

Carnegie Mellon University HeinzCollege

INFORMATION SYSTEMS • PUBLIC POLICY • MANAGEMENT

MSIT
Program
Handbook

2013-2014

Master of Science in Information Technology

- Information Technology Management
- Information Security and Assurance
- Business Intelligence and Data Analytics
- Software Design and Management
- Customized Partner Programs:
 - *General Motors – Information Systems Management*
 - *General Motors – Software Engineering*
 - *Tec de Monterrey – Information Technology Management*
 - *SCS and SEI – Software Engineering Management*

Ramayya Krishnan, Dean
Andrew Wasser, Associate Dean
Michael D. Smith, Faculty Chair
Allison Frankoski, Program Director

Table of Contents

1	COLLEGE and PROGRAM HANDBOOKS.....	3
2	MSIT PROGRAM OVERVIEW	3
3	MSIT PROGRAM SPECIFIC POLICIES	4
3.1	Graduation Requirements	4
3.2	Part-time Course Load	4
3.3	Exemption and Transfer Credit.....	5
3.4	Elective Options	5
3.5	Java Programming Prep Course (it's free!)	6
4	MSIT CURRICULUM.....	6
4.1	Information Technology Management Track	6
4.2	Information Security and Assurance Track	7
4.3	Business Intelligence and Data Analytics Track	7
4.4	Software Design and Management Track.....	7
4.5	Customized Partner Programs	8
4.5.1	General Motors Information Systems Management (MSIT-ISM admitted before Fall 2009)	8
4.5.2	General Motors Information Systems Management (MSIT-ISM effective Fall 2009)	8
4.5.3	General Motors Software Engineering (MSIT-DIS aka MSIT-SE effective Fall 2009)	9
4.5.4	Dual degree with Tec de Monterrey (MSIT-MATI).....	10
4.5.5	MSIT-Software Engineering Management (MSIT-SEM)	10

MSIT PROGRAM HANDBOOK

1 COLLEGE AND PROGRAM HANDBOOKS

This program handbook provides specific information on the curriculum and program requirements for the Master of Science in Information Technology (MSIT) degrees administered by the H. John Heinz III College of Carnegie Mellon University. The Heinz College also publishes a separate Student Handbook which details College-wide policies and procedures pertaining to educational planning, program committee, teaching, scheduling and course credit, performance standards, academic standing, ethics and discipline, student privacy rights and major forms and deadlines. Therefore, students should familiarize themselves with **both** handbooks as they include information that is critical for your success. Both handbooks can be obtained through your Program Director and via the Heinz College website at:

<http://www.heinz.cmu.edu/academic-resources/student-handbook-forms/index.aspx>.

2 MSIT PROGRAM OVERVIEW

The MSIT program is designed for the experienced IT and/or analytics professional. Its flexible curriculum and part-time study with evening and distance class formats allow adult students to complete this graduate degree while maintaining their full-time employment. Students are allowed to choose a course load each semester that best suits their personal/work situation. Most part-time MSIT students take 1-2 courses each semester and are able to complete the program in 2-3 years. However, you have up to five years to finish the program and may extend up to seven years for extenuating circumstances or extended leaves of absence.

The MSIT program offers four degrees of study:

- MSIT-Information Technology Management - evening (MSIT-ITM) or distance MSIT-(IMD)
- MSIT-Information Security & Assurance - evening (MSIT-ITA) or distance (MSIT-DIA)
- MSIT-Business Intelligence & Data Analytics – evening (MSIT-BI) or distance (MSIT-DBI)
- MSIT-Software Design & Management - evening only (MSIT-ITD)

Each degree requires completion of 60 units of core courses and 84 units of elective coursework. Of those 84 units, up to 12 units may be an independent study related to the selected track and up to 24 units may be transfer credit from previous graduate coursework.

Electives may be chosen from the list of 95-xxx Information Systems Management department courses. In addition, graduate-level courses offered by other Heinz College programs or CMU departments may qualify as electives, subject to pre-approval from your Program Director.

We also offer customized programs for some corporate (General Motors) and educational (Tec de Monterrey) partners, which are variations of the above tracks of study, program format and curriculum distribution as noted in their respective sections of this handbook.

3 MSIT PROGRAM SPECIFIC POLICIES

The Master of Science in Information Technology (MSIT) program abides by the policies of the Heinz College as outlined in the Heinz College Student Handbook. Here are some specific requirements or modifications that are important to MSIT students:

3.1 *Graduation Requirements*

A student will be certified for graduation from the MSIT program when they have satisfied the following:

- Earned 144 units of course credit (*including approved transfer credit*);
- Successfully passed all required core courses (*with a C- or better, or earned an exemption*);
- And achieved a minimum cumulative grade point average (GPA) of 3.0.

Most part-time MSIT students can complete their degree in two to three years. However, you have up to five years to finish the program (from the semester in which the student was first admitted). After five years, a student may petition to extend this to seven years if the delay was due to extenuating circumstances or extended leave(s) of absence that prevented the student from completing the degree within five years. Contact your Program Director during your fifth year to discuss a plan for completion. Otherwise, the student may need to reapply for admission to the program and/or retake any core course that has changed significantly.

3.2 *Part-time Course Load*

A full-semester course carries 12 units of credit and generally expects 12 hours for your time and effort per week on average, including 3 hours of lecture per week. “Mini” courses are half a semester in length; they generally carry 6 units of credit, and also require approximately 12 hours per week of your time. Part-time student should use this as a guide to determine how much coursework they can manage on top of their other work and personal commitments.

Part-time students can take up to 30 units maximum per semester, although most find 12-18 units a more manageable load. You may petition the Program Director or Associate Dean to exceed 30 units if you have extenuating circumstances that require a heavier course load and your demonstrated academic performance shows you can handle the extra workload. International students are prohibited from exceeding 30 units due to student visa regulations. Ideally, students who wish to enroll on a full-time basis (over 30 units) should transfer to one of the full-time programs instead.

Students can change their schedules without penalty up until the official Add/Drop deadline for the class, which is typically the first two weeks of a semester-long class and just the first week of

each mini-semester class. Any schedule changes after that must be due to extenuating circumstances and be approved by the Program Director. Please contact the Program Director to discuss your situation.

If you are making good progress in a class but extenuating circumstances beyond your control will prevent you from completing all requirements for a course by the end of the semester, ask the instructor for permission to take an incomplete or "I" grade. If the instructor agrees (and he or she may refuse), you and the instructor must sign a formal contract before the end of the class detailing the plan for completion, including a default final grade if the remaining work is not done. The incomplete work must be done no later than the end of the subsequent semester.

Part-time students are also permitted to take a semester or more off from classes. Just submit a Leave of Absence form to your Program Director, ideally one week before the first day of the semester. When you are ready to return, submit the Petition to Return from Leave to your Program Director before the first day of the semester. Both forms can be downloaded from the registrar's website: www.cmu.edu/hub.

3.3 *Exemption and Transfer Credit*

MSIT students may pursue exemptions from core courses if you have already acquired all or most of the skills taught in that course outside of the College. To receive an exemption, you must either take a qualifying exam or petition the instructor of the relevant course. The procedures are outlined in the College handbook. Please note you do not earn credit for an exemption, therefore, you must substitute an elective to make up the units. An exemption does mean you have satisfied completion of that core course for purposes of graduation.

In general, the Heinz College full-time programs do not give credit toward graduation for graduate courses taken prior to admission. However, the **MSIT program will consider up to 24 units of relevant transfer credit** to count towards your MSIT elective requirements. This is decided on a case-by-case basis, and depends on a number of factors, such as when and where the coursework was completed, the subject in which it was taken, and the grade that was earned. Minimum criteria typically include that it was earned within the last 10 years at a regionally accredited university with a grade of B or better. The grade will not be calculated into your CMU grade point average but the units will be counted towards MSIT elective requirements. Discuss this previous graduate work with your Program Director upon admission and be sure to get your Application for Transfer Credit submitted during your first year of enrollment.

3.4 *Elective Options*

You are permitted up to 12 units of Independent Study as an elective, except for our sponsored students from General Motors and Tec de Monterrey. Contact the Program Director for guidelines on developing an appropriate independent study.

You can take up to 12 units of elective coursework as Pass/Fail grade, except for our sponsored students from General Motors and Tec de Monterrey.

You may take graduate coursework from other CMU departments but you must get approval in advance from the Program Director before registering for that class, except for our sponsored students from General Motors and Tec de Monterrey.

Courses at other universities fall under the transfer credit policy for MSIT and generally must be done prior to admission. Any exceptions require a petition to the Program Director **before** taking the non-CMU course or must have been pre-approved as part of a custom curriculum for one of our partner programs (like GM or Tec de Monterrey.)

3.5 Java Programming Prep Course (it's free!)

Our MSIT programs typically expect students have had an undergraduate level object-oriented programming course or equivalent work experience. This background is especially important to have before taking our programming classes, 95-712 or 95-807. Anyone lacking that background or wanting a refresher should review the free online course, 95-815 Programming Basics in Java, at <http://www.andrew.cmu.edu/course/95-815/>.

This self-directed tutorial is available online anytime - no need to register. Online resources include about 6-8 hours of narrated slides with built-in pop quizzes, recommended readings, practice labs, and tests with answers keys to check your own work. There is no instructor or grading - students can utilize as much or as little of the materials as they so choose.

4 MSIT CURRICULUM

4.1 Information Technology Management Track

This track can be done on-campus/evening or through distance learning.

Evening students may need to take an occasional core course in distance mode ^(D) if the instructor only teaches during the daytime, or they can take the daytime class if their schedule permits.

95-703*	Database Management	12 units
95-712**	Object Oriented Programming in Java	12 units
95-706	Object-Oriented Analysis and Design	6 units
95-705	Telecommunications Management	12 units
95-730 ^(D)	E-business Technology and Management	12 units
95-808***	IT Project Management	6 units
Various	Electives	84 units

* 90-746 can be substituted for 95-703

** 95-807 ^D is substituted for 95-712 in the distance program; evenings students may take either one but 95-712 is recommended if you intend to take other technical electives.

*** 91-821 or 94-813 can be substituted for 95-808

4.2 Information Security and Assurance Track

This track can be done on-campus/evening or through distance learning.

Evening students may need to take an occasional core course in distance mode ^(D) if the instructor only teaches during the daytime, or they can take the daytime class if their schedule permits.

95-752	Intro to Information Security Management	12 units
95-705	Telecommunications Management	12 units
94-806* ^(D)	Privacy in the Digital Age	6 units
95-756	Information Security Risk Analysis	6 units
95-761*	Cybersecurity in Critical Infrastructure Protection	6 units
95-753	Internet Security	6 units
95-769**	Network Security Analysis	12 units
Various	Electives	84 units

* 94-806 replaces 95-710 Econ and 95-761 replaces 95-757. Students admitted before Fall 2013 can continue with their original plan or adopt one or both of these new core.

** 95-855 Network Situational Awareness can be substituted for 95-769.

4.3 Business Intelligence and Data Analytics Track

This new degree launched January 2014 and can be done on-campus/evening or through distance learning. *Evening students may need to take an occasional core course in distance mode ^(D) if the instructor only teaches during the daytime, or they can take the daytime class if their schedule permits.*

95-703	Database Management	12 units
95-710	Economic Analysis	6 units
95-796	Statistics for IT Managers	6 units
94-806 ^(D)	Privacy in the Digital Age	6 units
95-797	Data Warehousing	6 units
95-868 ^(D)	Exploring and Visualizing Data (using R)	6 units
95-791	Data Mining	6 units
95-852 ^(D)	Applied Data Science	6 units
95-866 ^(D)	Advanced Business Analytics (capstone class)	6 units
Various	Electives	84 units

4.4 Software Design and Management Track

This track is in conjunction with the School of Computer Science and can be done on-campus/evening only although some courses can be done through distance learning.

95-771	Data Structures and Algorithms	12 units
--------	--------------------------------	----------

17-653	Managing Software Development	12 units
17-655	Architecture of Software Systems	12 units
95-703*	Database Management	12 units
95-808**	IT Project Management	6 units
95-706***	Object-Oriented Analysis and Design	6 units
Various	Electives	84 units

* 90-746 can be substituted for 95-703

** 91-821 or 94-813 can be substituted for 95-808

*** The programming requirement for admission to this track satisfies the 95-712 prerequisite for 95-706 and any other course that has 95-712 as a prerequisite.

4.5 Customized Partner Programs

All Heinz College and MSIT policies may apply unless otherwise modified in the curriculum distribution listed here and/or in the educational partnership agreement/contract.

4.5.1 General Motors Information Systems Management (MSIT-ISM admitted before Fall 2009)

95-703	Database Management	12 units/4 credits
95-807	Object Oriented Programming	12 units/4 credits
95-705	Telecommunications Management	12 units/4 credits
95-730	E-business Technology and Management	12 units/4 credits
95-833	Global IT Management and Sourcing	12 units/4 credits
95-834	Managing IT Systems Development	12 units/4 credits
95-720	Information Systems Project	24 units/8 credits
Various*	Electives (pick 4)	48 units/16 credits

* At least one elective must be either 95-752 or 95-704 from CMU. The remaining three electives can include other CMU electives (95-xxx or 17-xxx), pre-approved electives offered by other GM TEP partner universities, and/or completion of the IT Skills for Success certificate from GMU/Learning Tree (specifically course G250 Case Study in Infrastructure Integration leading to the IT Management Certified Professional certificate.) GM students grandfathered under this plan of study are allowed 3 of the 4 electives to be non-CMU courses (or up to 36 units/12 credits of transfer credit).

4.5.2 General Motors Information Systems Management (MSIT-ISM effective Fall 2009)

95-703	Database Management	12 units/4 credits
95-807	Object Oriented Programming	12 units/4 credits

95-705	Telecommunications Management	12 units/4 credits
95-730	E-business Technology and Management	12 units/4 credits
95-833	Global IT Management and Sourcing	12 units/4 credits
95-834*	Managing IT Systems Development	12 units/4 credits
17-653	Managing Software Development	12 units/4 credits
17-655**	Architecture of Software Systems	12 units/4 credits
95-720	Information Systems Project	24 units/8 credits
Various**	*Electives (pick 2)	24 units/8 credits

* 95-834 was replaced by and can be substituted with 95-831 Enterprise Architectures AND 95-872 Art and Science of Business Analytics effective Spring 2014.

** 17-638 can be substituted for 17-655. This is a 6 unit/2 credit, less programming intensive Architectures course so you will need to add an additional 6 units/2 credits of elective to make up the difference.

*** Includes CMU 95-xxx electives and pre-approved electives offered by other GM TEP partner universities. Credit will no longer be given for completion of the IT Skills for Success certificate from GMU/Learning Tree (specifically course G250 Case Study in Infrastructure Integration leading to the IT Management Certified Professional certificate) for students admitted after Summer 2010.

4.5.3 General Motors Software Engineering (MSIT-DIS aka MSIT-SE effective Fall 2009)

This program requires experience in programming and software development as a prerequisite to apply. Therefore students admitted to this track have essentially earned an exemption from 95-807 and can disregard if they see 95-807 as a prerequisite for any required course in the curriculum below:

17-651	Models of Software Systems	12 units/4 credits
17-652	Methods: Deciding What to Design	12 units/4 credits
17-653	Managing Software Development	12 units/4 credits
17-654	Analysis of Software Artifacts	12 units/4 credits
17-655	Architecture of Software Systems	12 units/4 credits
95-703	Database Management	12 units/4 credits
95-705	Telecommunications Management	12 units/4 credits
95-730	E-business Technology and Management	12 units/4 credits
95-720	Information Systems Project	24 units/8 credits
Various*	Electives (pick 2)	24 units/8 credits

* Can include CMU electives (95-xxx) and pre-approved electives offered by other GM TEP partner universities.

4.5.4 Dual degree with Tec de Monterrey (MSIT-MATI)

This dual degree distance program with Instituto Tecnológico y de Estudios Superiores de Monterrey, México (ITESM) requires students to complete 96 units from each university by following a prescribed plan of study with their cohort. ITESM will transfer all 96 units of MSIT credit towards their MATI degree; Heinz College will transfer 48 units of ITESM credit to count towards completion of the MSIT degree. Therefore, you can't earn one degree without completion of the other. There are also no course exemptions, electives or independent study allowed in this program.

The MSIT-MATI dual degree program requires successful completion of the following 96 units of MSIT coursework plus completion of ITESM's MATI degree:

95-805	Business Communications	6 units
95-833	Global IT Management and Sourcing	12 units
95-703	Database Management	12 units
95-710	Economic Analysis	6 units
95-808	IT Project Management	6 units
95-810*	Managing in a Virtual Environment	6 units
95-705	Telecommunications Management	12 units
95-796	Statistics for IT Managers	6 units
95-797	Data Warehousing	6 units
95-760	Decision Making Under Uncertainty	6 units
95-831**	Enterprise Architectures	6 units
95-722	Digital Transformation	6 units
95-774	Business Process Modeling	6 units

* 95-810 is being replaced by 95-872 effective with the 2013 cohort.

** 95-859 Innovation & Technology was substituted for 95-831 in 2011 and 2012 while 95-831 was under redevelopment.

4.5.5 MSIT-Software Engineering Management (MSIT-SEM)

This joint degree with the School of Computer Science and Software Engineering Institute stopped admitting new candidates in 2011 and will be defunct when the last candidate graduates in 2015 after successful completion of the following 150 units of graduate coursework plus completion of eight SEI training classes:

17-652	Methods: Deciding What to Design	12 units
17-653	Managing Software Development	12 units
17-655	Architecture of Software Systems	12 units

95-710	Economic Analysis	6 units
95-715	Financial Accounting	6 units
95-722	Digital Transformation	6 units
95-796	Statistics for IT Managers	6 units
95-810	Managing in a Virtual Environment	6 units
94-800	Negotiation (formerly 95-790)	6 units
17-677	Practicum for Software Engineering I & II	42 units
Various*	Electives	36 units
SEI**	SEI Training (pick 8)	

* Electives can be chosen from other distance courses offered by the School of Computer Science and Heinz College MSIT programs, up to 12 units of independent study, or up to 24 units of transfer credit from previous graduate credit earned in the last 10 years.

** If you have completed any SEI classes within 6 years prior to admission to MSIT-SEM, you can request them to count towards satisfying the SEI Training requirement.