

IS PhD Program Revisions for Spring 2018 (proposed 9/7/2017)

Overview of Program Revisions

- Reducing the number of credits required to be more in line with the NJIT requirements. Only 600-level courses necessary for the two research tracks will be required: Data-intensive research and Human-centered computing, as well as four 700-level courses.
- Removed some IS-centric wording and IS-centric core courses. This is because IS was the old department name (now changed to Informatics), and not the focus of the PhD program. These IS core courses were left over from an older version of the curriculum, which had already been revised to focus more on the two research tracks. (Now we are revising this further to focus solely on preparing students for the two research tracks.
- Removed mention of required article reviewing, grant writing, and the research proposition. These are *defunct* requirements - old requirements that were formally removed in a prior revision to this program, but remained in some of the wording inadvertently.
- Clarified some procedures in the Research Study, which serves as the qualifying exam.
- Small tweaking of the wording for clarity.

Changes marked in **BOLD and BLUE**, deletions in ~~strikeout~~

Ph.D. in Information Systems

Academic Advisor: Michael P. Bieber

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Overall Course Requirements **[MOVED DOWN]**

~~Students must maintain a grade average of 3.5 (B+) or better in core courses. No course with a grade less than B will count. Up to 2 courses may be independent study. At least 4 courses must be at the 700 level.~~

Ph.D. Program Goals

Students in the PhD program will be able to demonstrate the ability to:

~~1. understand the state of the art of IS practice [REMOVE - IS-CENTRIC]~~

1. understand fundamental knowledge of and apply research methods within student's chosen focus of Human-Centered Computing (HCC) or data intensive research
2. critically examine research in the student's chosen research area

~~3. develop a fundable research proposal [REMOVE - DEFUNCT REQUIREMENT (REFLECTS OLD REQUIREMENT REMOVED IN A PREVIOUS REVISION)]~~

3. develop research questions, design research methodologies, implement systems, interpret results, and discuss implications for a research project in the student's chosen research area, and
4. teach effectively in one IS course

Ph.D. Program Overview and Credits

The PhD program has 4 stages. Full-time students entering with ~~an IS~~ a related Master's degree are expected to complete within 4 years. Those entering with only a Bachelors or ~~a non-IS an~~ unrelated background are expected to complete within 5 years. Per NJIT policy, the maximum duration for the entire doctoral study is 7 years for both full-time and part-time students. The following table shows the expected and maximum time allowed for each stage.

~~Further~~ Ongoing Activities [MOVED FROM BOTTOM FOR EMPHASIS AND CLARIFIED]

As future researchers, throughout their studies ~~phd~~ PhD students are **expected encouraged** to work with faculty and fellow students to:

- Publish regularly in quality conferences and journals, including co-authoring,
- Attend conferences relevant to the student's research area,
- Regularly review conference and journal submissions, and
- Participate in authoring grant submissions and working on grant-funded projects.

Overall Course Requirements [MOVED FROM ABOVE AND CLARIFIED]

Students must maintain a grade average of 3.5 (B+) or better in core courses. No course with a grade less than B will count. Up to 2 courses may be independent study. **Students entering with an MS degree must take a minimum of 4 courses (12 credits) at the 700 level. Students entering without an MS degree must take a minimum of 12 courses (36 credits), where at least 4 courses must be at the 700 level.**

Ph.D Program Stage Details

Stage 1: Foundation

Students will consult with the PhD Director to develop an appropriate set of foundation courses, [\[ADD COMMA\]](#) which must include the following if not previously studied.

Code	Title	Credits
IS Foundation [REMOVED - too IS-CENTRIC]		
IS 677	Information System Principles (Required)	3
Programming		
IS 601	Web Systems Development	3

Stage 2: Core Knowledge Acquisition

In this stage, students will focus on core **and specialty** courses, ~~article reviews and the qualifying exam. [REMOVED - DEFUNCT REQUIREMENT]~~ Students may be required to take a different set of core courses or in a different sequence, depending on their educational background. Student additionally should participate in research activities. Students must take four 700 level courses to graduate.

First Year		
1st Semester		Term Credits
IS 631	Enterprise Database Management	3
IS 661 or IS 664	User Experience Design [COURSES MOVED BELOW] or Customer Discovery	3
IS 665	Data Analytics for Info System	3
ENG 503	Advanced English for International Teaching Assistants [ADD SPACE] (international students only)	3
<p>Students with the Human-Centered Computing focus must take both of the following courses. Students with the Data-Intensive Research focus must take 1 of the following courses. [CHANGED TO STRENGTHEN THE STUDENT'S RESEARCH FOCUS]</p>		
IS 661 or IS 664	User Experience Design [MOVED FROM ABOVE] or Customer Discovery	3
Term Credits		9-12
2nd Semester		
IS 663	System Analysis and Design	3

IS 765	Quantitative Methods in Information Systems Research	3
Select one of the following:		3
IS 634	Information Retrieval (Select one of the following:)	-
IS 687	Transaction Mining and Fraud Detection	-
IS 688	Web Mining	-
Students with the Human-Centered Computing focus must take the second of the following courses. [CHANGED TO STRENGTHEN THE STUDENT'S RESEARCH FOCUS]		
IS 661 or IS 664	User Experience Design or Customer Discovery	-
Students with the Data-Intensive Research focus take a specialty course in this focus in consultation (as recommended by the advisor) [ADDING FLEXIBILITY TO THE SET OF ALLOWED DATA-INTENSIVE RESEARCH COURSES]		
Term Credits		9
Second Year		
1st Semester		
IS 684	Business Process Innovation [REMOVED - too IS-CENTRIC]	3
IS 776	IS Research Proposition	3
0-2 specialty courses 1 specialty course (as recommended by the advisor and required for full-time status)		3-0-6
Term Credits		3-9
2nd Semester		
IS 725	Independent Study in Information Systems	3
or a 700-level specialty course (if needed to fulfill 700-level course requirements)		
0-2 specialty courses (if recommended by the advisor)		0-6
Term Credits		3-9
Third Year		
1st Semester		
IS 726	Independent Research II	0-3
if needed to fulfill 700-level course requirements)		
More specialty courses (if recommended by the advisor)		0-6 3
Term Credits		0-9 6

Additional Course Information

[ADDED TO GUIDE STUDENTS SINCE WE REMOVED SEVERAL CORE COURSES]

- Students should choose specialty courses in conjunction with their advisor.
- Advisors may require that students take additional specialization courses to prepare for their dissertation research.
- Students who intend to work in an academic department focusing on business or information systems are highly recommended to take additional information systems (IS) electives to prepare for teaching in this field. For these students we highly recommend:
 - IS 684 Business Process Innovation
 - IS 677 Information Systems Principles (as a foundation course)
- Students focusing on Human-Centered Computing are highly recommended to take a second course in data-intensive research (in addition to IS 665).
- After fulfilling regular coursework, students must register for IS 792 Pre-Doctoral Research each semester until presenting their dissertation proposal.
- After presenting the dissertation proposal, students register for IS 790A Doctoral Dissertation and Research each semester until graduating.

Participation in Research Activities

IS research group meetings present an important opportunity for faculty and PhD students to immerse themselves in IS research paradigms, learn about research interests, present ideas, and find collaborators.

Full-time funded students must register for [IS 791](#) Graduate Seminar and attend research group meetings, **and** research talks, ~~and serve on research proposition panels every semester. [REMOVED – DEFUNCT REQUIREMENT]~~ Part-time students also must register for the seminar and actively participate for at least 2 semesters, and are strongly encouraged to attend additional sessions as often as they can remotely via video conferencing. ~~Exit r~~ Requirements for [IS 791](#) Graduate Seminar include presentations in research group meetings ~~and satisfactory reviewing performance on research proposition panels. [REMOVED – DEFUNCT REQUIREMENT]~~

Stage 3: Research & Teaching Apprenticeship

This stage includes:

- finding a dissertation advisor

- completing coursework
- completing a qualifying exam (research study)
- publishing
- apprenticing teaching

Dissertation Advisor

Students must select a dissertation advisor by the end of the first year of entering Stage 3. This presumably was the student's faculty advocate during the admissions process, though this is a period for students to explore one or more areas of research as part of finding an exciting dissertation topic. Students may switch advisors as their research interests evolve. Starting this stage, including when switching advisors, no student may be without an approved advisor for more than 4 **calendar** months. **[ADDED FOR CLARITY]**

Coursework

Students must complete their coursework by the end of this stage. Courses fall into three categories:

1. *Core Courses:* Completing the courses listed in Stage 2.
2. *Specific Knowledge for Research and Dissertation:* Students and their advisors are responsible for choosing courses that will provide appropriate knowledge to complete the student's dissertation, and to be considered knowledgeable in the student's chosen field. The advisor can recommend courses in excess of the official number of credits required for graduation if the additional knowledge is critical.
3. *General Knowledge for Teaching:* If necessary, students and their advisors are responsible for choosing additional courses providing enough knowledge to teach general undergraduate courses in Information Systems and/or in the students chosen specialty.

Qualifying Exam: Research Study **[WORDING UPDATED TO CLARIFY PROCESS]**

~~The research study serves as the PhD qualifying exam and demonstrates research readiness. Each student works with a faculty member to identify the topic of a research study, and then takes the lead in designing and conducting the study, and analyzing the results. The study should be submitted by the end of the first semester of this stage. At the start of the second semester the student will present the study and results in a department seminar, and prepare a quality publication as lead author. Recommended revisions to the study and publication must be completed by the end of the second semester. Because the study topic may be part of the faculty member's existing research efforts, the student must petition the department PhD committee to be allowed to utilize it as a dissertation topic. The student will register for IS 776 under the faculty member to conduct this Research Study. (IS 725 and IS 726 cannot be used for this Research Study.)~~

~~The faculty advisor (the faculty member working with the student) will propose a Qualifying Exam Committee (QEC) of 3 faculty members with sufficient familiarity of the~~

~~topic or the study methodology. The QEC must be approved by the Department PhD Committee. The faculty advisor will not be a member of the QEC. Each QEC member will vote (pass-fail) on the Research Study as a whole (considering the design, execution, analysis, and written report to be submitted for publication). The student must receive a unanimous pass vote from the QEC to pass the Qualifying Exam.~~

The Research Study (RS) serves as the PhD qualifying exam and demonstrates research readiness. Each student works with a faculty member to identify the topic of a research study, and then takes the lead in designing and conducting the study, and analyzing the results, and writing a paper of publishable quality. The student will register for IS 776 under this faculty advisor to conduct this research study. Normally, students should attempt this requirement in the Fall of their second year. A Qualifier Exam Committee (QEC) of three faculty members excluding the faculty advisor evaluates the RS. The PhD program director and the adviser jointly appoint the three-person committee, with majority of the members holding primary, joint, emeritus, or research faculty appointments in the Department of Informatics. The faculty advisor will not be a member of the QEC.

Defense: A public defense will be held at the start of the following semester. The defense consists of three parts: 1) a presentation open to the public, 2) a follow-up Q&A session where both the student's QEC and the public can ask questions regarding any aspect of or related to the presented research, 3) a closed-door oral exam with the student and the QEC, and the student's advisor (as an observer), where only the student's QEC will ask more detailed questions. Oral exam questions will focus on the state of the art within the RS's topical area, the study itself, and justification for the research method and analysis chosen versus other possible research methods and analysis approaches.

Outcomes of the Public Defense: After completing all three parts of the defense, the QEC will meet alone and conduct a closed-door discussion. Each QEC member will vote (pass-fail) on the RS as a whole and the oral exam. The student must receive a unanimous pass vote from the QEC to pass the Qualifying Exam. Possible outcomes include: 1) passing the student immediately, 2) requesting the student to revise and resubmit the written work produced in the RS, with or without the need to re-defend the research, 3) failing the student immediately. If the committee fails the student in the defense, the student will have a second chance only to defend his/her RS by the end of the semester. A student failing to address all requested revisions or to pass the defense within one calendar year after initial registration for the RS will be dismissed from the program.

Publishing

Students must have one paper accepted for publication in a quality conference or journal as lead author by the end of their third year. Students are strongly encouraged to start on this requirement during this stage and over time submit multiple papers to ensure that it is

met. Students also are encouraged to co-author papers with faculty and other doctoral students.

Teaching Apprenticeship

Students apprentice with a faculty member for a semester in preparation for a teaching practicum. During the apprenticeship, students typically will serve as a teaching assistant or grader.

Stage 4: Dissertation Process and Teaching Practicum

This stage includes:

- writing and defending a dissertation proposal
- conducting the main study
- writing and defending the full dissertation thesis
- submitting a publication based both on the thesis and
- independent teaching practicum

Dissertation Proposal

The dissertation proposal is a binding contract between the dissertation committee and the student. If a student successfully defends a proposal, the research plan in the dissertation proposal is to be followed.

A dissertation proposal must show motivation, appropriate coverage of literature, a sound research framework, a prototype system (where appropriate), a pilot study (where appropriate), data analysis, and the detailed steps for completing the full dissertation.

Dissertation

The dissertation completes the research proposed, including a formal study, and descriptions of contributions and limitations.

Publishing Dissertation Research

Before defending the final dissertation, a student must **submit finalize for submission [REWORDED FOR SUBMISSION TIMING FLEXIBILITY]** a quality paper approved by his or her advisor based upon a substantial aspect of the thesis work to a recognized conference or journal in the field.

Independent Teaching Practicum

During the practicum a degree candidate will teach at least one previously apprenticed course under the course coordinator's direct supervision. Students must receive a satisfactory evaluation to pass this requirement.

~~Further Ongoing Activities~~ [MOVED TO ABOVE FOR EMPHASIS]

~~As future researchers, throughout their studies phd students are encouraged to work with faculty and fellow students to:~~

- ~~• Publish regularly in quality conferences and journals, including co-authoring,~~
- ~~• Attend conferences relevant to the student's research area,~~
- ~~• Regularly review conference and journal submissions, and~~
- ~~• Participate in authoring grant submissions and working on grant-funded projects.~~

Final version with edits incorporated

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2. critically examine research in the student's chosen research area
3. develop research questions, design research methodologies, implement systems, interpret results, and discuss implications for a research project in the student's chosen research area, and
4. teach effectively in one IS course

Ph.D. Program Overview and Credits

The PhD program has 4 stages. Full-time students entering with a related Master's degree are expected to complete within 4 years. Those entering with only a Bachelors or an unrelated background are expected to complete within 5 years. Per NJIT policy, the maximum duration for the entire doctoral study is 7 years for both full-time and part-time students. The following table shows the expected and maximum time allowed for each stage.

Ongoing Activities

As future researchers, throughout their studies PhD students are expected to work with faculty and fellow students to:

- Publish regularly in quality conferences and journals, including co-authoring,
- Attend conferences relevant to the student's research area,
- Regularly review conference and journal submissions, and
- Participate in authoring grant submissions and working on grant-funded projects.

Overall Course Requirements

Students must maintain a grade average of 3.5 (B+) or better in core courses. No course with a grade less than B will count. Up to 2 courses may be independent study. Students entering with an MS degree must take a minimum of 4 courses (12 credits) at the 700 level. Students entering without an MS degree must take a minimum of 12 courses (36 credits), where at least 4 courses must be at the 700 level.

Ph.D Program Stage Details

Stage 1: Foundation

Students will consult with the PhD Director to develop an appropriate set of foundation courses, which must include the following if not previously studied.

Code	Title	Credits
Programming		
<u>IS 601</u>	Web Systems Development	3

Stage 2: Core Knowledge Acquisition

In this stage, students will focus on core and specialty courses. Students may be required to take a different set of core courses or in a different sequence, depending on their educational background. Student additionally should participate in research activities. Students must take four 700 level courses to graduate.

First Year		
1st Semester		Term Credits
<u>IS 631</u>	Enterprise Database Management	3
<u>IS 665</u>	Data Analytics for Info System	3
<u>ENG 503</u>	Advanced English for International Teaching Assistants (international students only)	3
Students with the Human-Centered Computing focus must take both of the following courses. Students with the Data-Intensive Research focus must take 1 of the following courses.		
<u>IS 661</u> or <u>IS 664</u>	User Experience Design or Customer Discovery	3
Term Credits		9-12

2nd Semester		
<u>IS 663</u>	System Analysis and Design	3
<u>IS 765</u>	Quantitative Methods in Information Systems Research	3
Select one of the following:		3
Students with the Human-Centered Computing focus must take the second of the following courses.		
<u>IS 661</u> or <u>IS 664</u>	User Experience Design or Customer Discovery	-
Students with the Data-Intensive Research focus take a specialty course in this focus in consultation (as recommended by the advisor)		-
Term Credits		9
Second Year		
1st Semester		
<u>IS 776</u>	IS Research Proposition	3
0-2 specialty courses (as recommended by the advisor and required for full-time status)		0-6
Term Credits		3-9
2nd Semester		
<u>IS 725</u>	Independent Study in Information Systems	3
or a 700-level specialty course (if needed to fulfill 700-level course requirements)		
0-2 specialty courses (if recommended by the advisor or required for full-time status)		0-6
Term Credits		3-9
Third Year		
1st Semester		
<u>IS 726</u>	Independent Research II	0-3
if needed to fulfill 700-level course requirements)		
More specialty courses (if recommended by the advisor)		0-3
Term Credits		0-6
Total Credits		24-39

Additional Course Information

- Students should choose specialty courses in conjunction with their advisor.
- Advisors may require that students take additional specialization courses to prepare for their dissertation research.

- Students who intend to work in an academic department focusing on business or information systems are highly recommended to take additional information systems (IS) electives to prepare for teaching in this field. For these students we highly recommend:
 - IS 684 Business Process Innovation
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- Students focusing on Human-Centered Computing are highly recommended to take a second course in data-intensive research (in addition to IS 665).
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This stage includes:

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