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 Human-Centered Computing (HCC) and data intensive research
3. understand and apply research methods in HCC and data intensive research
4. critically examine research in the student’s chosen research area
5. develop a fundable research proposal
6. 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
7. 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.

IS Foundation
IS 677 Information System Principles (Required) 3

Programming
CS 602 Java Programming 3

Networking & Security (optionally choose at least one) 3-9
- CS 652 Computer Networks-Architectures, Protocols and Standards
- CS 656 Internet and Higher-Layer Protocols
- CS 696 Network Management and Security

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.

First Year

1st Semester
IS 631 Enterprise Database Management 3
IS 661 User Experience Design 3
IS 665 Data Analytics for Info System 3
IS 7XX Usability 3
ENG 503 Advanced English for International Teaching Assistants(international students only) 3

Term Credits 15

2nd Semester
IS 663 System Analysis and Design 3
or R834 562 Research Design
IS 765 Quantitative Methods in Information Systems Research 3
or R834 607 or Resrch Sem I: Quant Methods

New Jersey Institute of Technology
IS 7XX User Experience Evaluation 3
PTC 698 Selected Topics in Professional and Technical Communication 3

| Term Credits | 12 |

Second Year

1st Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 634</td>
<td>Information Retrieval</td>
<td>3</td>
</tr>
<tr>
<td>or IS 687</td>
<td>or Transaction Mining and Fraud Detection</td>
<td></td>
</tr>
<tr>
<td>or IS 688</td>
<td>or Web Mining</td>
<td></td>
</tr>
<tr>
<td>IS 684</td>
<td>Business Process Innovation</td>
<td>3</td>
</tr>
<tr>
<td>R834 575</td>
<td>Grant Writing &amp; Grants Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>IS 725</td>
<td>Independent Study in Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

| Term Credits | 12 |

2nd Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS 726</td>
<td>Independent Research II</td>
<td>3</td>
</tr>
<tr>
<td>IS 776</td>
<td>IS Research Proposition</td>
<td>3</td>
</tr>
<tr>
<td>2 courses in specialty area</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

| Term Credits | 12 |

Third Year

More specialty courses (if needed) 0-12

| Term Credits | 0-12 |

Total Credits 51-63

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.

Article Reviews

Critically reviewing articles is an important research skill and service to the community. Students must review at least 6 articles (3 conference papers and 3 journal papers, either before or after publication) to the satisfaction of faculty members from the IS Department, or other faculty approved by the PhD director. Faculty members must sign off on the quality of the reviews, and may require several revisions. Students are responsible for finding faculty to pick papers and evaluate reviews, and students can work with several different faculty members to fulfill this requirement. Guidelines for article reviews are posted on the Department’s PhD web pages. (Full-time students may complete this requirement within 2 years; and part-time students may complete this requirement within 3 years.)

Qualifying Exam

The qualifying exam is given each year in May. The exam has 2 sections:

- Quantitative research methods
- Human-Centered Computing and Philosophy of Information Science

These topics will be covered in part through coursework, and in part through studying additional materials we make available.

A student failing both sections the first time or any part twice will be dismissed from the program. If a student fails only one section, one opportunity to retake that section will be offered in the following May. No other options besides retaking the exam will be considered.

Stage 3: Research & Teaching Apprenticeship

This stage includes:

- finding a dissertation advisor
• completing coursework
• completing required article reviews
• regular publishing
• apprenticing teaching
• developing a research proposition and presentation.

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.

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.

Research Proposition and Presentation
Once a student has sufficient knowledge in a research area, the student will prepare a research proposition. The research proposition proposes a research project following an established grant proposal format. The research proposition is meant to demonstrate research readiness in preparation for dissertation work. The topic does not have to become the student's dissertation, but the ideal case will and also would yield an actual grant proposal that gains funding for the student's research. Propositions will be reviewed by faculty and peers in a fashion similar to the National Science Foundation review process. During this process, students will present their proposition in the IS Research Seminar once when developing the proposition to gain feedback, and again in the semester after passing the proposition. Finally, students must complete necessary revisions to the proposition no later than the following semester.

Regular Publishing
Students must submit one conference or journal paper every year. Students are strongly 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 publications based both on the proposal and final thesis
• 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
Before defending the dissertation proposal, a student must submit a paper based upon some aspect of it. Before defending the final dissertation, a student must submit a paper based on the results from its formal study (not just the pilot study from the proposal).

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.