

Rensselaer Polytechnic Institute

Master of Science
Information Technology



ITWS Advanced Professional
Studies (APS)

April 2015

Overview

Rensselaer's Master of Science in Information Technology balances the study of management strategies and technology leadership with advanced course work in an IT concentration. For the Advanced Professional Studies (APS) degree, students complete a suite of Core and Capstone courses, and also select three courses to complete their Concentrations.

The concentrations that are available are:

- Data Science and Analytics
- Web Science

Curriculum

Students admitted to the M.S. in IT develop an approved plan of study that includes the following:

- Ten courses in IT (A minimum of thirty credits)
- A minimum of six courses (eighteen or more credits) at the 6000 graduate level
- Five Core courses in Information Technology (IT Core)
- A minimum of three courses (nine credit hours or more) in a Concentration
- One elective approved by the advisor to add further breadth or depth to the degree
- ITWS-6800 Information Technology Master's Capstone course

The Core and Concentration courses are designed to accommodate a wide range of backgrounds. If students have previously completed a basic required Core course, they then complete the next level required course to add depth in that Core area. For example, if an equivalent course to Database Systems was completed in a prior degree, the Core requirement could be satisfied by taking Enterprise Database Systems or Database Mining. Our goal is to bring students to the next level of IT expertise.

The M.S. in IT Capstone course integrates the knowledge and professional practice of IT Core and Concentration courses. Topics in database systems, networking, data analytics, software design and engineering, management of technology, human computer interaction, and ethics are applied within a framework of global e-business strategy. The course utilizes an Information Technology Team Project with a real organization to practice the major concepts of the IT Degree. Team members select, develop, and present a significant technology implementation project, incorporating strategy, systems development and business planning.

Transfer credit is not expected to fulfill Core or Concentration requirements. Students can waive an IT core area requirement and substitute an approved elective only if they have already taken the equivalent of all listed core courses. Students may request transfer credit for the elective, subject to advisor approval. Additionally, no more than half of all credits used towards the M.S. in IT degree may be taken from courses offered by the Lally School of Management and Technology. These courses are coded MGMT.

Core Courses

To acquire a breadth of IT experience, master's degree students take the five Core courses listed below. If students have previously completed a Core course at Rensselaer or elsewhere, they fulfill the Core requirement by taking an advanced course in that area.

Required Core Courses

IT Core Area	Course Number	Course Title	Term(s) Offered
Database Systems	CSCI-4380	Database Systems	Spring
Data Analytics	ITWS-6350	Data Science	Fall
Software Design and Engineering	CSCI-4440	Software Design and Documentation	Fall/Spring
	ITWS-6700	Software Development	Fall
Management of Technology	ITWS-6300	Business Issues for Engineers and Scientists	Fall/Spring
Human Computer Interaction	COMM-6420	Foundations of HCI Usability	Fall

Advanced Core options for students who have previously completed a Core Course

IT Core Area	Course Number	Course Title	Term(s) Offered
Database Systems	CSCI-6390	Database Mining	Fall
	ITWS-6350	Data Science	Fall
Data Analytics	CSCI-6390	Database Mining	Fall
	ITWS-6400	X-Informatics	Spring
	ITWX-6600	Data Analytics	Spring
Software Design and Engineering	CSCI-6500	Distributed Computing Over the Internet	Spring
	ITWS-6400	X-informatics	Spring
Management of Technology	MGMT-6080	Networks, Innovation and Value Creation	Spring
	MGMT-6140	Information Systems for Management	Spring
Human Computer Interaction	COMM-6620	Information Architecture	Spring
	COMM-6760	User-Experience Design	Fall
	COMM-696X	Interactive Data Visualization	Summer

Required

Master's Capstone	ITWS-6800	Information Technology Master's Capstone (Professional Track Only)	Fall/Spring
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Admissions Requirements

Applicants are expected to have prior academic records that indicate their ability to excel in advanced coursework. Prospective students should also have completed the equivalent to the following three Rensselaer courses prior to enrollment:

- CSCI-1100 Computer Science I (Fundamentals of Computer Science) – Number systems; basic computer architecture; stepwise refinement of algorithms; functions and parameter passing; basic programming concepts through two-dimensional arrays and pointer basics using C++.
- CSCI-1200 Data Structures – Pointers; classes; operator overloading; deep vs. shallow copy constructors; inheritance; file I/O; templates in C++, introductory algorithm analysis and data structures.
- CSCI-2300 Introduction to Algorithms – Topics including mathematical induction and its application to algorithm design; linear structures; trees and balanced trees; heaps and priority queues; graphs and graph algorithms; backtracking, divide-and-conquer and greedy algorithms.

Either the PPI (Personal Potential Index) or the GRE (Graduate Record Examination); and a resume are required of all applicants.

APS Concentrations

The IT faculty designed the IT Concentrations to provide an in-depth, leading-edge experience in the application of information technology. Students often select areas that complement their prior backgrounds. At this time, two concentrations are offered: Data Science and Analytics and Web Science.

NOTES:

- Courses taken to complete a Core requirement do not count towards the Concentration.
- Students must have the prerequisites knowledge for each course as described in the university catalog: <http://www.rpi.edu/academics/catalog/index.html>

Concentration	Course Number	Course Name	Term(s) Offered
DATA SCIENCE AND ANALYTICS	Data and Information analytics extends analysis (descriptive and predictive models to obtain knowledge from data) by using insight from analyses to recommend action or to guide and communicate decision-making. Thus, analytics is not so much concerned with individual analyses or analysis steps, but with an entire methodology. Key topics include: advanced statistical computing theory, multivariate analysis, and application of computer science courses such as data mining and machine learning and change detection by uncovering unexpected patterns in data.		
	Select two or three of the following courses:		
	ITWS-6350	Data Science	Fall
	ITWS-6400	X-Informatics	Spring
	ITWS-6600	Data Analytics	Spring
	ISYE-6180/ISYE-696X	Knowledge Discovery with Data Mining/ Big Data Analytics	Spring
	If only two of the above were chosen, select one more of the following courses:		
	COMM-6620	Information Architecture	Spring
	CSCI-4020	Computer Algorithms	Spring
	CSCI-4150	Introduction to AI	Fall
	CSCI-4220	Network Programming	Spring
	CSCI-4320/ CSCI-6360	Parallel Programming/ Parallel Computing	Spring
	CSCI-6100	Machine Learning	Fall
	CSCI-6270	Computational Vision	Fall
	CSCI-6390	Database Mining	Fall
	CSCI-696X	Foundations of Data Science	Spring
	ISYE-4220	Optimization Algorithms and Applications	Fall
	ISYE-4670	Mathematical Statistics	Spring
	ISYE-4810	Computational Intelligence	Spring
	ITWS-696X	Data and Society	Spring
	MGMT-6100	Statistics and Operations Management	Summer
	MGMT-696X	Technology Fundamentals for Business Analytics	Fall
MGMT-696X	Predictive Analytics Using Social Media	Spring	

Concentration	Course Number	Course Name	Term(s) Offered
WEB SCIENCE	<p>The study of Web Science gives students insights into understanding what the web is and how to engineer its future and ensure its social benefit. The new Web Science concentration contains courses focused on one of the most powerful research, social and commercial technologies of our time.</p>		
	<p>The leader of the concentration is Dr. James Hendler, an internationally renowned figure in Web research and one of the pioneers of the Semantic Web. Along with colleagues Dr. Peter Fox and Dr. Deborah McGuinness, Dr. Hendler is working on research to advance scientific discovery and innovation by enabling rapid and easy collaboration between scientists, educators, students, policy makers, and even "citizen scientists" around the world wide web. They have created an innovative set of courses that focus on new trends in eScience and new technologies for the World Wide Web.</p>		
	<p>IT professionals who complete this concentration can apply their knowledge to careers in web-based businesses, web-based startup companies, or to playing the role of innovators in their organizations' use of the web.</p>		
	<p>Select two of the following courses:</p>		
	ITWS-696X	Advanced Web Science	Spring
	ITWS-696x	Web Science Systems Development	Spring
	ITWS-6400	X-Informatics	Spring
	COMM-4580	Advertising and Culture	Fall
	COMM-4690	Interface Design: Hypermedia Theory and Application	Spring
	COMM-6270	Digital Rhetoric	Fall
	COMM-6480	Theory and Research in Technical Communication and HCI	Fall
	COMM-6510	Communication Theory	Fall
	COMM-6620	Information Architecture	Spring
	COMM-6760	User-Experience Design	Fall
	COMM-696X	Interactive Data Visualization	Summer
	CSCI-4220	Network Programming	Spring
	MGMT-6720	Internet Marketing	Spring
	<p>Optional Data Course, select only one:</p>		
	CSCI-6100	Machine Learning	Fall
	ITWS-6350	Data Science	Fall
ITWS-6600	Data Analytics	Spring	
ISYE-6180/ISYE-696X	Knowledge Discovery with Data Mining/ Big Data Analytics	Spring	