Ph.D. in Information Systems

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. 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
2. understand fundamental knowledge of and apply research methods within student's chosen focus of Human-Centered Computing (HCC) or data intensive research
3. critically examine research in the student’s chosen research area
4. develop a fundable research proposal
5. 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
6. 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 Master’s degree are expected to complete within 4 years. Those entering with only a Bachelors or a non-IS 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.

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.

<table>
<thead>
<tr>
<th>IS Foundation</th>
<th>Term Credits</th>
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</thead>
<tbody>
<tr>
<td>IS 677 Information System Principles (Required)</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Programming</th>
<th>Term Credits</th>
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<tbody>
<tr>
<td>IS 601 Web Systems Development</td>
<td>3</td>
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Stage 2: Core Knowledge Acquisition
In this stage, students will focus on core courses, article reviews and the qualifying exam. 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

<table>
<thead>
<tr>
<th>1st Semester</th>
<th>Term Credits</th>
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<tbody>
<tr>
<td>IS 631 Enterprise Database Management</td>
<td>3</td>
</tr>
<tr>
<td>IS 661 User Experience Design</td>
<td>3</td>
</tr>
<tr>
<td>or IS 664 or Customer Discovery</td>
<td></td>
</tr>
<tr>
<td>IS 665 Data Analytics for Info System</td>
<td>3</td>
</tr>
<tr>
<td>ENG 503 Advanced English for International Teaching Assistants(international students only)</td>
<td>3</td>
</tr>
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<th>Term Credits</th>
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<tr>
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2nd Semester

<table>
<thead>
<tr>
<th>2nd Semester</th>
<th>Term Credits</th>
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<tbody>
<tr>
<td>IS 663 System Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>IS 765 Quantitative Methods in Information Systems Research</td>
<td>3</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Term Credits</th>
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<td>3</td>
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<table>
<thead>
<tr>
<th>IS 634 Information Retrieval (Select one of the following:)</th>
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<tbody>
<tr>
<td>IS 687 Transaction Mining and Fraud Detection</td>
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<tr>
<td>IS 688 Web Mining</td>
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<tr>
<th>Term Credits</th>
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<tr>
<td>9</td>
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</tbody>
</table>
Second Year
1st Semester
IS 684 Business Process Innovation  3
IS 776 IS Research Proposition  3
1 specialty course (as recommended by the advisor)  3

Term Credits  9

2nd Semester
IS 725 Independent Study in Information Systems  3
or a 700-level specialty course
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

Term Credits  0-9

Total Credits  33-48

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, research talks, and serve on research proposition panels every semester. 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 requirements for IS 791 Graduate Seminar include presentations in research group meetings and satisfactory reviewing performance on research proposition panels.

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 months.

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

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.

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 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

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.