foundation and quantitative methods courses that are taught during the first year (MIS 531, MIS 611A, MIS 611B, MIS 611D, MIS 696A, MIS601).

Second Year
You should perform well in your second year coursework (grades of B or better), including minor courses. You should also register for and receive a grade of P for the research seminar in both semesters. You should be working on a research project that will lead to your prelim paper (to be presented by October of your third year).

It is important to begin working on research papers for submission to journals as early as possible in your doctoral program. It can take one to two years (or more) from the time you submit a paper to the time it is accepted, depending on the journal. Submitting papers in your second year should lead to publications by the time you begin looking for a job.

The annual report in the second year should discuss your progress on research papers and submissions, with a focus on preparing the prelim paper that will be presented in fall of your third year. Continued funding is contingent on the annual report evaluation.

Third Year
You should complete your coursework in the third year. Again, you should aim to have achieved grades of B or better.

Your written prelim should be scheduled by October 15th. Once all of your coursework is completed (for the major and the minor), you can schedule your oral comprehensive examination. You should continue working on research with the goal of submitting to journals. If you did not produce journal-ready papers in year two, it is critical that you focus on doing that in year three.

For the annual report in your third year, you should have completed the written prelim. If the prelim is not completed or scheduled, you should provide an explanation as to why. You should be planning to meet your teaching requirements in the summer of your third year. Continued funding is contingent on the annual report evaluation.

Years 4 and 5
Many students take five years to complete the degree, though some complete it in four. Ideally, students in their fourth year will have a journal publication, as well as a pipeline of future projects. The minor requirements should be fulfilled and the oral exam should have been successfully completed. If a student is not on track, he or she should explain the delay in their annual report. At this stage, students should be focused on their dissertation topics and working toward completing the dissertation. If students have not met the teaching requirement, they should be planning to do so the summer of their fourth year. As before, continued funding is contingent on the annual report evaluation.
For the annual report in your fourth and fifth years, you should have completed the written and oral prelim exams and you should have taught at least one class. If any of these activities have not been completed or scheduled, you should provide an explanation as to why. If you are on the market, you should provide the committee with information regarding your plans for final defense and the status of your job search. If you are not on the market, continued funding is contingent on the annual report evaluation. ALL students who are in the program when the annual report is due must complete one.

**Preparation to enter the job market**
As you prepare to enter the job market, it is important to develop a job packet that includes a cv, teaching and research statements, and sample publications. Looking for a job is a full time job, so be sure to allocate sufficient time to preparing the packet, sending out applications, following up on applications, and participating in interviews. Typically, schools require candidates to do a presentation (or job talk) about their research. You should consider presenting your job talk at the department’s research workshop. It is a good opportunity to receive feedback from a friendly audience.

**PhD Achievement Fund**
Each student in the MIS PhD program will have a travel and research expense account that accumulates as the student successfully completes major milestones of the program. This account, referred to the PhD Achievement Fund (PAF) will be managed by the student, but can only be used for expenses that are allowed by the University and that directly support their research or travel. The PAF will be funded as follows:

- When a student begins the program, $500 will be added to their PAF
- When a student passes the core exam, $1000 will be added to their PAF
- When a student completes the prelim, $1000 will be added to their PAF
- When a student passes the oral exam, $1000 will be added to their PAF
- When a student is in their final year (i.e., on the market), $1500 will be added to their PAF

This totals to $5000. Any unused funds after the student graduates are returned to the department.

There are additional opportunities to gain funding for student research-related travel: Annual competitions for the Alan Dennis award ($1000), as well as the Sy Goodman award ($500) are provided. If awarded, these funds will be deposited in the student’s bursar account. The department’s ICIS Doctoral Consortium designee (as nominated by the department and selected by ICIS) will receive funding to attend and participate in ICIS (participation in any additional ancillary conferences will come from the student’s account).

Students also have access to GPSC travel funding up to $750 per year. The department encourages students to apply for these funds to aid their participation in various conferences and research activities.

**Additional Details on Program Milestones**
**Teaching Requirement** – All doctoral students must teach at least two courses for the MIS department during the program. In order to be eligible to teach you must complete the Teaching Assistants Training Online (TATO). You cannot be a GA or a TA for a course unless you have completed TATO and FERPA modules.

Classroom instruction is an important aspect of doctoral student training. All doctoral students will be required to teach a *minimum* of two courses for the MIS Department during their doctoral
studies. Students will teach two courses (total) during years two through four of their program. For each year students are in residence beyond year four, they will be required to teach one additional course. The department will schedule students in the courses, although students will be given some flexibility in scheduling their teaching to best meet the travel, academic, and research activities of their program. Under special circumstances and with the support of their advisor, students may petition the PhD Committee for a one-course waiver. Students will coordinate with a faculty member who teaches the course in order to align syllabi and learning outcomes. Students whose teaching evaluations in their first course are below desired departmental standards will be required to complete an improvement program that may include enrolling in a teaching workshop, class observation, and/or review of course materials with a faculty member prior to teaching their next course.

Written Comprehensive Exam – The Core – The core is taken following the first year of study in the PhD program. It covers all of the required courses taken in MIS during the first year in the PhD program. It is typically administered around the third week of May (normally, the Thursday and Friday before Memorial Day) of the first year. Students must pass the core exam in order to move forward in the PhD program. Students who fail the core exam may be asked to transfer to the MS MIS program or, in rare cases, be given other options. Students who receive a marginal pass may be required to undergo remedial work to address deficiencies.

Plan of Study – Students are responsible for mapping out a set of courses that comprise their plan of study. The plan of study should be filed by the end of the student’s third semester in residence. It should include courses the student has transferred, courses the student has taken, and courses the student intends to take to fulfill the requirements of the major and minor.

Written Prelim – This is done during the fall of the third year. The purpose of the written prelim is to write and present a research paper that demonstrates a student’s ability to conceive of and execute a research project. The written prelim paper should be of journal quality. Students are expected to complete or schedule their written prelim by October 15 of their third year.

Written minor exam – Students who take minors in which a written exam is required must take and pass the minor exam prior to taking the oral exam in MIS. Please discuss minor requirements with your minor advisor.

Oral Comprehensive Exam– The oral comprehensive exam is a graduate college requirement, taken after you have completed all coursework.

According to the graduate college:
“Before admission to candidacy for the doctoral degree, the student must pass a written and an oral Doctoral Comprehensive Examination. This examination is intended to test the student's comprehensive knowledge of the major and minor subjects of study, both in breadth across the general field of study and in depth within the area of specialization. The examination, therefore, should not take place until the student has completed all, or almost all, of their coursework. The Comprehensive Examination is considered a single examination, although it consists of written and oral parts. While the Graduate College sets general policies and guidelines for exams, it is expected that each program will have different ways of assessing a student's knowledge of the field and their preparation to begin the dissertation. Each program determines the format and administration of the written portion. The minor department controls the minor portion of the written examination and may waive it at their discretion. A student will pass the written portion before sitting for the oral portion. Programs will have
written policies regarding whether or not students may retake failed written exams as well as specific policies regarding second attempts of the oral. The time between the written and oral portion is determined by individual programs, but the oral portion should come early enough to allow the student to advance to candidacy in a timely fashion. Normally, the written and oral portions of the comprehensive examination should take place at least three months prior to the Final Oral Examination (defense of dissertation). The exact time and place of the oral comprehensive examination must be scheduled with the department and announced in GradPath using the Announcement of Doctoral Comprehensive Exam form before the exam can take place.”

“Upon successful completion of the written portion of the examination, the **Oral Comprehensive Examination** is conducted before the examining committee of the faculty. The oral portion of the examination must cover both the major and the minor. Remote participation by one or more committee member by video or phone conference is permitted on the condition that the student and all committee members can effectively communicate. All members must participate in the entire examination. The oral examination is the occasion when faculty committee members have both the opportunity and obligation to require the student to display a broad knowledge of the chosen field of study and sufficient depth of understanding in areas of specialization. Discussion of proposed dissertation research may be included. The examining committee must attest that the student has demonstrated the professional level of knowledge expected of a junior academic colleague. The Graduate College allows no more than one re-take of the oral exam.”

**Comprehensive Examination Committee**

The student is responsible for forming a comprehensive examination committee that can examine her or him on the major and minor fields to confirm competency in those areas as identified by policy or in pre-exam consultations. The examining committee must consist of a minimum of four members. The Major Advisor and two additional members must be current tenured, or tenure track faculty members, or approved tenure equivalent. The fourth member may be tenured or tenure-track, or an approved special member. Special members must be pre-approved by the Dean of the Graduate College. Any members beyond the fourth can also be current tenured or tenure-track faculty members, or approved special members.

Note that some faculty will encourage or require students to have a separate dissertation proposal defense. This activity, while not required by the graduate college, can be very valuable in terms of obtaining feedback prior to getting too far along in the dissertation process. You should check with your advisor about this.

Prior to entering candidacy, all students must have a dissertation proposal on file. After (or concurrent with) the oral exam, the student will prepare a written dissertation proposal. The student will circulate the proposal among the dissertation committee and will either:

a. Accumulate the signatures of the committee members (after the advisor has signed off) at or after the oral comprehensive exam or

b. Hold an oral proposal defense in which committee members participate and, at the successful completion, sign off on the proposal.

Students will have 3 months after their oral to file the proposal. Students taking longer than 3 months will be reviewed on a case-by-case basis.
Final Dissertation Defense – Having filed your Committee Appointment Form, you must then file the Announcement of Final Oral Examination at least seven working days prior to the defense date. Forms can be found in GradPath, using the link available in your UAccess Student Center.

Registration and the Final Defense. To defend during the Fall or Spring semester, you must register for a minimum of three graduate units. If you have completed 18 dissertation credits, you need only register for one graduate unit. Note that this satisfies the requirements for continuous enrollment, but does not qualify a student for full time status; six credits are required for full time status. New in 2012: “Doctoral students finishing in the summer or winter term who have maintained continuous enrollment, completed all other degree requirements as well as the required 18 credits of dissertation may defend in the summer or winter term without registration. Students should verify eligibility with their degree auditor.” Your degree auditor can be found under Management Information Systems on the graduate college web site.

The Graduate College requires a minimum of three members on the dissertation committee, all of whom must be University of Arizona tenured, tenure-track, or approved as equivalent.

Preparation of the dissertation follows the Graduate College format and style rules. Refer to the Manual for Electronic Theses and Dissertation on the Graduate College Website.

To be safe and to make sure you have the most up-to-date version of the policies, please be sure to check the graduate college website: https://grad.arizona.edu/gsas/degree-requirements
**PROGRAM CHECKLIST**

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<tr>
<th>First Year</th>
<th>When</th>
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<tr>
<td>□ Teaching Assistants Training Online (TATO) and FERPA</td>
<td>August</td>
</tr>
<tr>
<td>□ Submit Annual Report</td>
<td>February</td>
</tr>
<tr>
<td>□ Pass core examination</td>
<td>May</td>
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<tr>
<th>Second Year</th>
<th></th>
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<tbody>
<tr>
<td>□ Submit Ph.D. Plan of Study (in Grad Path)</td>
<td>December</td>
</tr>
<tr>
<td>□ Submit Annual Report</td>
<td>February</td>
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<table>
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<tr>
<th>Third Year</th>
<th></th>
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<tbody>
<tr>
<td>□ Written Prelim Proposal*</td>
<td>July</td>
</tr>
<tr>
<td>□ Written Prelim *</td>
<td>October</td>
</tr>
<tr>
<td>□ Submit Annual Report</td>
<td>February</td>
</tr>
<tr>
<td>□ Oral Comprehensive Exam submit Comp Exam Committee Appointment form and Announcement (in GradPath)</td>
<td>Spring semester</td>
</tr>
<tr>
<td>□ Submit the Doctoral Dissertation Committee Appointment Form</td>
<td>After oral (after passing oral exam and <em>ideally</em> 6 months prior to defense)</td>
</tr>
<tr>
<td>□ Teach one class for the MIS Department.</td>
<td>Summer or academic year</td>
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<tr>
<th>Fourth /Fifth Year</th>
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<tbody>
<tr>
<td>□ Teach one class for the MIS Department. (each year)</td>
<td>Summer or academic year</td>
</tr>
<tr>
<td>□ Prepare Job Placement Packet</td>
<td>August of the Job Market Yr.</td>
</tr>
<tr>
<td>□ Present practice Job Talk</td>
<td>Fall of the Job Market Yr.</td>
</tr>
<tr>
<td>□ Submit Annual Report</td>
<td>February</td>
</tr>
<tr>
<td>□ Submit Announcement of Final Oral Examination to Grad. Degree Certification</td>
<td>Seven working days prior to the exam</td>
</tr>
<tr>
<td>□ Final Oral Defense of the completed dissertation</td>
<td>When Ready</td>
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</tbody>
</table>

* Note: The Program Coordinator retains copies of all official departmental documentation. University paperwork is held in GradPath. Departmental paperwork (associated with the written prelim) should be submitted to the Program Coordinator.