

# Ph.D., Information Technology

The Information Technology PhD program emphasizes the particular aspects of technology located in the Northern Virginia Technology Corridor and around the globe. Our focus on the science, engineering, and technology of information processing complements and enhances traditional approaches to engineering that are more strongly based on the physical and material sciences. The Information Technology PhD program is broad, and includes several specific concentrations. Students may also pursue such doctoral studies without designating a concentration.

Students may designate a concentration in information sciences and technology. In that case, the transcript of the graduating student would be “PhD in IT with Concentration in Information Sciences and Technology”.

## Mason Research Interests in Information Sciences and Technology

Information Sciences and Technology is a rich topic area for interdisciplinary research as, increasingly, every area of human endeavor comes to rely on ubiquitous access to information (as opposed to mere data), including medicine, defense, education, transportation, shipping, agriculture, manufacturing, and virtually all areas of advanced research. Research activity in the IST field is communicated via conferences held by organizations including the ACM and IEEE, and in publications such as IEEE Transactions on Knowledge and Data Engineering, Network Sciences and Sybersecurity [Springer], International Journal of Intelligent Defense Support Systems [Inderscience], Computers in Human Behavior [Elsevier], Information Systems Frontiers [Springer], and ACM Transactions. Major funding sources for research in this field include the National Science Foundation, National Institutes of Health, Department of Homeland Security, Department of Defense, Sandia Labs, etc.

The PhD in IT with a Concentration in IST focuses on the following three areas:

- Cyber Security
- Cognitive Assistants
- Cyber-Human Systems

### Cyber Security

The PhD program in IT provides students interested in pursuing research in Cyber Security with opportunities to work closely with research faculty in the Department of Information Sciences and Technology and at the Center for Secure Information Systems. Students will participate in cutting-edge

research programs addressing the most complex security challenges that our society is facing today, and will have access to state of the art labs and computing facilities.

### Cognitive Assistants

Students interested in pursuing this research area will explore how Humans and Cognitive Assistants can synergistically integrate their creativity and computational power in a mixed-initiative interaction environment. Rapid development of cognitive assistants in various domains will stimulate the knowledge revolution of this century. Moreover, the process will continue to expand from the individual to the communities of interest, grouping complementary expertise in innovative ways to solve complex problems in various domains, from intelligence, data analytics to education.

### Cyber-Human Systems

In the Cyber-Human Systems (CHS) concentration, students will learn how the analysis of information extracted from both offline and online environments help understand and address the fundamental challenges existing in the interaction between technology and humans. Cyber-Human Systems focus on the design, analysis and evaluation of technological solutions that augment the capabilities of individuals, society and organizations. These novel solutions aim at leveraging diverse big data sources, representing and incorporating knowledge of human behavior to design systems, and improving the human performance and experience with technology, especially for applications involving social good, healthcare, and education fields.

## Requirements

Students seeking this concentration must satisfy all the requirements for the PhD in Information Technology. In addition, the following requirements must be met.

### Plan of Study

All decisions concerning the student's course requirements and plan of study must be approved by the student's academic/dissertation advisor or IST program director with the consent of the Senior Associate Dean.

### Qualifying Examinations

To satisfy the breadth requirement for the PhD degree, each student must pass a set of four qualifying examinations designed to test a student's fundamental knowledge with at least three exams offered by the IST department. The qualifying exams for the Information Sciences and Technology concentration are:

1. [Algorithms Essentials](#)
2. [Communications and Network Security](#)
3. [Cyber-Human Systems](#)
4. [Database Systems](#)
5. [Information Platforms Operating Principles](#)
6. Any qualifying exam offered by a VSE unit (IST or other)

### Advanced Emphasis Requirement

Assuming a 30 credits reduction for completion of a prior Master's Degree, and excluding any courses taken to prepare for the Qualifying Exams, a student's plan of study must include 18 credit hours. Of the 18, 12 credits must be in courses numbered 700 or higher, and these 12 credits cannot include directed reading, project, or thesis courses. Please visit the [PhD in IT section in the GMU Catalog](#) for more information on approved courses.

For more information visit: <http://catalog.gmu.edu/colleges-schools/engineering/information-technology-phd/#requirements>